

**UNIVERSITY OF HEALTH AND ALLIED SCIENCES  
SCHOOL OF ALLIED HEALTH SCIENCES**



**PREVALENCE OF INTESTINAL PARASITIC INFECTIONS AND  
ASSOCIATED RISK FACTORS AMONG PRIMARY SCHOOL CHILDREN IN  
THE ADAKLU DISTRICT, VOLTA REGION, GHANA.**

**A PROJECT RESEARCH PROPOSAL**

**BY:**

**BEDZINA ISRAEL  
(UHAS20174828)**

**&**

**AADAARYEB BENJAMIN  
(UHAS20174006)**

**DEPARTMENT OF MEDICAL LABORATORY SCIENCES**

**OCTOBER, 2020**



**RESEARCH OPERATIONS OFFICE  
INSTITUTE OF HEALTH RESEARCH  
UNIVERSITY OF HEALTH AND ALLIED SCIENCES  
RESEARCH ETHICS COMMITTEE (REC)  
NEW PROTOCOL SUBMISSION FORM**



---

**Requirements:**

1. A new protocol must be submitted to the REC **at least three months before** the proposed commencement date of the research.
  2. All sections of this form must be completed before protocol can be considered for review.
  3. A soft copy of proposal and other documentations should also be emailed to [rec@uhas.edu.gh](mailto:rec@uhas.edu.gh)
- 

**Section 1 – BACKGROUND INFORMATION**

1.1 Title of Study:	Prevalence of intestinal parasitic infections and associated risk factors among primary school children in the Adaklu district, Volta Region, Ghana.
---------------------	--

**1.2 Principal Investigators (PI)**

a. Full name:( <i>Surname First, Title, Qualification</i> )	Bedzina Israel, Mr. Student
b. Postal Address:	PMB 31, Ho, Volta Region
c. Institutional Affiliation:	Dept. Of Medical Lab. Sciences, School Of Allied Health Science, University of Health and Allied Sciences
d. Phone Number:	0556883987/0501625894
e. Email Address:	<a href="mailto:israelbedzina@gmail.com">israelbedzina@gmail.com</a>

Principal Investigator 2 (PI)

a. Full name: (Surname First, Title, Qualification)	Aadaaryeb Benjamin, Mr. student
b. Postal Address:	PMB 31, Ho, Volta Region
c. Institutional Affiliation:	Dept. of medical lab. sciences, school of allied health science, University of health and allied sciences
d. Phone Number:	0554413799/0501625897
e. Email Address:	<a href="mailto:bzhyon5@gmail.com">bzhyon5@gmail.com</a>

1.3 Co-Investigator(s)

First Co-Investigator

a. Name of 1st Co-Investigator: (Surname First, Title, Qualifications)	Squire, Daniel Sai, PhD
b. Postal Address:	PMB 31, Ho, Volta Region
c. Institutional Affiliation:	Dept. of medical lab. sciences, school of allied health science, University of health and allied sciences
d. Phone Number:	0542401448
e. Email Address:	dsquire@uhas.edu.gh

Second Co-Investigator (if applicable)

a. Name of 2 <sup>nd</sup> Co-Investigator (Surname First, Title, Qualifications)	
b. Postal Address:	
c. Institutional Affiliation:	
d. Phone Number:	
e. Email Address:	

#### 1.4 Proposed Study/Research Information

a. Type of Proposal	<input checked="" type="checkbox"/> Student Research Application/Faculty <input type="checkbox"/> Grant <input type="checkbox"/> Research
b. Student Status (for student applicants only)	<input checked="" type="checkbox"/> Undergraduate PhD <input type="checkbox"/> Masters <input type="checkbox"/>
c. Type of Research/Study:	<input type="checkbox"/> Clinical Trial <input checked="" type="checkbox"/> Biomedical Epidemiology Study <input type="checkbox"/> Others (specify)
d. Location of Research/Study: (Region, District, Towns)	Volta Region, Ho Municipal, Ho.
e. Duration of Research/Study:	Study Start Date: OCTOBER, 2020 End Date: MARCH 2020
a. Source(s) of Funding: (Name, Postal Address and Email)	

### Section 2 – Outline of Protocol

#### 1. COVER PAGE

#### 2. STRUCTURED ABSTRACT (*1 page maximum and must not have references*)

- Background
- General Aim
- Methodology

- Expected Outcome (expected results or what you hope to achieve from study)

### **3. BACKGROUND (1-3 pages maximum)**

- Introduction
- Problem statement:
- Justification/Relevance
- Hypothesis (if applicable)
- Aim (s)
- Specific Objectives

### **4. LITERATURE REVIEW (5 pages maximum)**

### **5. METHODOLOGY (8 pages maximum)**

- Study Design
- Study Site
- Subject/Study Population
- Inclusion/Exclusion Criteria
- Sample Size Determination
- Procedures to be used (Data Collection methods and instruments)
- Data handling (May include coding, quality control, data security and confidentiality)
- Statistical Analysis

### **6. DISSEMINATION OF RESULTS**

- To Project sponsors and policy makers (where applicable)
- At workshops, seminars and conferences
- In different types of publications

### **7. ETHICAL ISSUES**

#### **A. For Human Subjects**

- 1) Consider Recruitment and sampling procedures, Potential risks and benefits, confidentiality.
- 2) For vulnerable subjects (children, pregnant women, institutionalized subjects), state how subjects' protection will be ensured.
- 3) Provide **Consent Form** with simple and clear language.

***B. For Vertebrate Animals***

- 1) Justification for use of animals
- 2) Housing and veterinary care
- 3) Processes to minimize discomfort
- 4) Euthanasia

**8. REFERENCES**

- Use APA Style. Must be consistent

**9. TIMELINES/WORK SCHEDULE/WORK PLAN**

- This is usually in the form of a Gantt chart (to show different activities versus time frames for expected completion).

**10. PERSONNEL OF THE STUDY TEAM INCLUDING PERCENTAGE EFFORT**

- Role of each member (Not applicable for students)

**11. BUDGET & BUDGET JUSTIFICATION**

- To be detailed even if no external funding is required.

**12. APPENDIX**

- **Consent Form** (UHAS-REC Consent form template available)
- **Assent Form and Parental Consent Form** (Only applicable where children of ages 12 to 17 would be recruited as research participants)

- **Data Collection Instruments** (e.g. Questionnaire, interview guide etc. if applicable)
- **Letters of Support** (if applicable)
- **Principal Investigator's CV** (not applicable to students, for students, supervisor's CV is required)
- **Prior Scientific Review:** (Attach Letter of Approval)
- **Prior Ethical and Protocol Review:** (Name any other Ethical and Protocol review board/committee this proposal has been submitted to and attach approval letter if applicable. In case of rejection, state reasons)
- **Collaborating Institutions:** (Attach Letter of Approval)
- Any other attachments

<b>Section 3 - SIGNATURE</b>
------------------------------

**NOTE:**

*As the **Principal Investigator / Co-investigator / Researcher** on this project, your signature on the proposal confirms that:*

