**ADDIS ABABA UNIVERSITY**

**COLLEGE OF HEALTH SCIENCES**

**SCHOOL OF PUBLIC HEALTH**


# THE MAGNITUDE AND DETERMINANTS OF INTESTINAL PARASITES AMONG STUDENTS, WHO USE THREE OFADDIS ABABA UNIVERSITY CAMPUS CLINICS IN ADDIS ABABA, ETHIOPIA

BY: EMNET NEDA (B.sc)

A THESIS SUBMITTED TO THE SCHOOL OF GRADUATE STUDIES OF ADDIS ABABA UNIVERSITY AS A PARTIAL FULFILMENT OF THE REQUIREMENTS FOR THE DEGREE OFMASTERS IN PUBLIC HEALTH.

NOVEMBER 2013

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## LIST OF ABBREVIATIONS

| | |
|---|---|
| AAU | Addis Ababa University |
| AIDS | Acquired Immunodeficiency Syndrome |
| EJHD | Ethiopian Journal of Health Development |
| FGD | Focus Group discussion |
| IP | Intestinal Parasite |
| IPI | Intestinal Parasitic Infestation |
| OPD | Outpatient Department |
| SPSS | Statistical Package for Social Science |
| VCT | Voluntary Counseling and Testing |
| WHO | World Health Organization |

## ABSTRACT

**Background:** In Ethiopia, intestinal parasitic diseases are one of the major causes of morbidity nationwide. In addition to that, intestinal parasites have significant socioeconomic problem in terms of productivity, school performance and cost for diagnosis and treatment. Intestinal parasitosis is one of the major problems among student of Addis Ababa University who visited student clinics.

**Objective:** The purpose of this study is to assess the magnitude and determinants of intestinal parasitosis among Addis Ababa University students who utilize AAU student clinic service, Addis Ababa, Ethiopia.

**Methods:** Health facility based cross-sectional study design was employed. Total of 556 students were selected by systematical cluster sampling from the three campuses (Main, North technology, Science). Self- administered, close and open ended coded questionnaire was prepared to assess their knowledge attitude and practice towards intestinal parasite, personal hygiene and sanitation. Finally the stool samples was diagnosed using direct wet mount and concentrated technique then the data was analyzed using Crude and adjusted Odds ratio with 95% confidence interval at $P < 0.05$ to check whether there were significant association between dependent and independent variables.

**Result:** A total of 556 study subjects were participated, of which 424(76.3 %) were males. Out of total, 134 of them had at least one parasitic infestation with an overall prevalence of 24.1%, of which 108(80.6%) were males. Out of total study subjects, 326(58.6%) had abdominal pain or discomfort during two weeks before the survey. Cafeteria usage and eating street food were significantly associated with intestinal parasitosis [AOR: 2.1, 95% CI (1.2, 5.0)] and [AOR: 2.6, 95% CI (1.45, 3.51)], respectively. Technology campus fulfilled nearly 2/3 of sanitary requirements while, Main and Science campus fulfilled less than half of the requirement.

**Conclusion and recommendation:** There was high prevalence of intestinal parasitosis and presence of abdominal pain or discomfort among the university students. The amount of water and toilet availability in cafeteria and student dormitory did not met the required sanitary standards. Sanitary building codes and enforcement needs to be in place for the current and newly built dormitories and cafeteria services.

# 1. INTRODUCTION

## 1.1. Background

Presence of parasite, particularly intestinal parasite infestation, is a threat to the well-being of millions of people living in the world, especially to the people who are living in developing countries. As study shows, the infestation creates a global health burden causing clinical morbidity and mortality in the developing world affecting about 450 million people (1).

This is due to low socio-economic status or poverty, insufficient or impoverished health services, deficiency of safe drinking water supplies, illiteracy of parent, poor hygiene and large size of the family and poor health status of the children, ignorance of health promotion practices particularly in tropical regions where the biophysical environment and cultural practice favor transmission (2-4). In addition, intestinal parasitic agents increase in polluted environments such as refuse heaps, gutters and sewage units in and around human dwelling and living conditions of the people in crowded or unhealthy situations (3, 5).Transmission of intestinal parasites is effected directly or indirectly through faeces contaminated objects such as food, water, soil and finger nails. Although various modes of transmission of intestinal parasites are known to exist, several studies have shown the higher magnitude of hand to mouth transmission as potential sources of exposure to parasitic infestation (6). Parasitic infestation are governed by behavioral, biological, environmental, socioeconomic and health systems factors (7). Local conditions, including access to and quality of domestic and village infrastructure, economic factors such as disposable income, employment and occupation, and social factors such as education influence the risk of infection, disease transmission and associated morbidity and mortality (8). Intestinal parasitosis refers to a group of diseases caused by one or more species of protozoa or helmenith. The prevalence of different parasites differs between immunocompetent and immunodeficient individuals. Globally, in immunocompetent individuals ascaris is the leading parasitic infestation with the prevalence of 600 million cases per a year followed by schistosomiasis about 300 million cases per a year and amebiasis about 40-50million cases per a year. In immunodeficient individuals, on the other hand, cryptosporidiosis is the commonest intestinal parasite known to occur (9). Ethiopia, with the aforementioned problems, is one of the countries with high prevalence of intestinal parasitic infestation (10). Because parasites can live inside the human body for years without making their presence known and usually have no sign and symptoms, they are more common than one might think (11). And it is widely distributed in Ethiopia, as in

most of African countries and their epidemiology has been studied by several authors. According to Ministry of Health of Ethiopia out-patient visits intestinal parasitism accounts (8.5%) of all male and (10.4%) of all female in the country. Prevalence rates higher than 70% and high rates of multiple infections have been reported from many urban and rural communities.

High prevalence of intestinal parasitosis and polyparasitism affect the health status of the individual mainly affecting physical and mental developments causing malnutrition, anaemia, stunting, cognitive impairment, lowered educational achievement and interfering with productivity(12).

Their presence causes a variety of chronic diseases and conditions such as chronic fatigue, abdominal pain, diarrhea, nausea or vomiting, gas or bloating, dysentery , rash or itching around the rectum or vulva, stomach pain or tenderness, feeling tired, weight loss, passing a worm in the stool (13).

## 1.2. Statement of the Problem

Intestinal parasitosis is a common health problem throughout the world especially in the developing countries. It imposes a continual and intolerable threat to the well being of millions of people in the tropics and subtropics and the cost of parasites in terms of human misery and economic loss is immeasurable (14).

Intestinal parasitism has been widespread in Ethiopia. Helminthic infestation is the second most predominant causes of outpatient morbidity in the country. Several studies indicated that the prevalence of parasitosis were high in the lower altitude including southwestern Ethiopia (15). Intestinal parasites could be expected to be highly prevalent in Addis Ababa because of over massed number of population live in crowded area, shortage of water, problem in sewage system, poor sanitation of hotels and cafeterias and other unhygienic factors and activities that aggravates the probability of infestation by different parasites (16).

To our knowledge there is scarcity of information on the prevalence of intestinal parasite among university students who are literate and are expected to exhibit high level of hygiene. One of the reasons for such scarcity of information is because university students are expected to be aware of these infestation and thereby preventing its occurrence among them (17). I therefore designed this study to determine the prevalence and determinant of intestinal parasitosis among Addis Ababa University students who use clinic service in Addis Ababa, Ethiopia.

Considering the significance of intestinal parasites regarding individual and social health and its high incidence in our country; and a crowded environment within the campus, possible transmission of intestinal parasitosis can occur among students. Therefore, the aim of this study is to determine the prevalence and determinants of intestinal parasitosis in Addis Ababa University students who use clinic services.

In Addis Ababa University Technology campus there was occurrence of an outbreak of diarrheal illness among students in March 2010. Stool culture confirmed shigella flexneri species in (45%) of specimens tested. The causative factors associated with the illness included eating specific foods at specific meal time in the student cafeteria (18). Intestinal parasitosis is one of the major problems among student of AAU who visited student clinics, but it is not adequately addressed. This implies that intestinal parasitosis have been creating negative impact on the students' health and educational learning abilities. And also when we look at a confirmed registration data in laboratory in 2010/11, there were 234 cases out of 840 direct smear stool analysis and in 2011/12, there were 340 cases out of 1020 direct stool analysis (19). These samples data shows that from those students who have taken a test for direct stool examination, above 25% of them had at least one intestinal parasite. Therefore, in order to make an intervention, there should be a research based baseline data.

Additionally, although there are many researches done on prevalence of intestinal parasitosis in Ethiopia, the numbers of those researches, focused on higher education, are too insufficient.

### 1.3. Rational of the Study

This study provides the prevalence and determinants of intestinal parasitosis among Addis Ababa University students who use clinic services and moreover, the university has not well enough information about the magnitude of the problem and it doesn't know where the risk factors are. So it would give useful information to identify the determinant factors that are associated with the intestinal parasitosis status among the study population. Depending on the result of the study students will have better health service and awareness about intestinal parasites. There has been no adequate information about the prevalence of intestinal parasitosis among students of higher education in Ethiopia. Therefore, there is a need to give information about current prevalence of intestinal parasitosis within the higher education institutes to the society as well as to stake holders to enable decision on the control of this neglected tropical disease. The research finding will also help government in formulating its health policy and strategies to alleviate problems.

Moreover, the result of the study will also be helpful for planning and implementing health service provision in higher education as the finding will indicate which intestinal parasite is more predominant, what type of drug or reagent should be purchased, how to overcome such problem etc.

And importantly, this research will also be beneficial and helpful for researchers to serve as a reference and to show areas where more research can be done in the future.

## 2. LITRATURE REVIEW

Parasites are organisms that live inside humans or other organisms who act as hosts. They are dependent on their hosts because they are unable to produce food or energy for themselves. Parasites are harmful to humans because they consume needed food, eat away body tissues and cells, and produce toxic waste, which makes people sick (20). The magnitude of harm caused by intestinal parasitosis to the health and interests of individuals and communities depends on the species of the parasite, the intensity of infestation, nature of the interaction between the parasite and coexisting infestation, nutritional and immunological status of the individual, and numerous socio economic factors (21, 22). These factors may in tern be modulated by seasonal and climatic condition. Thus while it is commonly extremely hard to compute the suffering caused by infectious disease (7). Frequencies of infestation are higher in children living in sub-Saharan Africa, followed by Asia and then Latin America and the Caribbean. Intestinal parasitic infections can badly impact host nutritional status in different ways. Especially they can lower appetite and food intake. The factors predisposing students to infestation included students' status on knowledge of intestinal parasites, attitudes towards infections, prevailing practices and unhygienic environmental factors. The most prominent factors predisposing to infestation were failure to wash hands before meals and infrequent cleaning of toilets which attracted Fannia scalaris(latrine flies) (23). There is a strong correlation between the students' level of awareness about parasitic infestation and age, level of study, family income, family educational status, following newspaper/television, type of living home and previous exposure to intestinal parasites (24). Another risk factor for the distribution of intestinal parasite is food handlers with poor personal hygiene working in food serving-establishments could be potential sources of infections by many of the intestinal helminthes and protozoa. Food-handlers who harbor and excrete intestinal parasites may contaminate food from their faeces-to-their fingers and then to food processing and the healthy person may be infected by eating this finger-to-food contaminated food stuff (12, 25). Out of the 101 finger nail content specimens from Jimma University student cafeteria workers (10.9%) were positive for one or more intestinal parasites (12).

The Ethiopian population falls by and large in the low socio-economic strata and health care coverage in the country is underprivileged. The degree of infectious diseases, together with intestinal parasites in any age group therefore anticipated to be high. Intestinal parasitic diseases are one of the ten top causes of morbidity in Ethiopia. In addition to the health problem, intestinal parasites have significant socioeconomic problem in terms of absence from work,

cost for diagnosis and treatment(26). In Ethiopia the prevalence of intestinal parasitosis varies from place to place, for that reason a need for local baseline data for better control and prevention strategies. In Addis Ababa Intestinal parasites would be expected to be highly prevalent since the shortage of clean water, problems in the sewage system and other unhygienic factors that increase the chance of infection by intestinal parasites (16).

Most of the parasitic disease cannot be diagnosed by physical examination alone and laboratory analysis is crucial to decide whether or not the patient is infected with a parasite and, if so, what species of parasite is present (27). The most common intestinal helminths leading to digestive tract disorders including Ascaris lumbricoides, Strongyloides stercoralis, Trichuris trichiura, Enterobius vermicularis, Hookworms, Taenia saginata and Hymenolepis nana, are usually transmitted from contaminated food or water or from the environment. The most common protozoans reported to lead to digestive tract disorders include Entamoeba histolytica and Giardia lamblia. Outbreaks of protozoan infections in humans have been linked to contaminated food from improper environmental sanitation and to inadequate personal hygiene by food-handlers (28). According to the annual report of Addis Ababa University Clinics (of the year 2011/12), 21,718 students have visited the clinics. Of these, the result of the examination shows that, 4976(22.91%) students have upper respiratory tract infection, 2561 (11.79%) peptic ulcer disease, 2084(9.60%) intestinal parasite, 2049(9.43%) acute febrile illness, 1670 (7.69%) eye, ear and nose throat disease, 1454 (6.69%) skin disease, 1321(6.08%) dental carries, 1026 (4.72%) urinary tract infection, 889 (4.09%) rheumatic pain and other types, 3688(16.98%). The above results indicate that intestinal parasitosis is among the major diseases of students' health problems in the university (29).

To identify, evaluate, determine, and give recommendation associated with this intestinal parasitosis, various researches have been done in different countries. Here, on this study some of the findings are discussed focusing on the prevalence of intestinal parasitosis in higher education.

A cross-sectional study was done in University of Lorastan in Iran. There were 310 students selected randomly and they requested to fill up questionnaires and provide stool sample for examination. The stool sample was analyzed using formol-ether concentration technique. In this study each student with at least one pathogenic or non pathogenic parasite was considered infected. The prevalence of intestinal parasitosis in the study subject was (8.4%). From this

Giardia lamblia is the commonest infestation, (13.9%). Between the infected and none infected there was a higher difference with regard to parent education and hand washing habit before eating. Since Giardia lamblia does not permanently appear in stool, probably, the actual infestation rate is higher than the report. Therefore this study showed that parents educational level in addition to hand washing behavior before eating play a significant role in infection with intestinal parasite among the study subject (30).

Additionally, study was also conducted in Dacca University in Bangladesh, 933 students were examined. Out of the total, five hundred and thirty three (57.3%) of the students had single or multiple intestinal parasitosis, of which Ascaris lumbricoides (366), Entamoeba histolytica (113) and Trichuris trichiura (99) were the commonest. It is suggested that chronic nutritional deficiencies are compounded by these parasites, leading to low weights, and low haemoglobins (31).

In study conducted in Bangladesh, the prevalence of intestinal parasitosis was investigated among the outdoor patients including teacher, student and staff of the Dhaka University treated at Dhaka University Medical Centre. I selected only students which is related to my thesis, out of 277 students, (24.55%) showed infestation with intestinal parasites, Ascaris lumbrichoid is the highest (12.6%) followed by G. intestinalis, (6.5%), E.histolytica, (3.2%) T.trichiura, (2.2%) are seen (32).

A study was conducted in Mustafa Kemal University, School of Health in Turk. The prevalence of intestinal parasites in female students (aged from 16-18 years) in the University was investigated. Fecal samples and cellophane tape preparations were used for diagnosis. For this reason 142 fecal samples and 136 cellophane tape preparations were examined. One or more parasites were found in 65 (45.77%) fecal samples. The prevalence of parasites that found in fecal samples is as follows: Blastocystis hominis in 63 samples (96.92%) and Giardia intestinalis in 2 samples (3.08 %). Enterobius vermicularis was found in 9 (6.61%) out of 136 cellophane tape preparations (33).

One study which was conducted in Edo State, Nigeria on the prevalence of intestinal parasites among tertiary institution students, a total of 1222 university students were examined for intestinal parasitosis and the prevalence of students infected was (12.52%). The main parasites

identified were Ascaris, (4.33%), Entameba histoltica, (3.27%), hook worm, (2.53%) Trichuris trichiura, (1.6%), Gardia lamblia, (0.8%) and Taenia species, (0.57%) (34).

A study was done on prevalence of soil transmitted helminthes among the students of the Federal Polytechnic Ede, a tertiary institution in Osun State, Nigeria. A total of 252 subjects were screened. Ascaris lumbricoides and hookworm were the only parasites recovered from the stool sample of the students and the prevalence of parasitosis was (20.6%). A. lumbricoides had the highest prevalence of (12.7%), while the prevalence of Hookworm was (8.0%). Entamoeba histolytica was also observed in the study population with a prevalence of 3.19% (17).

All the above study shows there is significant number of higher institution students who were infested by different intestinal parasites, therefore emphasis should be given to this area because this age groups are productive group and could have enormous negative impact on one's country.

## Conceptual framework

The factors that are related to intestinal parasitosis are multi-dimensional (living or visiting an area known to have parasites, poor sanitation (for both food and water), poor personal hygiene, having weakened immune system are some of the major factors) (12, 25, 35). Improper food handling practices and poor parental educational status also increase transmission of intestinal parasites and food borne illness (30, 36).

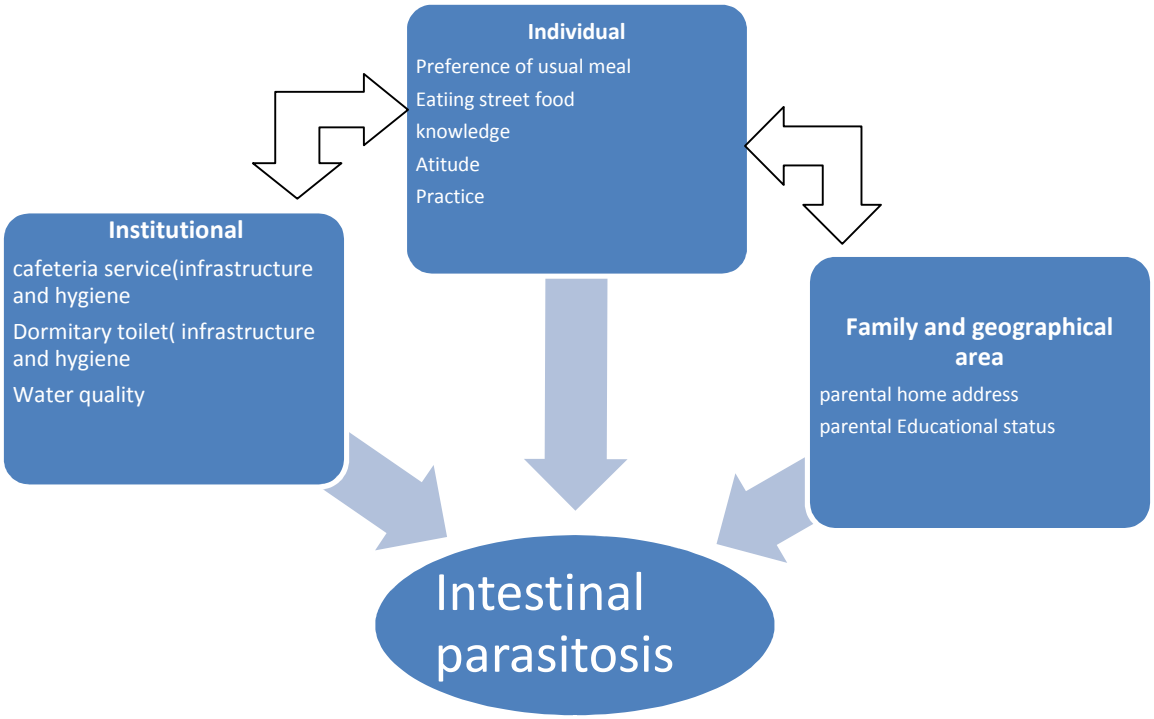


**Figure 1***: Conceptual framework for determinant of intestinal parasitosis among students who use Addis Ababa University clinics in Addis Ababa, Ethiopia, 2013 (n= 556)*

# 3. OBJECTIVE OF THE STUDY

## 3.1. General Objective

- To determine the prevalence and determinants of intestinal parasitosis among AAU students who use AAU student clinic service in Addis Ababa, Ethiopia.

## 3.2. Specific Objective

1. Determine the prevalence of intestinal parasite among AAU clinic service users.
2. Assess the sanitary condition of student cafeteria and dormitory toilets
3. Assess the determinants of intestinal parasitosis among AAU students who use clinic service.

# 4. METHOD AND MATERIAL

## 4.1. Study Design and Period

Health facility based cross sectional study with quantitative method complemented by qualitative method was conducted to assess the prevalence and determinants of intestinal parasitosis among AAU students who use clinic service. The study was conducted from Sep. 2012 to Nov. 2013.

## 4.2. Study area

The study was conducted in Adds Ababa University (formerly Haile Selassie I University) which is the first university in Ethiopia. Established 1950, it was originally named "University college of Addis Ababa" at its founding, and then renamed following the Ethiopian emperor Haile Selassie I in 1962 before receiving its current name in 1975.

It has seven campuses; six in Addis Ababa and one in Bishoftu, about 45 kilometers away. It also maintains branches in many cities throughout Ethiopia, leading to the claim of being "the largest university in Africa." The government assigns qualified students to these universities upon completion of preparatory school.

In 2009/10 academic year, there were 20,701 enrolled undergraduate, 7,127 graduate, and 14,669 continuing education students making a total of 42,497 students (37).

Student clinic service is one of the services that the university provides to regular students. This study did within the students' clinic at Main Campus, Addis Ababa. The study site was selected by considering high number of students enrolled, location, cost, time and availability of laboratory. Addis Ababa University Student Service has six student clinics located in Main campus, College of natural science, North Technology, College of health science (Tikur Anbesa Specialzed Referal hospital), School of Journalism, and Sefereselam campus. More number of students is served in Main, Science and North Technology campus. The objectives of these clinics are that to ensure students' wellbeing and provision of health care and medication to all regular students.

Staffs of these clinics could be classified into two: Health professional and Supportive staffs. There were 36 Nurses, 1 Sanitary Technician, 2 Laboratory Technologist, 1 Laboratory technician and 3 part times Doctors (2 Internist and 1 Psychiatrist). There were a total of 21

supportive staffs. Therefore, totally the staffs who were working at different campus of the university were 64.

The number of regular students who had utilized the clinic health services during the last academic year were 21,718 students (15864 male and 5854 Female) (29).

### 4.3. Source Population

All Addis Ababa University students who use clinic service

### 4.4. Study Population

Addis Ababa University students who use clinic service in the three campuses

### 4.5. Eligibility Criteria

Inclusion criteria: All students who use university clinic service in the three campuses

Exclusion criteria: Post graduate students and Students who are department of special needs (deaf or blind). Because there is no skilled personnel for sign language and no man power of interviewer for blind students.

### 4.6. Study Variable

- **Dependent variable**

  Presence of Intestinal parasites

- **Independent variable** (Main independent variables)

  Age
  Sex
  Field of Study
  Parental educational status (maternal and paternal)
  Parental home address
  Dormitory usage in the campus
  Cafeteria usage in the campus
  Knowledge
  Attitude
  Hand washing habit
  Finger nail status
  Habit of eating street food

### 4.7. Sample Size Determination

Sample size was calculated using a single population proportion. Although different studies show varying prevalence rates of intestinal parasitic infection among study groups (school children, food handler, dweller…) there is no observable study in higher institution students in Ethiopia, so I used the latest Addis Ababa University clinic laboratory annual report, hence 33% prevalence was considered.

$$n = \frac{(z_{\alpha/2})^2 P(1-P)}{d^2}$$

$$= \frac{(1.96)^2 \times 0.33(1- 0.33)}{(0.04)^2} = 530$$

Where,

n = calculated sample size

$Z_{\alpha/2}$ = 95% confidence interval = 1.96

P = prevalence of intestinal parasite among AAU university students who use clinics service = 0.33

d = margin of error = 0.04

To allow for possible non-response, the sample size was adjusted by 5%.

n = 530+5% = 556

### 4.8. Sampling Techniques

Select students using systematic cluster sampling technique from OPD, Emergency and VCT of the three campuses (Main, Science and Technology). These campuses were selected purposively based on higher number of students enrolled and more student utilize clinics service, laboratory availability, location of the campuses, some of the campuses are in health facility for this reason some of students don't come to student clinics at all, so exclude such campuses and those selected campuses report high number of cases in their consecutive annual report. The number of students was selected based on proportional allocation of sample. Finally the total number of students was selected by systematic cluster sampling method. The sampling interval was the ratio of the daily average number of students visiting the clinics to the number of students to be included in the study in one day. According to the time frame for the study a one month data collection period was planned. To collect the desired sample size, 556 in one month, on the

average 28 students were included in the study in one day. Dividing 556 sample size for one month working day which is twenty (20) therefore 28 study subjects were included in one day Hence, the sampling interval was the ratio of the daily average expected number of student visiting the clinic which is one hundred (100) and 28 (Example: if 100 students come per a day, 100/28 = 3, so take every three). Finally proportional numbers of students were selected based on the daily service of the clinics.