- 1. You will ensure that all procedures performed under the study will be conducted in accordance with all relevant policies and regulations that govern research involving human participants.*
- 2. You understand that if there is any change from the project as originally approved you must submit an amendment to the REC for review and approval prior to its implementation. Where you fail to do so, the amended aspect of the study is invalid.*
- 3. You understand that you will report all serious adverse events associated with the study within seven days verbally and fourteen days in writing.*

4. *You understand that you will submit progress reports each year for review and renewal. Where you fail to do so, the REC is mandated to terminate the study upon expiry.*
5. *You agree that you will submit a final report to the REC at the end of the study.*

Name of person completing the form:

---

Role on the study:

---

Signature:

---

For all student projects:

---

Student Investigator

---

Date

---

Supervisors Signature

---

Date



**UNIVERSITY OF HEALTH AND ALLIED SCIENCES  
SCHOOL OF ALLIED HEALTH SCIENCES**



**PREVALENCE OF INTESTINAL PARASITIC INFECTIONS AND  
ASSOCIATED RISK FACTORS AMONG PRIMARY SCHOOL CHILDREN IN  
THE ADAKLU DISTRICT, VOLTA REGION, GHANA.**

**BY:**

**BEDZINA ISRAEL (UHAS20174828)**

**&**

**AADAARYEB BENJAMIN (UHAS20174006)**

**A PROJECT PROPOSAL SUBMITTED TO THE SCHOOL OF ALLIED  
HEALTH SCIENCES IN PARTIAL FULFILLMENT FOR THE AWARD OF  
BACHELOR OF MEDICAL LABORATORY SCIENCES**

**DEPARTMENT OF MEDICAL LABORATORY SCIENCES**

**OCTOBER, 2020**

## **DECLARATION**

We hereby declare that this research proposal is the result of our own original work and that no part of it has been presented for another degree in this university or elsewhere.

<b>NAMES</b>	<b>SIGNATURE</b>	<b>DATE</b>
<b>BEDZINA ISRAEL</b> <b>(UHAS20174828)</b>	.....	.....
<b>AADAARYEB BENJAMIN</b> <b>(UHAS20174006)</b>	.....	.....
<b>DR. DANIEL SAI SQUIRE</b> <b>(SUPERVISOR)</b>	.....	.....

## ABSTRACT

**Background:** *Intestinal parasitic infections (IPIs) in school children are a public health problem in most developing countries causing significant morbidity and mortality in underprivileged populations. Low standard living, unsafe drinking water, unawareness of health promoting behaviors, and poor personal hygiene are risk factors of intestinal parasite infection. Studies on IPI in different populations are important in order to develop strategies and plans to help eradicate this infection among school aged children.*

**General Aim:** *This study aims to determine the prevalence of intestinal parasitic infections and associated risk factors among primary school children in the Adaklu district, Volta Region, Ghana.*

**Methodology:** *196 primary school children will be recruited onto this study. Each participant will be administered a questionnaire for epidemiological data collection, and provided with a standard fecal vial container to collect faecal samples. Samples obtained will be processed using standard laboratory techniques; direct microscopy, formol-ether and formol-ether oocyst concentration technique for detection of ova, larvae, and cyst of intestinal parasites. Modified Zeihl-Nelson stain method will be used for the detection of cryptosporidium parvum and isospora belli. Semi-structured questionnaires will be administered to assess the risk factors and knowledge on intestinal parasite infection and deworming. Data will be summarized using Microsoft Office Excel 2019, IBM SPSS 25 will be used for data analysis; A p-value of  $<0.05$  shall be considered to be statistically significant.*

**Expected Outcome:** *At the end of the research, findings are expected to; determine the prevalence and risk factors associated with intestinal parasite infection among primary school children in the Adaklu district as well as help in health education as part of public health control programs for the district, especially for parents and teachers on preventive measures that can be taken to reduce the risk of exposure of parasitic infections to their children.*

## TABLE OF CONTENTS

<b>Contents</b>	<b>Page Number</b>
<b>DECLARATION.....</b>	<b>i</b>
<b>ABSTRACT.....</b>	<b>ii</b>
<b>TABLE OF CONTENTS.....</b>	<b>iii</b>
<b>LIST OF FIGURES.....</b>	<b>v</b>
<b>LIST OF ABBREVIATIONS.....</b>	<b>vi</b>
<b>CHAPTER ONE.....</b>	<b>1</b>
<b>1.0 INTRODUCTION.....</b>	<b>1</b>
<b>1.1 Background .....</b>	<b>1</b>
<b>1.2 Problem statement .....</b>	<b>2</b>
<b>1.3 Justification .....</b>	<b>2</b>
<b>1.4 Objective:.....</b>	<b>2</b>
<b>CHAPTER TWO.....</b>	<b>4</b>
<b>2.0 LITERATURE REVIEW.....</b>	<b>4</b>
<b>2.1 General overview .....</b>	<b>4</b>
<b>2.2 Intestinal parasite as a global burden .....</b>	<b>4</b>
<b>2.3 Prevalence and risk factors.....</b>	<b>5</b>
<b>2.4 Diagnosis of intestinal parasite infection .....</b>	<b>6</b>
<b>2.5 Control and treatment of intestinal parasite infection .....</b>	<b>7</b>
<b>CHAPTER THREE.....</b>	<b>8</b>
<b>3.0 METHODOLOGY.....</b>	<b>8</b>
<b>3.1 Study Design.....</b>	<b>8</b>
<b>3.2 Study Site.....</b>	<b>8</b>
<b>3.3 Inclusion Criteria.....</b>	<b>9</b>
<b>3.4 Exclusion Criteria .....</b>	<b>9</b>
<b>3.5 Sample Size Determination .....</b>	<b>10</b>
<b>3.6 Data Collection.....</b>	<b>10</b>
<b>3.7 Data Analysis.....</b>	<b>10</b>

<b>3.8 Laboratory Techniques</b> .....	10
<b>3.8.1 Sample Collection.</b> .....	10
3.8.2 Wet mount (Direct microscopy) .....	11
3.8.3 Formol - ether concentration method.....	11
3.8.4 Formol - ether oocyst concentration method .....	11
3.8.5 Modified Zeihl-Nelson stain method .....	12
<b>.3.9 Dissemination of Results</b> .....	12
<b>3.10 Ethical consideration</b> .....	12
<b>REFERENCES</b> .....	14
<b>WORK PLAN</b> .....	18
<b>BUDGET</b> .....	19
<b>APPENDICES I: PARENTAL CONSENT FORM</b> .....	20
<b>APPENDICES II: CHILD ASSENT FORM</b> .....	25
<b>APPENDIX III: QUESTIONNAIRE</b> .....	Error!

Bookmark not defined.

## LIST OF FIGURES

Figure 1.0 District map of Adaklu .....	9
---	---

## LIST OF ABBREVIATIONS

×g	Gravity
EPRC	Ethics Protocol Review Committee
g	Gram
IPIs	Intestinal Parasitic Infections
RCF	Relative Centrifugal Force
RPM	Revolutions per minute
SAHS	School of Allied Health Sciences
spp.	Species
UHAS	University of Health and Allied Science
WASH	Water, sanitation, and hygiene

## CHAPTER ONE

### 1.0 INTRODUCTION

#### 1.1 Background

Intestinal parasitic infection (IPI) is an infection of the gastrointestinal tract of human by parasites (Sitotaw et al., 2019). Intestinal parasitic infections among primary school children result in multiple effects which includes the physical and mental development of the children (Hailegebriel, 2017). Low standard living, unsafe drinking water, unawareness of health promoting behaviors, and poor personal hygiene are risk factors of intestinal parasite infection such as *Ascaris lumbricoides*, hookworm, protozoan and *Trichuris trichiura* leading to reduce physical health, decreased intellectual and cognition development in growing children (Matthys et al., 2011). According to WHO, an estimated one billion people suffer soil transmitted parasitic infection worldwide, of which school children forms the majority (Agbakoba et al., 2009). According to Gebretsadik et al., (2018) soil transmitted helminth infection is second leading cause of mortality in Africa among children of less than 6 years old.

A study conducted in India and Mexico showed a frequency of 71.8% and 57% respectively for prevalence of IPI among children with low economic status, large family size, low literacy rate of parents, and poor health status of children as associated risk factors for the prevalence of IPI (Mumtaz et al., 2009). Recent studies indicates that, poly-parasitized children have worse cognitive outcomes and also associated with high mortality rates hence susceptible to other infections (Gyang et al., 2019). Apart from IPI resulting in mortality and morbidity, some may causes asthma, diarrhea, nervousness, anemia and malabsorption hence low level of immunity (Zemene & Shiferaw, 2018).

Intestinal parasite infection are transmitted directly through contaminated hand and indirectly through food, utensils, and contaminated drinking water, but soil transmitted helminth is highly associated with open defecation near water bodies where children are at high risk due to their play habit and during water collection (Brown et al., 2013). A study by Forson Et al., (2018) outline some measures to reduce IPI among children which



includes improved personal hygiene habits, programs to elevate socioeconomic conditions and having knowledge on IPI . Studies on IPI in different populations are important in order to develop strategies and plans to help eradicate this infection among school aged children (Forson et al., 2018).

### **1.2 Problem statement**

According to WHO, an estimated one billion people suffer soil transmitted parasitic infection worldwide, of which school children forms the majority (Agbakoba et al., 2009). According to Gebretsadik et al., (2018) soil transmitted helminth infection is second leading cause of mortality in Africa among children of less than 6 years old.

In addition to the fact that intestinal parasitic infection is the second leading cause of mortality among school children in developing countries, it also contributes significantly to several health burden including stunted growth, physical weakness, low educational performance as well as other related health problems (Gelaw et al., 2013).

### **1.3 Justification**

Children are at high risk of intestinal parasitic infection due to their level of Immunity and mode of living (Gebretsadik et al., 2018). Although several studies have been conducted on the distribution, prevalence and risk factors associated with intestinal parasitic in Ghana (Cosmos & John, 2015; Forson et al., 2018), there are still several localities for which epidemiological information is not available. This study therefore seeks to determine the prevalence and assess the risk factors associated with intestinal parasitic infections among school children in selected primary schools in the Adaklu district, Volta region, Ghana.

### **1.4 Objective:**

This study aims at determining the prevalence of intestinal parasitic infections and associated risk factors among primary school children in the Adaklu district, Volta Region, Ghana.

#### **1.4.1 Specific objectives:**

- To determine the prevalence of intestinal parasites among primary school children in the Adaklu district.
- To assess the risk factors associated with intestinal parasitic infections among primary school children in the Adaklu district.
- To assess the knowledge of guardians in the Adaklu district on the importance of screening for intestinal parasites and deworming.
- To identify the association between socio-demographic determinants and intestinal parasitic infection among the study population.

## CHAPTER TWO

### 2.0 LITERATURE REVIEW

#### 2.1 General overview

Parasites are organisms that live in or on another organism (host) and obtain shelter, nourishment and other benefits from it and may frequently cause harm. Parasites that infect the gastro intestinal tract of human are referred to as intestinal parasites. These parasites may either have part or all of their life cycle occurring within the intestinal tract of human. However, other stages of their life cycle may occur in other organs such as the heart, lungs, in circulation and in tissues (Ali, 2016). They may also occur in other animals nearby (Ali, 2016).

Protozoa and helminthic parasites are the known common parasites that affect the gastrointestinal cavity (Hailegebriel, 2017). Intestinal parasites such as *A. lumbricoides*, *T. trichiura* and hookworm are the most prevalent and affect about one-sixth of the world population (Hailegebriel, 2017). A study conducted indicated that *A. lumbricoides* is the main cause of about 1.2 billion infections globally while *T. trichiura* and hookworm infection result in about 795 million and 740 million, respectively. Among the protozoan parasites, *Entamoeba histolytica* and *Giardia lamblia* are the most dominant cause of intestinal morbidity in children (Hailegebriel, 2017).

#### 2.2 Intestinal parasite as a global burden

Intestinal parasitic infection remains a major diseases of public health problem, especially in developing countries (Legesse & Erko, 2004). Regardless of the efforts made by the WHO and governments to eliminate, prevent and treat parasitic diseases, IPI remains a major health problem. IPI infects over 3.5 billion people worldwide every year among which 4.5 million exhibit clinical symptoms. Parasitic infections may be asymptomatic or extend to morbidity and mortality, depending on the nutrition and health status of affected individuals (Hemmati et al., 2017). People of all ages are affected by this cycle of prevalent parasitic infections; however, children are the worst affected (Mehraj et al., 2008). According to WHO, soil-transmitted helminths (STH) are the second leading

cause of mortality in Africa among children of less than 6 years of age (Gebretsadik et al., 2018). IPIs rarely cause death but because of the size of the problem, the global number of related deaths is substantial (Mehraj et al., 2008). Apart from the fact that IPIs cause significant mortality and morbidity, infection with intestinal parasites is also associated with growth retardation, iron deficiency anemia, physical weakness and low educational achievement among schoolchildren in endemic countries (Legesse & Erko, 2004). Furthermore, chronic intestinal parasitic infections have become the subject of speculation and investigation in relation to the spreading and severity of other infectious diseases of viral origin, tuberculosis and malaria (Legesse & Erko, 2004).

In addition, IPIs deprive the poorest of the poor of health, contributing to economic instability and social marginalization (Mehraj et al., 2008). Also, about 39 million disability adjusted life years (DALYs) are attributed to IPIs and these infectious thus represent a substantial economic burden (Mehraj et al., 2008).

### **2.3 Prevalence and risk factors**

Varied prevalence of IPIs among children in several geographical regions have been reported in previous studies. A study conducted in Tilili, northwest Ethiopia, reported overall prevalence of intestinal helminth infection among primary school children to be 44.2% (Abera & Nibret, 2014). The relatively higher prevalence was attributed to the poor adherence to practice of good hygiene such as proper hand washing after toilet, cutting of fingernails, etc. (Abera & Nibret, 2014).

A study conducted in a suburb in Accra observed an overall prevalence of 15.1% for intestinal parasites, which is lower than the 72.9–83.8% reported in Ethiopia (Forson et al., 2018). The differences in results may be due to varying environmental conditions or the ongoing yearly deworming program of under-fives employed by the Ghanaian Ministry of Health or the fact that access to basic sanitation facilities in Ethiopia, especially in rural areas, is quite poor with only 11% of the total population having access to sustainable sanitation, and less than 42% having access to a source of clean water (Nguyen et al., 2012).