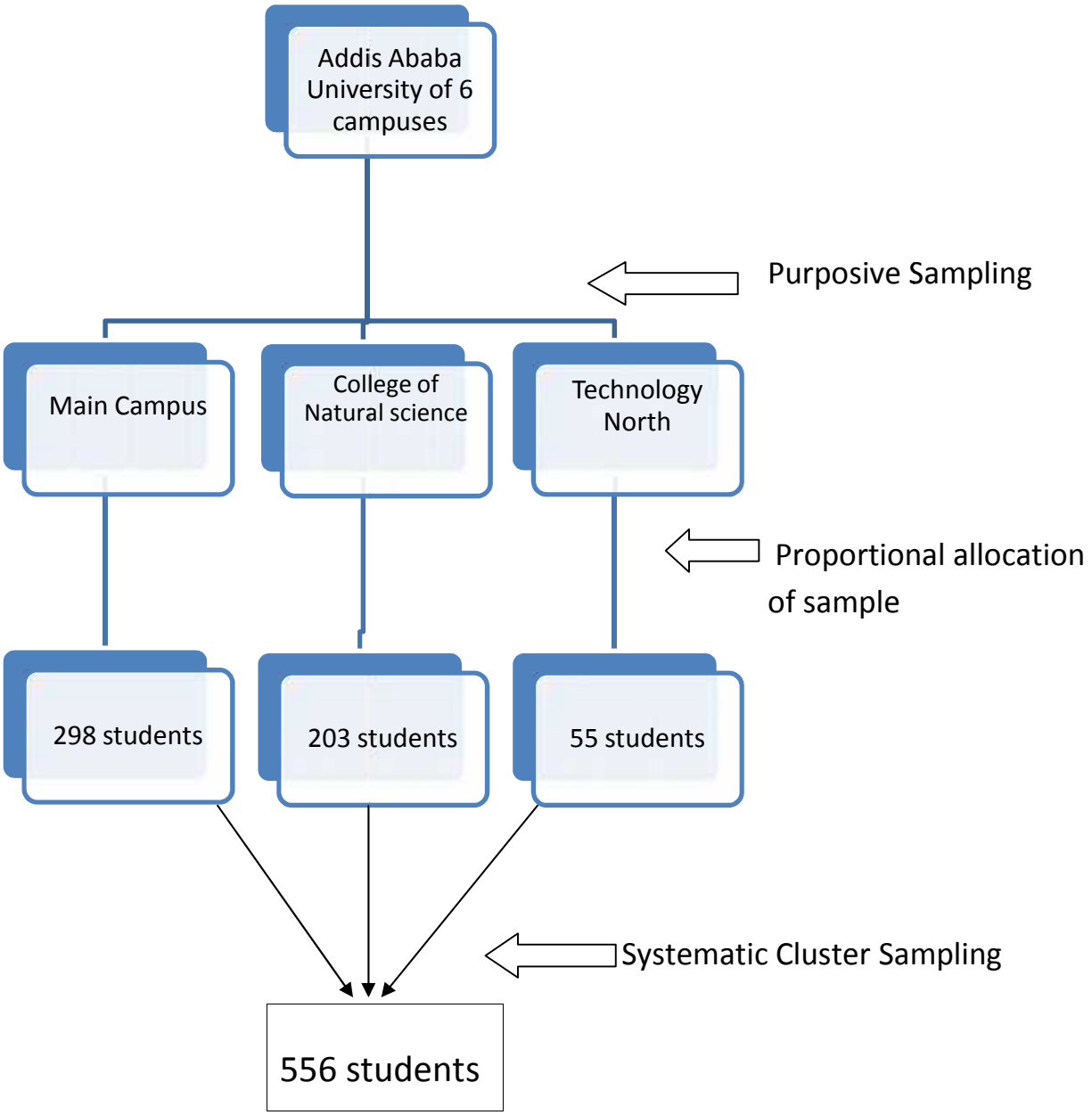


**Figure 2:** ***Sampling techniques among students who use Addis Ababa University clinics in Addis Ababa, Ethiopia, 2013 (n= 556)***

### 4.9. Data Collection Procedure

A structured, close and open ended, coded, question was prepared in Amharic and English version to know socio-demography and assess their knowledge, attitude and practice on intestinal parasites personal hygiene and sanitation. The questioner was self-administered. The completed questioner was facilitated and collected by the health professionals or patient card distributers. Finally the student gave stool sample to the laboratory then analyzed using direct wet mount and concentrated method in parallel.

To avoid inter and intra observer detection of parasites, a cross check was done by laboratory technologists. Inspection using observational check list was used to inspect for student cafeteria and dormitory toilet and focus group discussion of cafeteria workers for student cafeteria. This was carried out by the health professionals. The investigator created favorable condition at the time of data collection.

### 4.10. Data Quality Management

To control the data quality 7 (seven) health professionals and 3 (three) card distributers was trained on the administration of the study instrument and ethical issue for one day. The study instrument was first translated in to Amharic then English by different peer groups then it takes the common one. To keep the data quality data collection instruments were pretested and adjustment was made based on accepted assessment. Five percent of study subjects were pretested whether the respondents understood the instrument. We conducted a pretest test to assure quality of laboratory procedures on stool analysis before the commencement of the actual study through double analysis of same sample with different laboratory Technologists. Throughout the data collection the principal investigator gives supervision and keeps the quality of data its maximum. Timely correction of the completeness of the questionnaire was made.

### 4.11. Laboratory Methods

**Stool specimens:** Fecal samples were collected then immediately after collection, each stool specimen was tested in direct microscopy then formol-ether concentration technique, stools which are not test immediately preserve in a container containing 10% formalin.

**Direct wet mount preparations:** The direct wet smear is prepared by mixing a small amount of stool (about 2 mg) with a drop of 0.85% NaCl. These mixtures provide a uniform suspension under a cover slip. The entire cover slip should be systematically examined with the low-power objective (10x) under low light intensity; any suspicious objects may then be examined with the high dry objective (40x) (27, 38).

**The formol ether concentration technique:** By centrifugation, the concentration procedure leads to the recovery of all protozoa, eggs, and larvae present; however, the preparation contains more debris than is found with the floatation procedure. Ether is used to extract debris and fat from the feces and leave the parasites at the bottom of the suspension. This test is recommended as being the easiest to perform, allowing recovery of the broadest range of organisms, and being the least subject to technical error (27, 38).

### 4.12. Data Processing and Analysis

The data entered in to and cleaned using Epi info version 3.5.1 and analyzed using SPSS version 16.0 computer software. Data was described using frequency, counts, percent, mean, median standard deviation, logistic regression, crude odds ratio and adjusted odds ratio regarding age, sex, hand washing habit, campus cafeteria usage, dormitory usage, eating street food was stratify and associate the independent variables with presence of intestinal parasites. Crude and adjusted Odds ratio with 95% confidence interval at $P < 0.05$ was used to check whether there were significant association between dependent and independent variables. Recoding and computing new variables were made accordingly to make variables suitable for further analysis.

For qualitative part no statistical software was applied, but simple observation of student cafeteria and dormitory toilets with cafeteria checklist and measure the points based on the criteria.

## 4.13. Operational definitions

**Mixed infestation:** Is the simultaneous infestation of a host by two or more parasites.

**Abdominal pain/discomfort**: a person feels anywhere between the lower chest to the distal groin.

**Sanitation:** the provision of facilities and service for the safe disposal of human urine and faeces.

**Personal hygiene**: if an individual practice his/her body and clothes cleanliness and hand washing habit.

**Knowledge:** The fact or condition of being aware of hygiene, sanitation and intestinal parasites.

**Attitudes**: believing proper collection of solid or liquid waste is students' duty in addition to the duty of the university.

**Practices:** at all times; wash hands, body and hair with soap, cut nails, brush teeth, comb hair, and avoid eating street food which is risky for health

**Good hand washing:** a process of mechanically removing soil and debris from the skin of the hands using soap or detergent and water.

**Street food**: foods sold in road side which is risk for health such as cookies, 'pasty'… etcetera

**Solid Waste Management** The systematic administration of activities that provide for the collection, source separation, storage, transportation, transfer, processing, treatment, and disposal of solid waste.

**Ventilated:** a ventilation opening suitable for rapid ventilation having total area of at least $1/20^{th}$ of the floor area of the room

**Adequate lightening:** a light intensity of 20 foot candles (approximately equivalent to a 60 watt bulb at a clear distance of 5 feet.

**Main Campus:** Addis Ababa University "Sidst Kilo" campus

**Technology Campus:** Addis Ababa University North Technology "Amist kilo" Campus

**Science Campus:** Addis Ababa University Natural Science "Arat kilo" campus

**Cafeteria service:** food establishment service for students only

## 4.14. Ethical Considerations

Ethical clearance and permission was obtained from Research Ethics Review Committee School of Public Health, College of Health Sciences Addis Ababa University. Before the actual data collection starts, permission was obtained from Addis Ababa University Student Service Director. During the distribution of questionnaires and stool sample collection, students were informing about the purpose and benefit of the study along with their full right to refuse or completely reject in participation. The sample collection was anonymous and the test result was strictly confidential. Finally all the students who found positive for parasite gave standard treatment with free of charge.

## 4.15. Dissemination of Results

The result of the study will be present in School of Public Health in partial fulfillment graduation of Addis Ababa University then distributed to the City's Health Bureau, Ministry of Education (colleges and universities) and other concerned sectors. The hard copy will be available in Addis Ababa University School of public health libraries. Results will also be tried to publish through scientific journals.

# 5. RESULT

## 5.1.Socio Demographic Characteristics of Study Subject

From the total of 556 study subject, 424 (76.3 %) were male and 132 (23.7 %) female students with the non response rate 0%. The mean age was 21.96 (±3.8) years, ranging from 17 to 48 years. Study Year I, II and III comprised 425 (76.4 %) of the study subject and 131(23.6%) were year IV and V. Three hundred eighty one (68.5 %) of the students' field of study is natural science and engineering; and 175(31.5 %) of the students' field of study is social science. Many of the students, 222(40%) - 268 (48.2 %) maternal and paternal educational statuses were illiterate. Majority, 489(87.9 %) of study subjects have their parental home address were out of Addis Ababa while only for 67(12.1%) of the study subjects was in Addis Ababa. Out of 556 study subjects, 527(94.8%) of them had dormitory and 484(87.1%) of study subjects used cafeteria service. Majority, 280(57.9%) of study participant use cafeteria service in the main campus followed by science and technology campuses 160(33.1%) and 44(9.1%), respectively. Some students, 20(27.8%) eat their daily meals at home or prepared by self and only one (1.4%) student reported to use lounge service for daily meals.