A study conducted in an archetypal African urban slum in Nigeria among 384 school children reported a prevalence of 86.2% (Gyang et al., 2019). A significant risk factor for the increased prevalence was drinking of untreated water (Gyang et al., 2019). A prevalence of 64.7% was determined after studying a population of 252 school children in the capital of the Democratic Republic of Sao Tome and Principe in West Africa. This was attributed to poor sanitation and personal hygiene, (Liao et al., 2016). A prevalence of 49% was determined among school children in and around Amalapuram in India (Padmaja et al., 2014). This prevalence was attributed to low access to water and sanitation facilities among the school children (Padmaja et al., 2014). A similar study conducted among school children in Yemen showed a prevalence of 90% IPI due to poor hygiene and unsanitary conditions among them (Alwabr & Al-moayed, 2016).

The distribution of intestinal parasitic infection depends on several factors. These include socio-demographic variables such as reduced access to adequate sanitation, potable water, and health care as well as the prevailing climatic and environmental conditions (Maru, 2017). Poor sanitation is a major contributory risk factor in the contraction of Intestinal parasitic infections. A recent meta-analysis of the correlation between water, sanitation and health (WASH) and geo-helminths in China, showed that individuals with access to properly treated water had a lower chance of being infected by these geo-helminths (Yang et al., 2018). Another study conducted in a rural highland of north-western Ethiopia concluded that, intestinal parasites are extremely prevalent in school-aged children living in poor sanitary conditions with little or no access to clean water (Amor et al., 2016). Additionally, a study conducted in Rwanda revealed that children from families with access to treated water were less likely to be diagnosed with an intestinal parasite infection compared to those from families without access to treated water (Butera et al., 2019).

#### **2.4 Diagnosis of intestinal parasite infection**

A large number of people won't be identified and treated for IPI if screening is not done since IPI is an asymptomatic infection leaving a potentially infective pool in the population (Escobedo et al., 2008). Abdominal discomfort is an effective predictor for IPI or STH

infection in children (Escobedo et al., 2008). The most widely used method in diagnosing soil transmitted helminth in epidemiological surveys and drug efficacy trails is the Kato-Katz method. However, it is not sensitive in detecting light intensity helminth infection leading to the underestimation of infection prevalence, hence the need for examination of multiple stool samples to reduce error (Bärenbold et al., 2017). A study conducted by Bayoumi *et al.*, (2016) recommends Formalin-ethyl acetate concentration method for the diagnosis of intestinal parasites infection. The Formalin-ethyl acetate concentration is able to recover all protozoan cyst, oocyst, helminth eggs and larvae present in stool sample either fresh or fixed (World Health Organization, 2019).

With the availability of serological, proteomic and molecular techniques, microscopy remains the gold standard for diagnosis in the laboratory which involves the direct observation for parasite eggs in stool sample but stools are concentrated in the case of light helminth infection (Ricciardi & Ndao, 2015). The examination for eggs and larvae of helminths (and of ciliates) is classically done by scanning the entire field using the 10x objective lens of the microscope (World Health Organization, 2019).

## **2.5 Control and treatment of intestinal parasite infection**

Provision of safe water for consumption, regular deworming, and public health education on personal hygiene to parents and children is an effective strategy to reduce IPI among school children (Ayalew et al., 2011). Regular hand washing, careful handling (disposal) of fecal and fecal contaminated materials are measures to prevent IPI such as *Blastocystis* *sp* and mothers or guardians knowledge on the transmission mode of IPI is important for prevention of IPI in children (Mekonnen, 2019; Pipatsatitpong et al., 2012)

## **CHAPTER THREE**

### **3.0 METHODOLOGY**

#### **3.1 Study Design**

A prospective cross-sectional study will be conducted. Prior to collection of samples, semi structured questionnaires will be administered to parents of the children to collect data such as demographic characteristics, socio-economic parameters, and the knowledge of participants on importance of screening for parasites and deworming.

#### **3.2 Study Site**

The study will be carried out in the E.P primary school, Adaklu Ahunda Boso primary school, and Adaklu Ahunda Kpodzi primary school children in the Adaklu district. The district is located on Longitudes 06°41'1"N and 6.68361°N and Latitudes 00°20'1"E and 0.33361°E. It shares boundaries to the east with Ho-West, North-Tongu district to the south, Agotime-Ziope district to the north and to the east with Akatsi-North district. Adaklu district covers a total land area of 800.8sqkm (Figure 1.0). The population of Adaklu district, according to the 2010 Population and Housing Census, is 36,391 representing 1.7 percent of the region's total population (Ghana Statistical Service, 2014). Males constitute 49.0 percent and females represent 51.0 percent. The most dominant economic activity in the district is agriculture which employs about 78 percent of the labour force (Ghana Statistical Service, 2014). The district lacks portable water delivery and areas with few mechanized are inadequate to meet current population demand. The main sources of household drinking water are bore-hole/pump/ tube well (29.7%), river/stream (25.1%), dugout/pond/lake/dam/canal (15.9%) and public tap/standpipe (14.0%). Others are pipe-borne outside dwelling (6.5%), rain water (2.0%), and unprotected spring (1.7%) (Ghana Statistical Service, 2014). One in every three households (36.0%) use pit latrine while 27.4 percent use bush/field and 27.3 percent use public toilet (WC, KVIP, Pit, Pan). Households which use KVIP account for 7.8 percent (Ghana Statistical Service, 2014). Analysis will be done in the University of Health and Allied Sciences (UHAS) at the Microbiology laboratory.



Fig. 1.0. District map of Adaklu (Ghana Statistical Service, 2014)

### 3.3 Inclusion Criteria

The study will include primary school children less than 14 years of age. Children will only be included after a signed written informed consent and filled questionnaires have been obtained from the parents.

### 3.4 Exclusion Criteria

Children above age 13, children within the age range but on or have received anti-parasitic treatment prior to the study as well as children who meet the inclusion criteria, but guardians do not consent.



### 3.5 Sample Size Determination

At 95% confidence interval with an estimated prevalence (p) of 15% (Forson et al., 2018) and allowable margin of error (e) of 5%, minimum sample size (n) will be determined using the formula below;

$$n = \frac{z^2(p)(1-p)}{e^2}$$

Where  $z = 1.96$ , standard normal deviate that corresponds to a 95% confidence interval

$$n = \frac{1.96^2 (0.15) (0.85)}{0.05^2}$$

$$n = 196$$

### 3.6 Data Collection

Data will be collected from primary school children to assess the risk factors by use of a semi-structured questionnaire which will contain parameters such as demographic characteristics, socio-economic, and the knowledge of participants on intestinal parasitic infection and deworming. English and Ewe will be the main languages to be used to communicate in the interview and questionnaire but where the need be for a different language aside the above mentioned, help will be sought from an interpreter.

### 3.7 Data Analysis

Data will be summarized into frequency distribution tables using Microsoft Office Excel 2019. Descriptive method of analysis such as charts and graphs will be used to analyze and illustrate the occurrence of the various factors in the study. Categorical data will be analyzed using the Chi-square (X) or Fisher's exact t-test. Computer program software IBM SPSS 25 (Zemene & Shiferaw, 2018) will be used for data analysis. A p-value of  $<0.05$  shall be considered to be statistically significant.

### 3.8 Laboratory Techniques

#### 3.8.1 Sample Collection.

Wide neck leak proof containers labelled with name, age, and sex will be given to parents of children to assist with the collection of stool samples after they are educated on the proper methods of collecting the stool samples in English and Ewe

### **3.8.2 Wet mount (Direct microscopy)**

A drop of normal saline will be placed on a clean grease-free slide. With the help of an applicator, a piece of stool will be picked and placed on the slide. A cover glass will be lowered slowly to avoid any air bubbles. After placing the cover glass on the slide, the excess fluid on the slide will be absorbed with cotton and slide will be observed under 10X and 40X objectives. (Cheesbrough, 1981).

### **3.8.3 Formol - ether concentration method**

Using a rod or stick, an estimated 1 g (pea-size) of faeces will be emulsified in about 4 ml of 10% formol water contained in a screw-cap bottle or tube. A further 3–4 ml of 10% v/v formol water will be added, bottle capped, and mixed well by shaking. The emulsified faeces will be sieved, and the sieved suspension collected in a beaker. The suspension will be transferred to a conical (centrifuge) tube made of strong glass, copolymer, or polypropylene. About 3–4 ml of diethyl ether or ethyl acetate will then be added. The tube will be stoppered and mixed for 1 minute. A tissue or piece of cloth will be wrapped around the top of the tube with the stopper loosen (considerable pressure would have been built up inside the tube). Immediately, the tube will be centrifuged at 750–1000 g (approximately 3000 rpm) for 1 minute. Using a stick or the stem of a plastic bulb pipette, the layer of faecal debris will be loosen from the side of the tube and the tube will be inverted to discard the ether, faecal debris, and formol water. The sediment will remain. The tube will be returned to its upright position and the fluid allowed to drain from the side to the bottom. The bottom of the tube will be tapped to resuspend and mix the sediment. The sediment will then be transferred onto a slide and covered with a cover glass. The preparation will then be examined microscopically using the 10X objective with the condenser iris closed sufficiently to give good contrast. 40X objective lens will be used to examine small cysts and eggs. (Cheesbrough, 1981)

### **3.8.4 Formol - ether oocyst concentration method**

The general Formol-ether concentration technique will be followed up to the stage where a tissue will be wrapped around the top of the tube. The oocyst technique will be continued from this stage as follows. The tube will be centrifuged immediately at low

speed, that is, RCF 300–400 g (about 1000 rpm) for 1 minute. With a plastic bulb pipette or Pasteur pipette, the entire column of fluid will be removed below the fecal debris and ether and transferred to another centrifuge tube. Formol water will be added to make the volume up to 10–15 ml. Centrifuge at RCF 750–1000 g (about 3000 rpm) for 5–10 minutes. The supernatant will be removed. The bottom of the tube will be tapped to resuspend and mix the sediment. The sediment will be transferred to a slide and examined for oocysts using the 40X objective. (Cheesbrough, 1981).

### **3.8.5 Modified Zeihl-Nelson stain method**

A smear will be prepared either directly from stool sample or from the sediment obtained by the formol ether oocyst concentration technique. It will be air-dried and fixed with methanol for 2–3 minutes and stained with unheated carbol fuchsin for 10–15 minutes. The stain will be washed off with water thoroughly. Decolorization will be done with 1% acid alcohol for 15–20 seconds and washed off afterwards with water. A counterstain 0.4% malachite green (or methylene blue) will be used to stain for 30 seconds, washed off with water and the slide placed in a draining rack for the smear to dry. The smear will be examined microscopically for oocysts, using a low power magnification to detect the oocysts and the oil immersion objective to identify them. (Cheesbrough, 1981)

### **3.9 Dissemination of Results**

Outcome of the study would be disseminated in a form of presentation at the department of Medical Laboratory Science and submitted to the school of Allied Health Sciences (SAHS) of the university of Health and Allied Sciences (UHAS), and also the results will be disseminated through seminars and workshops. Manuscripts will be drafted and submitted to peer-review for publication.

### **3.10 Ethical consideration**

Ethical clearance would be obtained from the Ethical and Protocol Review Committee (ERC) of School of Allied Health Sciences (SAHS), University of Health and Allied Sciences (UHAS). Written consent will also be obtained from all participants who agree to partake in the study after they have been thoroughly informed. Confidentiality of

participants' information and data resulted from the study will be strictly adhered to following ERC of UHAS guidelines.

## REFERENCES

- Abera, A., & Nibret, E. (2014). Prevalence of gastrointestinal helminthic infections and associated risk factors among schoolchildren in Tilili town, northwest Ethiopia. *Asian Pacific Journal of Tropical Medicine*, 7(7), 525–530.  
[https://doi.org/10.1016/S1995-7645\(14\)60088-2](https://doi.org/10.1016/S1995-7645(14)60088-2)
- Agbakoba, N. R., Chukwuma, M. C., Ekejindu, I. M., Agbakoba, N. R., Ezeagwuna, D. A., Anaghalu, I. C., & Nwosu, D. C. (2009). The Prevalence and Risk Factors of Geohelminth Infections among Primary School Children in Ebenebe Town, Anambra State, Nigeria. *Middle-East Journal of Scientific Research*, 4(3), 211–215.
- Ali, Y. (2016). *Intestinal parasitic Infections among School-age Children In Mekaneselam Health Center, Borena, Northeast Ethiopia*.
- Alwabr, G. M. A., & Al-moayed, E. E. (2016). *Prevalence of intestinal parasitic infections among school children of Al-Mahweet Governorate , Yemen*. 6(2), 64–73.
- Amor, A., Rodriguez, E., Saugar, J. M., Arroyo, A., López-quintana, B., Abera, B., Yimer, M., Yizengaw, E., Zewdie, D., Ayehubizu, Z., Hailu, T., Mulu, W., Echazú, A., Krolewieki, A. J., Aparicio, P., Herrador, Z., Anegagrie, M., & Benito, A. (2016). High prevalence of *Strongyloides stercoralis* in school-aged children in a rural highland of north-western Ethiopia : the role of intensive diagnostic work-up. *Parasites & Vectors*, 1–8. <https://doi.org/10.1186/s13071-016-1912-8>
- Ayalew, A., Debebe, T., & Worku, A. (2011). *Prevalence and risk factors of intestinal parasites among Delgi school children , North Gondar , Ethiopia*. 3(December), 75–81. <https://doi.org/10.5897/JPVB11.019>
- Bärenbold, O., Raso, G., Coulibaly, J. T., N’Goran, E. K., Utzinger, J., & Vounatsou, P. (2017). Estimating sensitivity of the Kato-Katz technique for the diagnosis of *Schistosoma mansoni* and hookworm in relation to infection intensity. *PLoS Neglected Tropical Diseases*, 11(10), 1–11.  
<https://doi.org/10.1371/journal.pntd.0005953>
- Bayoumi, M., Nykwac, O., Kardaman, M., Ullberg, M., Alshammari, E. M., Sandström, G., Saeed, A., & Abd, H. (2016). *Intestinal Parasitic Infections in School Students in Malakal City, Upper Nile State, South Sudan SOJ Microbiology & Infectious Diseases*. [www.symbiosisonlinepublishing.com](http://www.symbiosisonlinepublishing.com)