**Table 1: Distribution of socio demographic and other related variables among Addis Ababa University students who use clinic service, 2013 (n= 556)**

| Variable | Frequency | Percent (%) |
|---|---|---|
| **Age** | | |
| 15-19 | 95 | 17.1 |
| 20-24 | 407 | 73.2 |
| >24 | 54 | 9.7 |
| **Total** | 556 | 100 |
| **Sex** | | |
| Male | 424 | 76.3 |
| Female | 132 | 23.7 |
| **Year of training** | | |
| Y-I | 135 | 24.5 |
| Y-II | 146 | 26.3 |
| Y-III | 144 | 25.9 |
| Y-IV | 89 | 16.0 |
| Y-V | 42 | 7.6 |
| **Field of study** | | |
| Natural science | 202 | 36.3 |
| Social science | 175 | 31.5 |
| Engineering | 179 | 32.2 |
| **Maternal educational status** | | |
| Illiterate | 268 | 48.2 |
| Elementary | 178 | 32.0 |
| High school | 56 | 10.1 |
| College | 54 | 9.7 |
| **Paternal educational status** | | |
| Illiterate | 222 | 39.9 |
| Elementary | 171 | 30.8 |
| High school | 96 | 17.3 |
| College | 67 | 12.1 |
| **Home address of parent** | | |
| Addis Ababa | 67 | 12.1 |
| Out of Addis Ababa | 489 | 87.9 |
| **Having dormitory (in campus)** | | |
| Yes | 527 | 94.8 |
| No | 29 | 5.2 |
| **Cafeteria usage (in campus)** | | |
| Yes | 484 | 87.1 |
| No | 72 | 12.9 |
| **Distribution by cafeteria** | | |
| Main | 280 | 57.9 |
| Science | 160 | 33.1 |
| Technology | 44 | 9.1 |
| **Other area to eat** | | |
| Home/prepared by self | 20 | 27.8 |
| Outside cafeteria | 51 | 70.8 |
| Lounge | 1 | 1.4 |

## 5.2. Presence of Abdominal Pain or Discomfort During the last two weeks

Study subjects were asked whether they had abdominal pain or discomfort during the last two weeks. Three hundred twenty six students (58.6%) had abdominal pain or discomfort, see the detail in table 2 below:

**Table 2: Presence of abdominal pain or discomfort two weeks prior to survey**

| Had abdominal Symptom | Frequency | Percent (%) |
|---|---|---|
| Abdominal discomfort (n= 556) | 326 | 58.6 |
| Bloody diarrhea (n= 326) | 72 | 22.1 |
| Watery diarrhea (n= 326) | 124 | 38.0 |
| Abdominal cramp/constipation (n= 326) | 175 | 53.7 |
| Other abdominal symptom(like bowl obstruction, intestinal ulcer…) (n= 326) | 25 | 7.7 |

*NB: Percent do not add up to 100% due to multiple responses*

### 5.3. Knowledge on Hygiene, Sanitation and Intestinal Parasites

Twelve variables in relation to hygiene, sanitation and intestinal parasites were sorted out to asses study subjects' knowledge level on hygiene, sanitation and intestinal parasites. The variables and their given points are; personal hygiene (4 points), sanitation (3 points), poor personal hygiene and sanitation (4 points), disease prevention transmitted by human waste (3 points), intestinal parasite (1 point), parasite transition to human (3 points), solid waste (5 points), effect of solid waste (4 points), and way of solid waste disposed (3 points). Summary score was calculated based on 30 points and the mean score was found to be 21 (±3.8). Therefore, study participants who scored greater than or equal to the mean score (21 points) were considered as knowledgeable and those who scored less than the mean score (21points) were not knowledgeable to hygiene, sanitation and intestinal parasites.

When study participants were asked about what is personal hygiene mean, majority 479(86.2%) of the participants responded as bathing, 471(84.7%) hand washing, 451(81.1%) cloth washing, 379(68.2%) trim short or clean finger nail, and 43(7.7%) of study participant mentioned other type of personal hygiene and sanitation like teeth brush and hair making(broom). When study participants were asked about what is sanitation mean, majority, 491(88.3%) of the participants responded as the establishment of environmental condition favorable to health, 403(72.5%) using toilet appropriately, 374(67.3) washing or cleaning dorm, 19(3.4%) mentioned other, like discarding the tissue paper appropriately. When study participants asked about what disease occurs due to poor personal hygiene and sanitation, majority, 463(83.3%) of study participants responded as diarrhea, 432(77.7%) intestinal parasite, 302(54.3%) trachoma and 256(46.0%) skin disease. They also asked about how prevent disease transmitted by human waste, majority, 479(86.2%) of study participants responded keep the toilet clean, 383(68.9%) flush water after using the toilet, 368(66.2%) flush water before using toilet, 31(5.6%) specify cloth toilet doors and use tissue paper appropriately. Below half, 232(41.7%) of the study participants correctly answered question about what is intestinal parasite mean which is micro or macro organisms found in soil, contaminated food or water, 110(19.8%) micro organism which live in air, 279(50.2%) micro organisms which is found everywhere, few or 19(3.4%) of study participant wrote a wrong definition. They also asked the transmission of intestinal parasites, majority 477(85.8%) of study participant answered from contaminated soil, food and water, 433(77.9%) poor personal hygiene and sanitation, 338(60.8%) vector (flies), 19(3.4%) specify other

mechanisms. They were also asked about what is solid waste mean, majority, 423(76.1%) of study participants responded as used soft papers, 405(72.8%) used plastics, 351(63.1%) used papers, 320(57.6%) chalk dust, 231(41.5) highly grown grass, 18(3.2%) mentioned other solid wastes. When asked about the effect of solid waste if not disposed properly, majority, 495(89.0%) of study participants responded it cause that health problems, 386(69.4%) create a bad smell, 383(68.9%) flies can breed, 355(63.8%) make the environment unsightly, and 15(2.7%) specify other effects. They also asked about the ways solid waste is disposed, majority, 408(73.4%) of study participants answered burn in refuse pit, 405(72.8%) collect in dust bin, 313(56.3%) buried, and 12(2.2%) mentioned other mechanisms like recycling and transport to far area.

Of the total 30 hygiene, sanitation and intestinal parasite points, three hundred eighty nine (70%) of the study subject scored more than or equal to the mean score (21 points) and these were considered as knowledgeable on hygiene, sanitation and intestinal parasites. While one hundred sixty seven (30%) of the study subject score less than the mean score (21 points) and considered as not knowledgeable on hygiene, sanitation and intestinal parasites.

**Table 3: Knowledge on hygiene, sanitation and intestinal parasites among Addis Ababa University students who use clinic service, 2013 (n= 556)**

| Variable | Frequency | Percent (%) |
|---|---|---|
| **What is personal hygiene** | | |
| Washing cloth | 451 | 81.1 |
| Bathing | 479 | 86.2 |
| Hand washing | 471 | 84.7 |
| Trim short/clean finger nail | 379 | 68.2 |
| Other (teeth brush, broom/shaving hair…etc)* | 43 | 7.7 |
| **What is sanitation mean** | | |
| Washing or cleaning dorm | 374 | 67.3 |
| Using toilet appropriately | 403 | 72.5 |
| The establishment of environmental condition favorable to health | 491 | 88.3 |
| Other (washing dorm and class room…etc)* | 19 | 3.4 |
| **What disease occur due to poor personal hygiene and sanitation** | | |
| Diarrhea | 463 | 83.3 |
| Intestinal parasite | 432 | 77.7 |
| Trachoma | 302 | 54.3 |
| Skin disease | 256 | 46.0 |
| Other (typhoid fever, typhus… etc)* | 19 | 3.4 |
| **How do you prevent disease transmitted by human waste** | | |
| Flush water before using toilet | 368 | 66.2 |
| Flush water after using toilet | 383 | 68.9 |
| Keep the toilet clean | 479 | 86.2 |
| Other (wash hands after use toilet, close the door after use… etc)* | 31 | 5.6 |
| **What is intestinal parasite mean**** | | |
| Microorganism which live in air | 110 | 19.8 |
| Microorganism which is found everywhere | 279 | 50.2 |
| Micro/macro organism found in soil, contaminated water or food** | 407 | 73.2 |
| Other (it is bacteria, " I don't know"… etc)* | 9 | 1.6 |
| **How intestinal parasites transmit to human** | | |
| From contaminated soil, food and water | 477 | 85.8 |
| vectors(flies) | 338 | 60.8 |
| Poor personal hygiene and sanitation | 433 | 77.9 |
| Other (poor hand washing, un hygienic food… etc)* | 19 | 3.4 |
| **What is solid waste mean** | | |
| Used paper | 351 | 63.1 |
| Used plastics | 405 | 72.8 |
| Chalk dust | 320 | 57.6 |
| Used soft paper | 423 | 76.1 |
| Highly grown grass | 231 | 41.5 |
| Other (dust and mud)* | 18 | 3.2 |
| **What is the effect of solid waste if not disposed properly** | | |
| Flies may breed | 383 | 68.9 |
| Bad smell | 386 | 69.4 |
| Health problem | 495 | 89.0 |
| Unsightly environment | 355 | 63.8 |
| Other (environmental pollution, filling sewage… etc)* | 15 | 2.7 |
| **How could solid waste disposed** | | |
| Collect in dust bin | 405 | 72.8 |
| Burn in refuse pit | 408 | 73.4 |
| Buried | 313 | 56.3 |
| Other (recycling, transport to far area… etc)* | 12 | 2.2 |

** Other responses in the bracket are not considered.*

***Due to multiple choices given to the question (i.e., what intestinal parasite mean), only 41.7% of students responded correctly as 'Micro/macro organisms which found in soil, water, or food' only. For those who responded with more than one answer including the correct one were not considered knowledgeable for that question.*

### 5.4. Attitude on Hygiene and Sanitation

Concerning their attitude, they were asked about the safety and cleanliness of the university toilets majority, 458(82.4%) of study participants responded it was not clean and safe, 98(17.6%) responded it was clean and safe. They were also asked their feeling about the cleanliness of the university compound, majority, 303(54.5%) of the study participant responded they have mixed feeling or it was not bad, 178(32.0%) had bad feeling, 75(13.5%) had good feeling. They also asked their attitude towards who keep the campus clean, majority, 494(88.8%) of study participants responded both of the University and students responsibility to take the duty, while only few, 29(5.2%) thought either merely it is the duty of the university, or 26(4.7%) take it as their duty to keep it clean, but 7(1.3%) mentioned other bodies to keep the campus clean.

The study subjects were also asked if they get education about personal hygiene and sanitation, 330(59.4%) of the study subject responded yes, where as 226(40.6%) answered no. From those who get education about personal hygiene and sanitation majority, 198(60%) mentioned mass media, 76(23.0%) from health professional, 51(15.4%) from teachers, while very few, 5(1.6%) mentioned other sources like books. When they were also asked about their preferred source of health information in descending order as, 300(54.0%) from health professional, followed by 186(33.5%) mass media, and 63(11.3%) teachers, 7(1.3%) prefer other sources like reading books. They were asked about the three major sanitation and hygiene related problems in the campus, majority (30.2%) responded lack of poor cafeteria service, lack of continuous water supply and dormitory cleanliness.

**Table 4: Attitude on hygiene and sanitation among Addis Ababa University students who use clinic service, 2013 (n= 556)**

| Variable | Frequency | Percent (%) |
|---|---|---|
| **University toilets are safe and clean** | | |
| Yes | 98 | 17.6 |
| No | 458 | 82.4 |
| **Feeling about the cleanliness of the University compound** | | |
| Good | 75 | 13.5 |
| Bad | 178 | 32.0 |
| Mixed feeling | 303 | 54.5 |
| **Who is responsible for the cleaning the campus** | | |
| It is the duty of the university | 29 | 5.2 |
| It is our duty to keep it clean | 26 | 4.7 |
| Both of us have to take the duty | 494 | 88.8 |
| Other (outside bodies) | 7 | 1.3 |
| **Do you ever get personal hygiene and sanitation education** | | |
| Yes | 330 | 59.4 |
| No | 226 | 40.6 |
| **Source of education about hygiene and sanitation** | | |
| From health professionals | 76 | 23.0 |
| Mass media | 198 | 60.0 |
| Teachers | 51 | 15.4 |
| Other (books, internet and peers) | 5 | 1.6 |
| **Preferred source of health information** | | |
| From health professionals | 300 | 54.0 |
| Mass media | 186 | 33.5 |
| Teachers | 63 | 11.3 |
| Other (books, internet and peers) | 7 | 1.3 |

## 5.5. Hygiene and Sanitation Practice

Seven variables were pertaining to hygiene and sanitation practices were selected, to assess the practice of study subjects on hygiene and sanitation. The variables and their given points are; hand washing (1 point), use soap or other detergent during hand washing (1 point), washing cloth (1 point), take a bath (1 point), trim short or clean finger nail (1 point), flush water on the latrine after use (1 point), often eat street food (1 point). A total of seven score points were taken of the seven variables. The mean practice score for hygiene and sanitation found to be 6.0. Participants who scored greater than or equal to the mean score (6.0 points) were considered that, they had good hygiene and sanitation practice while those scored less than the mean score (6.0 points) were poor hygiene and sanitation practice.

When study participants asked about at what time they wash their hand, majority, 530(95.3%) of study participant answered before eating, 460(82.7%) after eating, 425(76.4%) after visiting toilet and 34 (6.1%) mentioned additional times like any time when “I feel discomfort”. They also asked whether they use soap or other detergents when washing their hands, majority, 334 (60.1%) responded no, where as only 222(39.9%) conformed. When asked how often do they take a bath, majority, 226(40.6%) responded twice a week, 19(34.4%) once a week, 121(21.8%) from three times a week to every day and 18(3.2%) mentioned once in two week or more. They also asked how often they wash their clothes, majority, 419(75.4%) of study participant responded once a week, 81(14.6%) twice a week, 121(21.8%) from three times a week to every day and 32(5.8%) mentioned once in two week or more. They also asked whether they often trim short or clean their finger nail, majority, 498(89.6%) of study participant responded yes, whereas 58 (10.4%) responded no. When asked whether they flush water on the latrine after use, majority, 497 (89.4%) of study participant conformed while the rest, fifty nine (10.6%) not.

Of the total seven personal hygiene and sanitation points, four hundred eighty seven (87.6%) of study subjects scored more than or equal to the mean score (6.0 points) these were considered as good hygiene and sanitation practice. while, sixty nine (12.4%) of study subjects score less than the mean score (6.0) were considered as poor hygiene and sanitation practice.

**Table 5: Personal hygiene and sanitation practice among Addis Ababa University students who use clinic service, 2013 (n= 556)**

| Variables | Frequency | Percent (%) |
|---|---|---|
| **Time of washing hand** | | |
| Before eating | 530 | 95.3 |
| After eating | 460 | 82.7 |
| After visiting toilet | 425 | 76.4 |
| Other (after meeting with someone, touching soiled materials) | 34 | 6.1 |
| **Use soap or other detergent when washing hands** | | |
| Yes | 222 | 39.9 |
| No | 334 | 60.1 |
| **Time of washing clothes** | | |
| Once a week | 419 | 75.4 |
| Twice a week | 81 | 14.6 |
| Three times a week or more | 24 | 4.3 |
| Other (once in two/more weeks) | 32 | 5.8 |
| **Time of taking a bath** | | |
| Once a week | 191 | 34.4 |
| Twice a week | 226 | 40.6 |
| Three times a week or more | 121 | 21.8 |
| Other (once in two/more weeks) | 18 | 3.2 |
| **Trim short/clean finger nail** | | |
| Yes | 498 | 89.6 |
| No | 58 | 10.4 |
| **Flush water on the latrine after using** | | |
| Yes | 497 | 89.4 |
| No | 59 | 10.6 |
| **Often eat street food** | | |
| Yes | 225 | 40.5 |
| No | 331 | 59.5 |

### 5.6. Association between Socio-demographic Variables and Intestinal Parasitosis

A crude analysis was done using binary logistic regressions to asses any association between the socio demographic variables and intestinal parasitic infection. Illiteracy of maternal educational status and campus cafeteria service usage showed significant association with intestinal parasitosis ($P < 0.05$). However, age, sex, campus, year of study field of study paternal educational status, home address of parents and dormitory service were not significantly associated with intestinal parasites.

Study participants who had illiterate mother were 2.5 times more likely infested by intestinal parasites than college or higher educated mother, [COR: 2.5, 95% CI = (1.1, 5.7)]. and study participants who use cafeteria service were 2.4 times more likely infested by intestinal parasites than those who do not, [COR: 2.4, 95% CI: (1.2, 5.0)].

**Table 6: Association of socio-demographic variables and intestinal parasitosis among Addis Ababa University students who use clinic service, 2013 (n= 556)**

| Variables | Parasitic infestation | | COR(95% CI) |
|---|---|---|---|
| | Yes (%) | No (%) | |
| **Age** | | | |
| 15-19 | 20(21.0) | 75(79.0) | 1.53(0.6,3.8) |
| 20-24 | 106(26.0) | 301(74.0) | 2.0(0.92,4.4) |
| >24 | 8(14.8) | 46(85.2) | 1.00 |
| **Sex** | | | |
| Male | 108(25.4) | 316(74.6) | 1.39(0.86,2.25) |
| Female | 26(19.6) | 106(80.3) | 1.00 |
| **Year of training** | | | |
| Y-I | 32(23.7) | 103(76.3) | 1.13(0.49,2.63) |
| Y-II | 32(21.9) | 114(78.1) | 1.02(0.44,2.37) |
| Y-III | 37(25.7) | 107(74.3) | 1.3(0.55,2.89) |
| Y-IV | 24(27.0) | 65(73.0) | 1.35(0.56,3.24) |
| Y-V | 9(21.4) | 33(78.6) | 1.00 |
| **Field of study** | | | |
| Natural science | 47(23.3) | 155(76.7) | 1.02(0.63,1.64) |
| Social science | 46(26.3) | 129(73.7) | 1.28(0.74,1.94) |
| Engineering | 41(22.9) | 138(77.1) | 1.00 |
| **Maternal educational status** | | | |
| Illiterate | 72(26.9) | 196(73.1) | 2.46(1.1,5.7)* |
| Elementary | 43(24.2) | 135(75.8) | 2.13(0.90,5.0) |
| High school | 12(21.4) | 44(78.6) | 1.83(0.66,5.0) |
| College | 7(13.0) | 47(87.0) | 1.00 |
| **Paternal educational status** | | | |
| Illiterate | 59(26.6) | 163(73.4) | 1.84(0.90,3.75) |
| Elementary | 37(21.6) | 134(78.4) | 1.40(0.7,2.95) |
| High school | 27(28.1) | 69(71.9) | 1.99(0.90,4.36) |
| College | 11(16.4) | 56(83.6) | 1.00 |
| **Home address of parent** | | | |
| Addis Ababa | 11(16.4) | 56(83.6) | 1.00 |
| Out of Addis Ababa | 123(25.1) | 336(74.9) | 1.7(0.86,3.37) |
| **Having dormitory (in campus)** | | | |
| Yes | 131(24.9) | 396(75.1) | 2.9(0.85,9.62) |
| No | 3(10.3) | 26(89.7) | 1.00 |
| **Cafeteria usage (in campus)** | | | |
| Yes | 125(25.8) | 359(74.2) | 2.4(1.2,5.0)* |
| No | 9(12.5) | 63(87.5) | 1.00 |
| **Distribution by cafeteria** | | | |
| Main | 75(26.8) | 205(73.2) | 1.1(0.86,2.01) |
| Science | 39(74.4) | 121(75.6) | 1.0(0.6,2.33) |
| Technology | 11(12.5) | 33(87.5) | 1.00 |
| **Other areas to eat** | | | |
| Home/prepared by self | 1(5.0) | 19(95) | 1.00 |
| Outside cafeteria or lounge | 8(15.3) | 44(84.7) | 3.0(0.34,26.2) |

*= *Maternal illiteracy and cafeteria usage in the campus were significantly associated at $p < 0.05$*

## 5.7. Association of Knowledge, Attitude and practice on hygiene and sanitation with the presence of Intestinal Parasitosis.

A Crude analysis was done using binary logistic regressions to assess knowledge, attitude and practice on the presence of intestinal parasitosis; knowledge and attitude were not significantly associated ($P < 0.05$). However, Eating street food was significantly associated with intestinal parasitosis ($P < 0.05$). However, time of hand washing, using soap or detergent during hand washing, washing cloth, taking bath, trim short or clean finger nail, and flush water on the latrine were not significantly associated with intestinal parasitosis.

Study participants who eat street food often were 2.25 times more likely infested by intestinal parasites than those who do not [COR: 2.25, 95% CI: (1.5, 3.44)].

**Table 7: Association between hygiene and sanitation practice with intestinal parasitosis among Addis Ababa University student who use clinic service, 2013 (n= 556)**

| Variables | Parasitic infestation | | COR(95% CI) |
|---|---|---|---|
| | Yes (%) | No (%) | |
| **Washing hand before eating** | | | |
| Yes | 125(23.6) | 405(76.4) | 1.00 |
| No | 9(34.6) | 17(65.4) | 1.71(0.74, 4.0) |
| **Washing hand after eating** | | | |
| Yes | 108(23.5) | 352(76.5) | 1.00 |
| No | 26(27.0) | 70(73.0) | 1.2(0.5,1.36) |
| **Washing hand after visiting toilet** | | | |
| Yes | 96(22.6) | 329(77.4) | 1.00 |
| No | 38(29.0) | 93(71.0) | 1.4(0.90, 2.17) |
| **Time of washing clothes** | | | |
| Once or more in a week | 127(24.2) | 397(75.8) | 1.00 |
| Once in more than a week | 7(21.9) | 25(78.1) | 1.1(0.4,2.9) |
| **Time of taking a bath** | | | |
| Once or more in a week | 131(24.3) | 407(75.7) | 1.6(0.45,5.8) |
| Once in more than a week | 3(16.6) | 15(86.2) | 1.00 |
| **Trim short/clean finger nail** | | | |
| Yes | 126(25.3) | 372(74.7) | 2.1(1.0, 4.76) |
| No | 8(13.8) | 50(86.2) | 1.00 |
| **Flush water on the latrine after using** | | | |
| Yes | 89(23.5) | 289(76.5) | 1.00 |
| No | 45(23.9) | 143(76.1) | 1.6(0.35,1.73) |
| **Often eat street food** | | | |
| Yes | 96(30.0) | 223(70.0) | 2.25(1.5, 3.44)* |
| No | 38(16.0) | 199(84.0) | 1.00 |

** Eating street food was significantly associated at $p < 0.05$*

## 5.8. Multivariate Analysis

The crude odds ratio revealed a significant difference in the effect of maternal education, cafeteria usage and eating street food on the risk of intestinal parasitosis. However, there is no controls are introduced at this level we were unable to assess the independent effect of the covariates.

In opposition to this background, the multivariate results presented in Table 9 explore if illiteracy maternal education, campus cafeteria usage and often eating street food risk for intestinal parasites after controlling for the other factors. Hierarchical logistic regression technique was used to assess the relative effect of the explanatory factors on the outcome factor. To avoid an excessive number of variables and unstable estimates in the subsequent model, only variables reached a P-value less than 0.3 were kept in the subsequent analysis (39). By controlling the confounding variable using multivariate regression analysis, participants who had illiterate mother were not significantly associated with intestinal parasitosis. However, study participants who use cafeteria service and often eat street food were 2.1times [AOR: 2.1, 95% CI: (1.2, 5.0)] and 2.6 times [AOR: 2.6, 95% CI: (1.45, 3.51)] respectively have more likely infested by intestinal parasites.