- Brown, J., Cairncross, S., & Ensink, J. H. J. (2013). *Water , sanitation , hygiene and enteric infections in children*. 629–634. <https://doi.org/10.1136/archdischild-2011-301528>
- Butera, E., Mukabuteru, A., Nsereko, E., Munyanshongore, C., Rujeni, N., Mwikarago, I. E., Moreland, P. J., & Manasse, M. N. (2019). Prevalence and risk factors of intestinal parasites among children under two years of age in a rural area of Rutsiro district, Rwanda – A cross-sectional study. *Pan African Medical Journal*, 32. <https://doi.org/10.11604/pamj.2019.32.11.15949>
- Cheesbrough, M. (1981). Medical laboratory manual for tropical countries. *Medical Laboratory Manual for Tropical Countries., 1*.
- Cosmos, A. B., & John, O. S. (2015). *Prevalence and risk factors of parasitic protozoal infections in school children in the Kwabre East District of Ashanti Region , Ghana*. 4(4), 1–7.
- Escobedo, A. A., Cañete, R., Núñez, F. A., Escobedo, A. A., Cañete, R., & Núñez, F. A. (2008). *Prevalence , Risk Factors and Clinical Features Associated with Intestinal Parasitic Infections in Children from San Juan y Martínez , Pinar del Río , Cuba* *Prevalencia , Factores de Riesgo , y Aspectos Clínicos Asociados con las Infecciones Parasitarias I*. 57(1).
- Forson, A. O., Arthur, I., & Ayeh-kumi, P. F. (2018). *The role of family size , employment and education of parents in the prevalence of intestinal parasitic infections in school children in Accra*. 1–10.
- Gebretsadik, D., Metaferia, Y., Seid, A., Fenta, G. M., & Gedefie, A. (2018). Prevalence of intestinal parasitic infection among children under 5 years of age at Dessie Referral Hospital : cross sectional study. *BMC Research Notes*, 1–6. <https://doi.org/10.1186/s13104-018-3888-2>
- Gelaw, A., Anagaw, B., Nigussie, B., Silesh, B., Yirga, A., Alem, M., Endris, M., & Gelaw, B. (2013). Prevalence of intestinal parasitic infections and risk factors among schoolchildren at the University of Gondar Community School, Northwest Ethiopia: A cross-sectional study. *BMC Public Health*, 13(1), 1–7. <https://doi.org/10.1186/1471-2458-13-304>
- Ghana Statistical Service. (2014). *Adaklu district*. 1–35. <https://new-ndpc->

static1.s3.amazonaws.com/Caches/Publications/2016/06/06/Adaklu.pdf

- Gyang, V. P., Chuang, T., Liao, C., Lee, Y., Akinwale, O. P., Orok, A., Ajibaye, O., Babasola, A. J., & Cheng, P. (2019). ScienceDirect Intestinal parasitic infections : Current status and associated risk factors among school aged children in an archetypal African urban slum in Nigeria. *Journal of Microbiology, Immunology and Infection*, 52(1), 106–113. <https://doi.org/10.1016/j.jmii.2016.09.005>
- Hailegebriel, T. (2017). Prevalence of intestinal parasitic infections and associated risk factors among students at Dona Berber primary school, Bahir Dar, Ethiopia. *BMC Infectious Diseases*, 17(1). <https://doi.org/10.1186/s12879-017-2466-x>
- Hemmati, N., Razmjou, E., Hashemi-Hafshejani, S., Motevalian, A., Akhlaghi, L., & Meamar, A. R. (2017). Prevalence and risk factors of human intestinal parasites in Roudehen, Tehran province, Iran. *Iranian Journal of Parasitology*, 12(3), 364–373.
- Legesse, M., & Erko, B. (2004). Prevalence of intestinal parasites among schoolchildren in a rural area close to the southeast of Lake Langano , Ethiopia. *Ethiopia Journal of Health*, 2(18), 116–120.
- Liao, C., Fu, C., Kao, C., Lee, Y., & Chen, P. (2016). Prevalence of intestinal parasitic infections among school children in capital areas of the Democratic Republic of São Tomé and Príncipe , West Africa . *African Health Sciences*, 16(3), 690–697. <https://doi.org/http://dx.doi.org/10.4314/ahs.v16i3.8>
- Maru, D. S. (2017). *Prevalence of Intestinal Parasitic Infections and Associated Risk factors among School children in Adigrat town, Northern Ethiopia*. 89, 4943–4948.
- Matthys, B., Bobieva, M., Karimova, G., Mengliboeva, Z., Jean-richard, V., Hoimnazarova, M., Kurbonova, M., Lohourignon, L. K., Utzinger, J., & Wyss, K. (2011). *Prevalence and risk factors of helminths and intestinal protozoa infections among children from primary schools in western Tajikistan*.
- Mehraj, V., Hatcher, J., Akhtar, S., Rafique, G., & Beg, M. A. (2008). *Prevalence and Factors Associated with Intestinal Parasitic Infection among Children in an Urban Slum of Karachi*. 3(11). <https://doi.org/10.1371/journal.pone.0003680>
- Mekonnen, H. S. (2019). *Prevalence and factors associated with intestinal parasites among under-five children attending Woreta Health Center , Northwest Ethiopia*. 8, 1–8.

- Mumtaz, S., Siddiqui, H., & Ashfaq, T. (2009). *Original Article Frequency and risk factors for intestinal parasitic infection in children under five years age at a tertiary care hospital in Karachi*. 216–219.
- Nguyen, N. L., Gelaye, B., Aboset, N., Kumie, A., Williams, M. A., & Berhane, Y. (2012). Intestinal parasitic infection and nutritional status among school children in Angolela, Ethiopia. *Journal of Preventive Medicine and Hygiene*, 53(3), 157–164. <https://doi.org/10.15167/2421-4248/jpmh2012.53.3.338>
- Padmaja, N., Swaroop, P. S., & Nageswararao, P. (2014). *Prevalence of Intestinal Parasitic Infections among School Children in and around Amalapuram* . 2(2), 36–38.
- Pipatsatitpong, D., Rangsin, R., Leelayoova, S., Naaglor, T., & Mungthin, M. (2012). *Incidence and risk factors of Blastocystis infection in an orphanage in Bangkok , Thailand*.
- Ricciardi, A., & Ndao, M. (2015). Diagnosis of parasitic infections: What’s going on? *Journal of Biomolecular Screening*, 20(1), 6–21. <https://doi.org/10.1177/1087057114548065>
- Sitotaw, B., Mekuriaw, H., & Damtie, D. (2019). Prevalence of intestinal parasitic infections and associated risk factors among Jawi primary school children, Jawi town, north-west Ethiopia. *BMC Infectious Diseases*, 19(1). <https://doi.org/10.1186/s12879-019-3971-x>
- World Health Organization. (2019). *Bench aids*.
- Yang, D., Yang, Y., Wang, Y., Yang, Y., & Dong, S. (2018). Prevalence and Risk Factors of *Ascaris lumbricoides* , *Trichuris trichiura* and *Cryptosporidium* Infections in Elementary School Children in Southwestern China : A School-Based Cross-Sectional Study. *International Journal of Environmental Research and Public Health*, 1–16. <https://doi.org/10.3390/ijerph15091809>
- Zemene, T., & Shiferaw, M. B. (2018). Prevalence of intestinal parasitic infections in children under the age of 5 years attending the Debre Birhan referral hospital . *BMC Research Notes*, 1–6. <https://doi.org/10.1186/s13104-018-3166-3>