**Table 8: Association of intestinal parasitosis with some of socio-demographic and other covariates among Addis Ababa University students who use clinic service, 2013 (n= 556)**

| Variables | Parasitic infestation | | COR (95% CI) | AOR (95% CI) |
|---|---|---|---|---|
| | Yes (%) | No (%) | | |
| **Age** | | | | |
| 15-19 | 20(21.0) | 75(79.0) | 1.53(0.6,3.8) | 2.0(0.66,6.4) |
| 20-24 | 106(26.0) | 301(74,0) | 2.0(0.92,4.4) | 2.36(1.0,5.5) |
| >24 | 8(14.8) | 46(85.2) | 1.00 | 1.00 |
| **Sex** | | | | |
| Male | 108(25.4) | 316(74.6) | 1.39(0.86,2.25) | 1.23(0.7,2.1) |
| Female | 26(19.6) | 106(80.3) | 1.00 | 1.00 |
| Female | 26(19.6) | 106(80.3) | 1.00 | |
| **Year of training** | | | | |
| Y-I | 32(23.7) | 103(76.3) | 1.13(0.49,2.63) | ---- |
| Y-II | 32(21.9) | 114(78.1) | 1.02(0.44,2.37) | ---- |
| Y-III | 37(25.7) | 107(74.3) | 1.3(0.55,2.89) | ---- |
| Y-IV | 24(27.0) | 65(73.0) | 1.35(0.56,3.24) | ---- |
| Y-V | 9(21.4) | 33(78.6) | 1.00 | ---- |
| **Field of study** | | | | |
| Natural science | 47(23.3) | 155(76.7) | 1.02(0.63,1.64) | ---- |
| Social science | 46(26.3) | 129(73.7) | 1.28(0.74,1.94) | ---- |
| Engineering | 41(22.9) | 138(77.1) | 1.00 | ---- |
| **Maternal educational status** | | | | |
| Illiterate | 72(26.9) | 196(73.1) | 2.46(1.1,5.7)* | 2.2(0.44,11.5) |
| Elementary | 43(24.2) | 135(75.8) | 2.13(0.90,5.0) | 1.8(0.40, 8.0) |
| High school | 12(21.4) | 44(78.6) | 1.83(0.66,5.0) | 1.2(0.27,5.9) |
| College | 7(13.0) | 47(87.0) | 1.00 | 1.00 |
| **Paternal educational status** | | | | |
| Illiterate | 59(26.6) | 163(73.4) | 1.84(0.90,3.75) | 1.29(0.18,3.2) |
| Elementary | 37(21.6) | 134(78.4) | 1.40(0.7,2.95) | 1.87(0.14,2.0) |
| High school | 27(28.1) | 69(71.9) | 1.99(0.90,4.36) | 1.0(0.30,3.9) |
| College | 11(16.4) | 56(83.6) | 1.00 | 1.00 |
| **Home address of parent** | | | | |
| Addis Ababa | 11(16.4) | 56(83.6) | 1.00 | 1.00 |
| Out of Addis Ababa | 123(25.1) | 336(74.9) | 1.7(0.86,3.37) | 1.63(0.24,1.5) |
| **Having dormitory (in campus)** | | | | |
| Yes | 131(24.9) | 396(75.1) | 2.9(0.85,9.62) | 1.5(0.06,7.4) |
| No | 3(10.3) | 26(89.7) | 1.00 | 1.00 |
| **Cafeteria usage (in campus)** | | | | |
| Yes | 125(25.8) | 359(74.2) | 2.4(1.2, 5.1)* | 2.1(1.2, 5.0)* |
| No | 9(12.5) | 63(87.5) | 1.00 | 1.00 |
| **Distribution by cafeteria** | | | | |
| Main | 75(26.8) | 205(73.2) | 1.1(0.86,2.01) | 1.2(0.65,2.35) |
| Science | 39(74.4) | 121(75.6) | 1.0(0.6,2.33) | 1.7(0.58,4.99) |
| Technology | 11(12.5) | 33(87.5) | 1.00 | 1.00 |
| **Often eat street food** | | | | |
| Yes | 96(30.0) | 223(70.0) | 2.25(1.5, 3.44)* | 2.6(1.45, 3.51)* |
| No | 38(16.0) | 199(84.0) | 1.00 | 1.00 |

*NB: Only variables reached P-value less than 0.3 were kept in the subsequent analysis.*

**Campus cafeteria usage and often eating street food were significantly associated at P< 0.05*

## 5.9. Intestinal Parasitosis Prevalence rate

Among the five hundred fifty six study participants who provide stool sample for examination, 134 of them had at least one parasitosis and 189 intestinal parasites were detected with overall prevalence of 24.1%. From those who had parasite, 26(19.5%) were females and 108(80.5%) were males.

Out of 134 University students who had intestinal parasitosis Trophozoite stage of Entamoeba histolytica was the predominant parasite which had seen in 55(29.1%) of university students followed by cyst and trophozoite stage of Giardia lamblia 38(20%), Hymenolopsis nana 21(11.1%), Ascaris lubricoid 18(9.5%), Hook worm 18(9.5%), Cyst stage of Entamoeba histolytica/dispar 16(8.4%), Taenia specius 10(5.3%), Schistosoma specius 7(3.7%), Strongloid stercoralis 3(1.6%), Entrobius vermicularis 2(1.0%), and Trichuris trichuria 1(0.5%) in Table 9.

**Table 9: Proportion of intestinal parasites among Addis Ababa University students who use clinic service, 2013(n= 134)**

| Variables | Frequency | Percent (%) |
|---|---|---|
| Trophozoite of Entamoeba histplytica | 55 | 29.1 |
| Cyst of Entamoeba histolytica/Dispar | 16 | 8.4 |
| Trophozoite of Giardia lamblia | 30 | 15.9 |
| Cyst of Giardia lamblia | 8 | 4.2 |
| Hymenolopsis nana | 21 | 11.1 |
| Ascaris lumbricoides | 18 | 9.5 |
| Hook worm | 18 | 9.5 |
| Taenia species | 10 | 5.3 |
| Schistosoma mansoni | 7 | 3.7 |
| Srongloid stercoralis | 3 | 1.6 |
| Entrobius vermicularis | 2 | 1.0 |
| Trichuris Trichiuria | 1 | 0.5 |

*NB: 134 study subjects were infected by 189 intestinal parasites as single, double or triple infestation.*

According to this study, double and triple parasitosis proportion was found. Out of the total infested, 55(41%) of University students were infested by double parasite with a combination of Entamoeba histolytica and Giardia lamblia, Entamoaba histolytica and Ascaris lumbricoid, Entamoeba histolytica and hook worm, Entamoeba histolytica and Teania species, Entamoeba histolytica and Hymenolosis nana, Ascaris lumbricoid and Hook worm, Ascaris lumbricoid and Taenia species, Ascaris lumbricoid and Hymenolopsis nana, Hook worm and Hymenolopsis nana, Hook worm and Taenia species, Hymenolopsis nana and Taenia species. Out of the total, 1(0.7%) of University student was infested by triple parasites which was a combination of Giardia lamblia, Hymenolopsis nana and Taenia species.

**Table 10: Proportion of single and mixed parasitosis among Addis Ababa University students who use clinic service, 2013 (n= 134)**

| Singe and mixed parasitosis | Frequency | Percent (%) |
|---|---|---|
| Single parasite | 78 | 58.3 |
| Double parasites | 55 | 41.0 |
| Triple parasites | 1 | 0.7 |

*NB: 134 study subjects are infected by single, double or triple intestinal parasites (189 intestinal parasites)*

## 5.10. Sanitary Survey for Student Cafeteria Service and Dormitory Toilets

A sanitary inspection survey on the availability of sanitary facilities and hygienic status of cafeteria and dormitory toilet for university students was done using observation check list. The survey was carried out in the three campuses of Addis Ababa Universities namely, Main campus, Science campus and North Technology campus.

The observational finding indicate that, the three campus of cafeterias' exterior of building (roof, drainage area, surrounding landscape, garbage storage area, garbage handling system and rodent proofing) interior of building (food storage, kitchen areas, utility areas, toilets, and dining hall areas) were observed based on standard criteria.

**Exterior of building**: There were six components used to inspect the exterior area of the three campuses cafeteria building. Exterior area of roof, drainage area and surrounding landscape of the three campus cafeteria had good standard. However, garbage storage area, garbage handling system, and rodent proofing was poor standard (3 points out of 6 points).

**Interior building**: There were six components used to inspect the interior building of the campus cafeterias. When the Science campus cafeteria was observed; walls, floors, ceiling, floor drains, lightening and ventilation were poor (0 out of 6 points). When the interior building of Main campus cafeteria was inspected, walls were good and lighting was well illuminated. However, the floor, ceiling, floor drains and ventilation were poor (2 out of 6 points). When the interior building of Technology campus cafeteria inspected; the walls, floors, ceiling and lighting were good. However, the floor drains and ventilation were poor (4 out of 6 points).

**Food Storage**: There were four components used to inspect the food storage area. Main and Technology campuses scored 1 out of 4 each, whereas Science campus scored 0 out of 4 in food storage area. In Main and Technology campus cafeterias, there was good dry food storage area. However, spoiled dry food, empty container storage and refrigerated areas were found in poor sanitary conditions. Nevertheless, in Science campus cafeteria, dry food storage area, spoiled dry food and empty container storage, the refrigerator were found in poor sanitary condition.

**Kitchen**: There were six components used to inspect kitchen areas. Service area of the three campuses cafeteria was clean and free of food and grease deposits, but the space around equipments were not adequate (1 out of 2 points). Dish washing area, garbage/trash area, and storage area for pots/pans/plates of Science campus cafeteria were poor. However, tray return

area was good based on the standards (1 out of 4 points).There were good dish washing area and tray return area in Main campus cafeteria however garbage/trash area and storage area for pots/pans/plates were poor (2 out of 4 points). There were good dish washing area, garbage/trash area and tray return area in Technology campus cafeteria, however storage area for pots/pans/plates were poor based on the standards (3 out of 4 points).

**Water Supply**: There was lack of continuous water supply in the three campuses, in order of severity as Science campus followed by Technology campus and Main campus.

**Dining Hall**: Three components were used to inspect dining hall area. The three campuses cafeteria of table and chairs were clean and sanitized between each use, and the room area was cleaned daily and the furniture moves easily for cleaning (3 out of 3 points).

**Bath/Toilet Rooms**: There were bath rooms in the three campuses, but still there were water problems. In Science campus cafeteria there were inadequate number of toilets which was one toilet seat for 132 cafeteria workers (and no gender divide), and the toilet was not properly functioned like less privacy for users, including exit entrance door was non functional, human waste soiling of the seats area was observed outside, no adequate water availability, no disposal facilities for sanitary wastes (0 out of 5 points). In Main campus cafeteria there were inadequate number of toilets which were three toilets for 150 cafeteria workers (and no gender divide), and the toilets were not properly functioned like less privacy for users, including exit entrance doors are non functional, faeces are seen outside, no adequate water availability, there were disposal facilities for sanitary wastes (1 out of 5 points). In Technology campus cafeteria there were enough number of toilets, which were three toilets for 35 cafeteria workers, the toilets were functional, faeces are not seen, and there were disposal facility for sanitary wastes, however there were inadequate water availability (4 out of 5 points) (35, 40).

**General Assessment of Cafeterias**: There were no sanitary building codes in the three campus cafeterias. Based on the observational check lists there were 31 major components were listed to fulfill the basic standard cafeteria services, Technology campus, which scored 19 points of good sanitary status, had relatively better status in sanitary facilities than Main campus and Science campus, which scored 13 and 8 points out of 31, respectively.

**Workers' hygienic status**: Majority of cafeteria workers in the three campuses did not wear uniforms properly and few of them did not wear at all.

**Cafeteria inspection in the three campuses**: There was no cafeteria inspection during this study period.

**Focus Group Discussion with Cafeteria Workers**: Focus group discussion was done on eight cafeteria workers, three from each of Main and Science campus and 2 from Technology campus. Totally eight major issues were raised.

The group discussants reported that they did not ever discuss about intestinal parasites, hygiene sanitation and other disease and their transmission and prevention; or the sanitation of the cafeteria in related to transmitted disease with their colleagues, bosses, students or other concerned bodies.

When the group asked the most difficult part for them to take actions for improving the sanitation and preventing any transmitted disease, one of the participants replied,

> *"The administration system focuses more on making and serving the foods; they give less attention for sanitation."*

The rest of the participants agreed with her idea.

They were also asked in what condition they prefer to have education about intestinal parasites, other transmitted disease. They replied that they are working in shift, so if the time is appropriate for most of them, it is possible to take the trainings, so they will have enough knowledge that is needed for them to know.

When asked whether anybody or department gave voluntary training on intestinal parasite, hygiene, sanitation or other transmitted disease, they affirmatively responded that some of them took training, two years ago in Tefferi Mekonnen Secondary School for five days.

The discussants were also asked if they have had a medical checkup.

One of the employees responded,

> *"As you know, before 1 year ago, yes we had, but currently, I don't know why it is stopped."*

The cafeteria workers were also asked about the importance of discussing about intestinal parasite, hygiene, sanitation or other transmitted disease. They responded positively that it is

important to do so about health issues more than anything. When asked about the barriers which prevent them from discussing about such health and hygiene issues, they claimed that the administrative body did not give attention about this issue and forwarded the possible solution should be the administrative body to discuss with health professional and they should give them training in a programmed way.

**Students' Dormitory Toilets**: Student dormitory toilets were observed whether there were proper sanitary facilities. When Science campus was inspected, there were good storage and disposal solid waste and Proper liquid waste disposal system in toilet area. However, adequacy of toilet, cleanness of inside toilet, Condition or status of the toilet, adequacy of water in toilet area and water tested for its safeness was poor. When Main campus was inspected, there were good solid waste disposal in dorm and liquid waste disposal system in toilet area. However, adequacy of toilet, cleanness of inside toilet, condition of the toilet, adequacy of water in the toilet area, water tested for its safeness was poor. When Technology campus was inspected, there were adequate toilets; inside of toilets were clean, good condition and good liquid and solid waste disposal. However, there was inadequate water availability in toilet area and water was not tested for its safeness.

Technology campus had relatively better sanitary facilities in dormitory toilets than Main campus and Science campus. Show the table below for detail explanation.

**Table 11: Observation check list for student dormitory toilets**

| **Observation of dormitory toilet** | **Science campus** | **Main campus** | **Technology campus** |
|---|---|---|---|
| Adequacy of toilet | **Poor**(1seat for 20 males and 1seat for 16 Females) | **Poor**(1seat for 12 males and 1seat for 10 females | **Good**(1 seat for 6 males and 1 seat for 4 females |
| Cleanness of inside toilet | **Poor**(tissue papers are not dispose properly, | **Poor**(feces are seen outside) | **Good**(no used tissue paper and feces are seen) |
| Condition or status of the toilet | **Poor**(most of them are not function properly | **Poor**(most of them are not function properly | **Good**(most of them are function properly) |
| Adequacy of water toilet area | **Poor**(1 tap for 3toilets Some of them are not functional | **Poor**(1 tap for 3toilets Some of them are not functional | **Poor**(1 tap for 3toilets lack of continuous water supply |
| Stored and disposed solid waste | **Good** (Stored and burn in refuse pit) | **Good** (Stored and burn in refuse pit) | **Poor**(Stored and burn improperly closed container) |
| Water tested for its safeness | **Poor** (once in two or three year) | **Poor** (once in two or three year) | **Poor** (once in two or three year) |
| Proper liquid waste disposal | **Good**(sewerage system) | **Good**(sewerage system) | **Good**(sewerage system) |

*NB: numbers in the tables are proportion*

# 6. DISCUSSION

Regardless of development in delivery of health services, parasitic diseases remain as the most important public health problems in many countries, particularly the developing countries, of the world. Infectious food borne illness constitutes a substantial health burden in these countries. The effects of intestinal parasitic infestation vary according to species and burden of infection. These parasites are commonly transmitted through ingestion of contaminated food or water as a result of poor sanitation and hygiene. In some instances transmission occurs through close contact between infested and uninfected individuals as in infested food handlers and consumers, respectively (41).

The result of this study provides the prevalence of intestinal parasites, knowledge and attitude on hygiene and sanitation among University students and observational survey in student cafeteria and dormitory toilets. In the past most of the studies had focused on primary school children and dwellers in the rural and urban areas (17). This study showed that the occurrence of parasitic infestation is not limited to children or dwellers.

The prevalence (24.1%) of intestinal parasitosis recorded in this study is an indication that intestinal parasitosis is still of public health importance not only among primary school children in rural or urban communities in Ethiopia, but also among university students. This was slightly higher than the study done among Federal Polytechnic Ede Tertiary Institution students in Nigeria, which was 20.6% (17). But, it was higher than a previous study in Nigeria Ambrose Alli University that indicates 12.52% (34). However, it was lower than study done in Bangladesh Dacca University and Turk Mustafa Kemal University, which were 57.3% and 45.77%, respectively (31, 33).

The proportion of double and triple parasitosis was found to be 41% and 0.7%, respectively, in this study. The double infestation was very high compared to the prevalence reported in the studies conducted in Nigeria, which were 2.03% and 4.8 % (17, 34).

This study revealed that the university students were most frequently infested by protozoan (19.6 %) than helminthes (14.4%). However, a study done in Nigeria indicated that a lower rate with a prevalence of 6% helminthes and 2.83% protozoan (34).

Cyst and trophozoite of Entamoeba histolytica and cyst and trophozoite of Giardia lamblia were the dominant species with the prevalence of 37.5% and 20.1%, respectively, in this study. A

study done in Nigeria Ascaris lumbricoid (4.3%) and hook worm (2.53%) were the dominant parasite (34). A study done in Bangladesh reported that Ascaris lumbricoid (39.2%) and Entamoeba histolytica (12.1%) were the dominant parasites (31). Another study done in Bangladesh reported that Ascaris lumbricoid (12.6%) and Giardia lamblia (6.5%) were the dominant parasites (32). A study done in Turk reported that Blastocystis hominis (96.92%) was the dominant parasite (33), which is not reported in current study. A study done in Iran shows that Giardia lamblia (13.9%) was dominant parasite (30), which is lower than in this study.

The inconsistency in prevalence of intestinal parasitosis among different studies might happen due to sample size determination, methods employed and geographical, economical or social differences in the study subjects.

The result showed that students whom parental home address is out of Addis Ababa were more infested by intestinal parasites than those who were in Addis Ababa. This might be attributed to cafeteria usage and dormitory service because majority of students whose parental address in Addis Ababa did not use this service, or else, students whose parents are away from Addis Ababa, might have had some asymptomatic parasitic infestation while they went to their parental home addresses.

In this study, 25.8% students who use cafeteria and 12.5% of those who did not use had intestinal parasitosis. This indicates that students who use cafeteria service were more at risk for intestinal parasitosis than those who do not. This suggests that there is a need for intervention to improve the hygiene and sanitation status of the university cafeteria services.

Students who use cafeteria service in Science campus (74.4%) had an intestinal parasitosis, which is more than that of the Main campus and the Technology campus, 26.8% and 12.5%, respectively. This indicates more emphasis should be given to the Science campus student cafeteria. On the other hand, students who use outside campus cafeteria services had also intestinal parasitosis, which might be poor food hygiene and sanitary condition in cafeteria service on outside of campus, poor knowledge about hygiene and sanitation or eating street food or fast food services. Out of total (58.6%) of study subjects had abdominal pain or discomfort starts from two weeks before survey, this might be sign of parasitic, bacterial or viral diseases due to poor personal hygiene and sanitation.

The knowledge of the students about hygiene, sanitation and intestinal parasite is not significantly associated with the presence of intestinal parasites. However, (30%) of university students were poor knowledge about personal hygiene, sanitation and intestinal parasites this may have a negative effect on preventing the transmission of this communicable disease because majority of the students live together in the dormitory.

Concerning their attitude, 82.4% of the students feel the toilet is not clean and safe. This shows there is a need to give attention for the toilet. Also 5.2% of the students did not feel keeping the campus clean was their duty, this implies they need awareness who the responsible body was keeping the campus clean.

Even if there was not significantly associated with their knowledge and practice, 40.6 % of the students claimed they did not get health education on personal hygiene and sanitation ever. Hand washing with soap at critical times can reduce diarrhea by 44% also reduce respiratory diseases by over 30% (42). However, 334 (60.1%) of students do not use soap or detergent when washing their hand. Seventeen percent of students who eat street food had intestinal parasitic infection. A study done in Nigeria shows high prevalence of Ascaris lumbricoid and hook worm is attributed to buying street food from vendors who may have poor hygiene and sanitation practice (17). Study done in Kenya 85% of the vendors interviewed prepared their foods in unhygienic conditions given that garbage and dirty waste were conspicuously close to the stall (43). In this study it was found that those who eat street food had more risk of intestinal parasites than who do not.

From the study participants who uses dormitory service, majority (30.2%) respond about the three major problems related to hygiene and sanitation were poor cafeteria service, lack of continuous water supply and dormitory cleanliness. This calls for control, including provision of clean water and improved sanitation in higher institution.

Food prepared in large quantities is more liable to contamination and there is a greater potential for the occurrence of food borne disease outbreak if basic sanitary practice are not properly maintained (41).

Based on the observational checklist there was no proper garbage and handling systems in the three campuses. From food hygiene point of view, the quality of the working environment

depends on the facilities or equipment provided like disposal of waste products. Garbage and refuse containers must have tight-fitting lids or covers (40).

The general conditions of the external building of the three campuses cafeteria were in a good observation. However, there is poor insect and rodent control mechanism. All foundation shall be rodent proof. Opening between the floor and bottom of outer doors shall be adequately flashed with rodent proof material to eliminate any opening (44).

From the finding described in the result section some interior parts of the building of cafeterias were good. However, some parts of the cafeteria were in poor condition based on observation. Especially the science campus was relatively in poor condition. All floor coverings in kitchen, food storage utensil, washing areas, refrigeration units and toilet rooms must be smooth, non-absorbent, easily cleanable and durable. Properly installed, trapped floor drain shall be provided in floors that are water flushed for cleaning or that receive discharges of water or other flood waste from equipment (45).

Food items should be stored and handled correctly to decrease the growth of the microorganisms already present and to minimize the risk of contamination (43). Results from the present study revealed that food storage of Main campus and Technology campus were in good condition. However, Science campus was observed in poor condition. Though there was refrigeration system in the three campuses, there were no monitoring temperature and they did not have a separate area for storage of a raw food and ready to eat food items. Moreover, perishable and non perishable foods were stored in a single refrigerator. Inadequate refrigeration is one of the most common factors implicated in food borne outbreaks (46). Observations revealed that establishments of the kitchen had no adequate ventilation, but had good lighting and dish washing area in main and technology campus, though not in the Science campus. Some of the kitchens were found to be congested with kitchen goods and as a result space of the kitchen was compromised and cockroaches were also prevalent in some of the observed kitchens.

There was no adequate water availability in the three campus cafeterias. During the food preparation pathogenic organisms may be transferred to food item by cross contamination through hands, surfaces utensils and equipment that have been inadequately clean and disinfected between the preparations of different types of food (47, 48). More than 80% of diseases in developing countries these include amoebic dysentery, bacterial dysentery, typhoid

fever, helminthiasis, skin and eye infections are due to lack of safe water supply and sanitation which are the leading causes of morbidity (49). Therefore, fresh food products should be properly washed under running tape water before preparation or consumption to reduce or remove microorganisms.

Regarding cafeteria toilet facility Technology campus had good observation with adequate number of toilets. However, Main campus and Science campus had poor toilet facilities based on the standard criteria. Main and Science campus had no adequate continuous supply of water in the toilet area as the result flies were infested it. In addition to this, distance of the toilets from the cafeteria in the two campuses (Main and Science) were near, this has its own negative effect for contamination of utensils and foods. The most prominent factors predisposing to infections were failure to wash hands before meals and infrequent cleaning of toilets which attracted Fannia scalaris (latrine flies) (25).

An important part of good personal hygiene is clean and appropriate uniform. However, at the time of observation the cafeteria workers did not wear uniforms properly. Therefore, wear a clean, appropriate uniform every day and change uniforms as often as necessary to prevent microorganisms on soiled clothing from spreading to the hands and then to food (50).

From the focus group discussion, majority of the cafeteria worker replied there were no attention about the hygiene and sanitation of the catering establishment rather they focus on processing the food and served for the students. From the results of discussion food handlers did not practice periodic medical checkups. Medical checkup is important for prevention of diseases transmission through contaminated food, water or air should be carried out on regular basis. Cleanliness of the kitchen has to be done on daily bases monitored and verified in order to avoid contamination of food during cooking (51).