## WORK PLAN

Activities	September 2020	Sep.- October 2020	October 2020	December 2020	January 2021	February 2021	March 2021
Developing of proposal							
Ethical consideration							
Data collection and entry							
Analysis of data							
Write up							
Thesis submission							

## BUDGET

Description of Item	Units	Cost per Unit	Amount
Copies of proposal for submission to Review committee	3	GHC 5.00	GHC 15.00
Ziehl-Neelsen Stain [carbol fuchsin, acid alcohol, methylene blue]	1	GHC 704.00	GHC 704.00
Formol Ether [10% Formalin and Ethyl acetate]	1	GHC 275.00	GHC 275.00
Sample containers	200	GHC 35/bag of 100	GHC 140.00
Slides and cover slips	200	GHC 20/box of 50	GHC 80.00
Printing of questionnaires	200	GHC 0.6/ page	GHC 120.00
Printing of thesis	4	GHC 18/one	GHC 72.00
Miscellaneous			GHC 300.00
Transportation	5	GHC 20.00	GHC 100.00
		Total	GHC 1,806.00



**APPENDICES I: PARENTAL CONSENT FORM.**  
**UNIVERSITY OF HEALTH AND ALLIED SCIENCES**



**DEPARTMENT OF MEDICAL LABORATORY SCIENCES**

Title of Study:	Prevalence of intestinal parasitic infections and associated risk factors among primary school children in the Adaklu district, Volta region, Ghana.
Principal Investigators	Bedzina Israel Aadaaryeb N. Benjamin
Certified Protocol Number	

**Introduction**

We are Bedzina Israel (UHAS20174828), and Aadaaryeb Benjamin (UHAS20174006), final year students offering Bachelor of Medical Laboratory Sciences in the School of Allied Health Sciences at the University of Health and Allied Sciences, Ho, Volta Region. You are being asked to allow your child to take part in a research study on the worms that are commonly found in the intestine of primary school children and the conditions that makes it easier for the worms to infect them. We will be very grateful if you could spare a few minutes to answer these few questions. The research is for academic purposes only and therefore responses given will be kept confidential. Thank you.

**Purpose of research**

The main purpose of this research is to investigate the worms that are commonly found in the intestine of primary school children and conditions that makes it easier for the worms to infect them.

**Participant's role**

If you consent to take part in this study, we will conduct a brief interview with you which will contain questions about your age, occupation, your level of education and your knowledge on causes of worm infection. Furthermore, A small amount of faeces from your children will be obtained into a clean, plastic container which will be properly labelled with a unique number. The sample will then be transported to the laboratory under safe conditions for laboratory investigation for presence of various worms. The interview will not take us more than twenty (20) minutes.

### **Benefits/Risks of the study**

There is no direct benefit to your child from being in this study. But if your child takes part in this study, you can request for the laboratory results after analysis to know whether your child is infected with worm at the time faeces was collected. The study will also provide information that will be used by the Ghana Health Service to control and manage worm infection. This study will not pose any danger to your child as clean containers will be used in faeces collection. We will tell you about any new information that might change your decision to keep your child in the study.

### **Confidentiality**

Your child has rights regarding the privacy and confidentiality of his or her health information. Information obtained for this research will be kept strictly by the investigator and no disclosure of results will be allowed.

By signing this permission form, you are permitting the following people to have access to your child's medical record and use for the research purposes described in this form:

- University of Health and Allied Sciences, Research Ethics Committee (REC)
- The Department of Medical Laboratory Science, University of Health and Allied Sciences, Ho

### **Compensation**

There is no direct benefit to your child from being in this study though the child may be provided with refreshment.

### **Withdrawal from Study**

You may withdraw your child from the study at any time without penalty or loss of benefits to which your child is otherwise entitled.

We will inform you of any new information that develops during this study. This information may affect your decision to keep your child in the study. If your child withdraws from the study, information collected during the study before your child withdraws will be kept. No further information will be collected after a study participant is withdrawn from the study

### **What happens after study or when the participant changes his/her mind?**

If we publish reports or give talks about this research, we will only discuss group results. We will not use your child's name or any other personal information that would identify him/her.

To help protect confidentiality, we will give the study data a code number, and keep it in a file with a password that only the researchers know. The file will be on a computer that only the researchers are allowed to use.

We plan to keep this information for 5 years, in case we or other researchers want to use it later for other studies. But we will follow the same steps we just described to keep it as confidential as possible

### **Contact for Additional Information**

Daniel Sai Squire, PhD. (Lecturer/Supervisor),  
University of Health and Allied Sciences,  
PMB 31, Ho.

[dsquire@uhas.edu.gh](mailto:dsquire@uhas.edu.gh)

0542401448

OR

Bedzina Israel  
University of Health and Allied Sciences,  
PMB 31, Ho.

[israelbedzina@gmail.com](mailto:israelbedzina@gmail.com)

0556883987/0501625894

OR

Aadaaryeb Benjamin

University of Health and Allied Sciences,

PMB 31, Ho.

[bzhyon5@gmail.com](mailto:bzhyon5@gmail.com)

0554413799/0501625897

If you have any questions about your rights as a research participant in this study you may contact the Administrator of the Research Ethics Committee, IHR, University of Health and Allied Sciences at [rec@uhas.edu.gh](mailto:rec@uhas.edu.gh) or +233- 362-196-193.

## **PARTICIPANT AGREEMENT**

"I have read or have had someone read all of the above, asked questions, received answers regarding participation in this study, and am willing to give consent for me, my child/ward to participate in this study. I will not have any of my rights waived by signing this consent form. Upon signing this consent form, I will receive a copy for my personal records."

---

Name of Participant

---

Signature or mark of Participant

---

Date

If participant cannot read and or understand the form themselves, a witness must sign here:

I was present while the benefits, risks and procedures were read to the volunteer. All questions were answered and the volunteer has agreed to take part in the research.

---

Name of witness

---

Signature of witness / Mark

---

Date

I certify that the nature and purpose, the potential benefits, and possible risks associated with participating in this research have been explained to the above individual.

---

Name of Person who Obtained Consent

---

Signature of Person Who Obtained Consent

---

Date



## APPENDICES II: CHILD ASSENT FORM



### **UNIVERSITY OF HEALTH AND ALLIED SCIENCES**

### **DEPARTMENT OF MEDICAL LABORATORY SCIENCES**

#### **Introduction**

We are Bedzina Israel (UHAS20174828), and Aadaaryeb N. Benjamin (UHAS20174006), final year students from the Department of Medical Laboratory Sciences at the University of Health and Allied Sciences, Ho. We are asking you to take part in this research study in which we are trying to investigate the worms that are commonly found in the intestine of primary school children and the conditions that makes it easier for the worms to infect them. This will take a few minutes of your time.

#### **General Information**

If you agree to be in this study, you will be asked to answer some few questions which requires you provide information on your name, sex age and few more as well providing us with a small amount of feaces in a clean container.

#### **Possible Benefits**

If you take part in this study, you can request for your laboratory results after analysis to know whether you have been infected with worm at the time feaces was collected or not.

#### **Possible Risks and Discomforts**

This study will not pose any danger to your child as clean containers are used to collect small amount of feaces.

#### **Voluntary Participation and Right to Leave the Research**

There will be no penalties whatsoever if you decide not to participate at all or decide to drop out after agreeing to participate.

#### **Confidentiality**



Your information will be kept confidential. We will keep all your answers private, and will not show them to your teacher or parent(s)/guardian. Only people working on the study will see them.

If we publish reports or give talks about this research, we will only discuss group results. We will not use your name or any other personal information that would identify you.

To help protect confidentiality, we will give your study data a code number, and keep it in a file with a password that only the researchers know. The file will be on a computer that only the researchers are allowed to use.

We plan to keep this information for 5 years, in case we or other researchers want to use it later for other studies. But we will follow the same steps we just described to keep it as confidential as possible.

### **Contacts for Additional Information**

You may ask me any questions about this study. You can call me at any time: **0556883987** or 0554413799 Benjamin or Email: [israelbedzina@gmail.com](mailto:israelbedzina@gmail.com) , [bzhyon5@gmail.com](mailto:bzhyon5@gmail.com)

Please talk about this study with your parents before you decide whether or not to participate. I will also ask permission from your parents before you are enrolled into the study. Even if your parents say “yes” you can still decide not to participate.

### **Your rights as a Participant**

This research has been reviewed and approved by the Research Ethics Committee of Institute of Health Research (REC-IHR). If you have any questions about your rights as a research participant you can contact the REC Office between the hours of 8am-5pm through the landline **0362196193** or email addresses: [rec@uhas.edu.gh](mailto:rec@uhas.edu.gh).

## **VOLUNTARY AGREEMENT**

By signing or thumb printing below, it means that you:

- have understood what you will be doing for this study,
- have had all your questions answered,
- have talked to your parent(s)/legal guardian about this project, and
- agree to take part in this research

If you do not want to participate in this study, please **do not** sign or thumb print this assent form.

You and your parents will be given a copy of this form after you have signed/thumb printed it.

**Child's Name:** \_\_\_\_\_ **Researcher's Name:** \_\_\_\_\_

**Child's Sign/Thumbprint:** \_\_\_\_\_ **Researcher's Signature:** \_\_\_\_\_

Date: \_\_\_\_\_

Date: \_\_\_\_\_

### APPENDIX III: QUESTIONNAIRE



**UNIVERSITY OF HEALTH AND ALLIED SCIENCES**



**DEPARTMENT OF MEDICAL LABORATORY SCIENCES**

#### **PREVALENCE OF INTESTINAL PARASITIC INFECTIONS AND ASSOCIATED RISK FACTORS AMONG PRIMARY SCHOOL CHILDREN IN THE ADAKLU DISTRICT, VOLTA REGION, GHANA.**

We are Bedzina Israel (UHAS20174828), and Aadaaryeb Benjamin (UHAS20174006), final year students of the University of Health and Allied Sciences investigating the worms that are commonly found in the intestine of primary school children and the conditions that makes it easier for the worms to infect them. We will be well pleased if you will respond to the following questions and statements. This question is for research purpose and as such all information will be considered as confidential. Thanks in advance for your co-operation.

Code .....

Date ...../...../.....

<b>General demographic information of respondents  (please tick those that apply)</b>		
1	Gender	Male <input type="checkbox"/> Female <input type="checkbox"/>
2	Age	
3	Residence	
4	Religion	Christian <input type="checkbox"/> Muslim <input type="checkbox"/> Others .....
5	Parental occupation	
<b>Personal factors that may predispose respondents to study outcomes</b>		
6	Do you wash your hands after defecation?	Yes <input type="checkbox"/> No <input type="checkbox"/> Sometimes <input type="checkbox"/>

7	If yes, with what?	Water <input type="checkbox"/>	Soap and water <input type="checkbox"/>
8	Do you wash your hands before eating?	Yes <input type="checkbox"/>	No <input type="checkbox"/> Sometimes <input type="checkbox"/>
9	If yes, with what?	Water <input type="checkbox"/>	Soap and water <input type="checkbox"/>
10	What is your major source of drinking water?	Tap water <input type="checkbox"/>	stream <input type="checkbox"/> commercial <input type="checkbox"/>
11	What type of toilet facility do you use?	Water closet <input type="checkbox"/>	Pit latrine <input type="checkbox"/> Nearby bush <input type="checkbox"/> Public toilet <input type="checkbox"/>
12	Do you eat unwashed fruits?	Yes <input type="checkbox"/>	No <input type="checkbox"/> Sometimes <input type="checkbox"/>
13	Do you suck your fingers?	Yes <input type="checkbox"/>	No <input type="checkbox"/> Sometimes <input type="checkbox"/>
14	Do you bite your nails?	Yes <input type="checkbox"/>	No <input type="checkbox"/> Sometimes <input type="checkbox"/>
15	Do you walk barefooted?	Yes <input type="checkbox"/>	No <input type="checkbox"/> Sometimes <input type="checkbox"/>
16	Do you eat white clay or rocks?	Yes <input type="checkbox"/>	No <input type="checkbox"/> Sometimes <input type="checkbox"/>
17	If yes, how often?	Everyday <input type="checkbox"/>	3-5 times a week <input type="checkbox"/> <3 times a week <input type="checkbox"/>
18	What was your last deworming date?	< or = 3 months <input type="checkbox"/>	4 months <input type="checkbox"/> 7-12 months <input type="checkbox"/> Not at all <input type="checkbox"/>
<b>Clinical signs and symptoms</b>			
19	Do you experience abdominal pains?	Yes <input type="checkbox"/>	No <input type="checkbox"/> Sometimes <input type="checkbox"/>

20	If yes, how often?	Everyday <input type="checkbox"/> 3-5 times a week <input type="checkbox"/> <3 times a week <input type="checkbox"/>
21	Do you often experience fatigue?	Yes <input type="checkbox"/> No <input type="checkbox"/> Sometimes <input type="checkbox"/>
22	If yes, how often?	Everyday <input type="checkbox"/> 3-5 times a week <input type="checkbox"/> <3 times a week <input type="checkbox"/>
23	Do you often feel like vomiting?	Yes <input type="checkbox"/> No <input type="checkbox"/> Sometimes <input type="checkbox"/>
24	If yes, how often?	Everyday <input type="checkbox"/> 3-5 times a week <input type="checkbox"/> <3 times a week <input type="checkbox"/>
<b>Knowledge about causes of intestinal parasites</b>		
25	Do you know about intestinal worms?	Yes <input type="checkbox"/> No <input type="checkbox"/>
26	If yes, What do you know about them?	.....
27	How do you get infected by these parasites?	.....
28	How can you prevent yourself from being infected?	.....
29	Do you visit any facility when you experience nausea vomiting or diarrhea?	Yes <input type="checkbox"/> No <input type="checkbox"/>