Students have the right to a good quality and safe food supply. For this reason effective food safety and quality control programs are essential. In this study there was poor sanitary regulation system in the caterings establishments of the students' cafeteria.

Regarding students' toilet in the dormitory area, the result showed that there were proper toilet facilities but inadequate water availability in the Technology campus; however, there were poor toilet facilities in Main campus and Science campus based on their number, function and water availability.

# 7. STRENGTH AND LIMITATION

## Strength

Study was conducted by combining both quantitative and qualitative methods. Moreover, observation checklist for campus cafeteria and dormitory toilet was used to substantiate the reported data.

In addition, to increase the validity of the stool examination, wet mount and formol- ether concentration technique were used in parallel. More over the use of three laboratory professionals to diagnose the sample was a strength that improves the quality of the results.

## Limitation

Since exposure and disease status is assessed at a single point in time, temporal relationship between exposure and disease cannot be clearly determined. Respondents may expose the study for social desirability and information bias. It would have been better, if observation method was used for hygiene and sanitation practice of the student rather than self administer questionnaire. Concerning their attitude about the cleanliness of the University compound and toilets, it might be subjective response.

Due to financial constraint we didn't use kato-katz technique exhibit high sensitivity for the detection of Schistosoma mansoni, Trichuris trichuria and Ascaris lumbricoides (52). Eggs that do not concentrate well by formol-ether concentration technique are those of Faciola species Vampirolopsis nana (4).

# 8. CONCLUSION AND RECOMMENDATIONS

## Conclusions

According to the finding of this study, the following conclusions are forwarded

- There were high prevalence of intestinal parasitosis and abdominal pain/discomfort among the university student
- Students who use university cafeteria service and eating street food were more infested by intestinal parasites than those who did not used.
- There were no periodic health education program in the three clinics and some of the study participants were poor knowledge on hygiene and sanitation and also there were poor personal hygiene and sanitation practice.
- In the two campuses (Main and Science) cleanliness of toilet in cafeteria and student dormitory is poor which is conductive to disease condition.
- There were no sanitary building code and enforcement in the three campuses and there were no continuous mass cleaning program
- There were no periodic cafeteria inspection in the three campuses during the study period
- Generally based on physical observation, the three campuses had poor garbage handling system and lack of adequate continuous water supply and the two campuses (Main and Science) had relatively poor hygiene and sanitation cafeteria service than Technology campus.

**Recommendations**

According to the finding of the study the following are recommended

The present finding will be of valuable as the baseline information and indicators for the future activities to be carried out in line with the ministry of health and ministry of education regarding university students who use clinics.

1. **To Addis Ababa University**
    - Hygiene and sanitation of the cafeteria should be monitored and students who eat street food should give health education.
    - In spite of the fact that the university is currently expanding, it needs to consider and facilitate the sanitation of cafeteria and dormitory toilets service with the involvement of stakeholders.
    - An appropriate sanitary building codes and enforcement needs to be in place for current and newly built dormitories and cafeterias.
    - University clinics, staffs and stakeholders who work in health service area should provide planed health education to increase the current knowledge and practice of hygiene and sanitation among university students and cafeteria workers.
    - Improve the amount of water supply by use water container to minimize emergency problems and built additional toilets to increase the number and maintain the toilets which were not give proper service.
    - The university should establish or strengthen the mass cleaning program and follow its sustainability
    - The cafeterias need periodic inspection by sanitarians or health professionals and medical checkup of food handlers should be done quarterly and every food service employee should wear a uniform made of materials that can withstand hot water during laundering

2. **To the Federal ministry of health**
    - As large population of students are available in universities at national level, it is necessary to control intestinal parasites among the target population through integrated disease control programs through regular inspection and supervision of campus cafeterias and provision of appropriate treatments.

3. **Ministry of education**
    - With the fast expansion of universities in the country, it is the right time to plan and set priority for hygiene and sanitation of dormitory, cafeteria and establishing full service of clinics in the universities in cooperation with the ministry of health as outbreaks of disease often causes devastating health conditions and hampers educational learning abilities.

4. **To Addis Ababa City Administration Water Supply and Sewerage Authority**
    - The water shortage due to the interrupted water supply should be given immediate solution for the problem by considering the massive number of students that are served in the higher institutions.

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## Annex1. Informed Consent Form

Hello! I'm Nurse/HO _____ I am working with Emnet Neda who is working for fulfillment for the requirement of Masters Degree in General Public health in Addis Ababa University College of Health Sciences School of Public Health. By chance, you are selected to participate on this research. Please fill these questioners honestly about your knowledge attitude and practice of your personal hygiene, sanitation and knowledge of intestinal parasite; and some of the services you use in the university. In addition to this we would like to have your stool sample for parasitic examination. If there is any parasitic infestation you will have treatment with free of charge.

Your response for the questionnaire will help the University to improve the health services of all students. You don't need to write your name in this form and your response will never be used for other activities except for the research purpose. All information on this questionnaire will be kept strictly confidential. Please feel free that you are not obliged to answer any question you do not want to answer.

Informed consent certified by_____

Date of data collected _____

Checked by: Principal investigator Name _____Signature_____

**በጥናትና ምርምሩ ላይ ለመሳተፍ ፈቃደኝነትን መጠየቂያ የስምምነት ፎርም**

እንደምን ነህ እኔ ነርስ/ጤና መኮንን _____እባላለሁ፡፡ እምነት ነዳ በአዲስ አበባ ዩኒቨርሲቲ የጤና ሳየንስ ኮሌጅ የህብረተሰብ ጤና ትምህርት ውስጥ ለሚያደርገው የማስተርስ ዲግሪ ማሟያ የጥናትና ምርምር ስራው ላይ አብሬው እየሰራሁ ነው ፡፡

አንተም/ቺም በጥናትና ምርምር ስራው ሊሳተፉ ከሚችሉ ሰዎች መካከል በአጋጣሚ ተመርጠሀል/ሻል፡፡ ስለሆነም በመጠይቁ ላይ ስለ ሆድ ውስጥ ጥገኛ ትላትሎች ስለ ግልና አካባቢ ንጽህና አጠባበቅ ያለህን/ሽን እውቀት አመለካከትና ትግበራ እንዲሁም በዩኒቨርስቲው ውስጥ ስለምትጠቀማቸው/ሚያቸው አገልግሎቶች የተነሱትን ጥያቄዎች በግልጽና በታማኝነት እንድትመልስ/ሺ በአክብሮት እጠይቃለሁ፡፡ በተጨማሪም ለላቦራቶሪ ምርመራ የሰገራ ናሙና እንድትሰጥ በአክብሮት እየጠየኩ የምርመራው ውጤት ኢንፌክሽን መኖሩን የሚያሳይ ከሆነ ነጻ ህክምና የምታገኝ/ኚ መሆኑን ከወዲሁ እናረጋግጣለን፡፡ ያንተ/ቺ በጥናትና ምርምር ስራው ከላይ በተገለጸው መልኩ መሳተፍ ዩኒቨርስቲው ለተማሪዎች የሚሰጠውን የጤና አገልግሎት ለማሻሻል ከፍተኛ እገዛ አለው፡፡ በዚህ ቅጽ ላይም ሆነ መጠይቁ ላይ ስምህን/ሽን መጻፍ አያስፈልግም፡፡ የምትሰጠው/ጪው ምላሽ ከጥናትና ምርምር ስራው ውጪ አገልግሎት አይውልም፡፡ በመጠይቁ ላይ ከተመለከቱት ጥያቄዎች መካከል መመለስ የማትፈልገው/ጊው ጥያቄ ካለ አለመመለስ ትችላለህ/ቺያለሽ፡፡

ከላይ የተገለጸውን ቅጽ መሞላቱን ያረጋገጡት ፊርማ _____

መረጃው የተሰጠበት ቀን _____

የአጥኚው ፊርማ _____

## Annex2: Questionnaire (English version)

Campus/faculty_____ Patient card number _____

I. Socio-demography questions

| Sr. No | Questions | Responses | Skip to | code |
|---|---|---|---|---|
| 101 | Age | _____year | | |
| 102 | Sex | 1. Male<br>2. Female | | |
| 103 | Year of study | 1. I<br>2. II<br>3. III<br>4. IV<br>5. V | | |
| 104 | Field of study | 1. Natural Sciences<br>2. Social Sciences<br>3. Engineering | | |
| 105 | Maternal educational status | 1. Illiterate<br>2. literate(grade completed) _____ | | |
| 106 | Paternal educational status | 1. illiterate<br>2. literate(grade completed)_____ | | |
| 107 | Home address of Parents | 1. Addis Ababa<br>2. Out of Addis Ababa | | |
| 108 | Do you currently use dormitory service? | 1. Yes<br>2. No | | |
| 119 | Do you currently use cafeteria service in campus? | 1. Yes →<br>2. No → | 110<br>111 | |
| 110 | If yes to Q109, which cafeteria are you using? | 1. Main campus<br>2. N.Science campus<br>3. N.Techno. campus | | |
| 111 | If no to Q109, where do you eat? | 1. Home or prepared by yourself<br>2. Outside cafeteria<br>3. Other(specify)_____ | | |
| 112 | Did you feel any abdominal discomfort during the past two weeks? | 1. Yes →<br>2. No → | 113<br>Section II | |
| 113 | If yes to Q 112, what are the symptoms you experienced? Circle 1 or 2 in the bracket | 1. Yes -Bloody diarrhea(1,2)<br>2. No -Watery diarrhea(1,2)<br>-Abdominal cramps/constipation(1,2)<br>Other(specify) _____ | | |

II. Knowledge and attitude questions about personal hygiene and sanitation.

| Sr. No | Questions | Response | Skip to | code |
|---|---|---|---|---|
| 201 | What is personal hygiene to you? (circle only that you know) | 1. Washing clothes<br>2. Bathing<br>3. Hand washing<br>4. Cutting finger nail<br>5. Other( specify)_____ | | |
| 202 | What is sanitation mean to you? (circle only that you know) | 1. Washing dorms<br>2. Using toilet appropriately<br>3. The establishment of environmental conditions favorable to health<br>4. other (specify)_____ | | |
| 203 | Which diseases do you think could occur due to poor personal hygiene and sanitation? (circle only that you know) | 1. Diarrhea<br>2. Intestinal parasite<br>3. Trachoma<br>4. Skin disease<br>5. Other (specify)_____ | | |
| 204 | How do you prevent diseases transmitted by human waste? (circle only that you know) | 1. Flush water before using toilet<br>2. Flush water after using toilet<br>3. Keep the toilet clean<br>4. Other( specify)_____ | | |
| 205 | What do you know about intestinal parasites? (circle only that you know) | 1. microorganism which live in air<br>2. microorganism which is found every where<br>3. micro/macro organisms found in soil contaminated water or foods<br>4. other (specify)_____ | | |
| 206 | How do you think could parasites transmit to human? (circle only that you know) | 1 From contaminated food and water<br>2 Vector( flies)<br>3 Poor personal hygiene and sanitation<br>4 Other (specify)_____ | | |
| 207 | What is solid waste mean to you? (circle only that you know) | 1. Used papers<br>2. Plastics<br>3. Chalk dusts<br>4. Used soft papers<br>5. Highly grown grasses<br>6. Other (specify)_____ | | |
| 208 | What do you think are the effects of solid waste if not disposed properly? | 1. Flies can breed<br>2. Smell<br>3. Health problem | | |

| | | | | |
|---|---|---|---|---|
| | | 4. Unsightly environment<br>5. Other(specify)_____ | | |
| 209 | How solid waste could be disposed properly? | 1. Collect in dust bin<br>2. Burn in refuse pit<br>3. Buried<br>4. Other(specify)_____ | | |
| 210 | Do you think all the toilets are regularly clean and safe? | 1. Yes<br>2. No | | |
| 211 | How do you feel about the cleanliness of the university? | 1. good<br>2. Bad<br>3. Mixed felling | | |
| 212 | What do you think should we do to keep our campus clean? | 1. It is the duty of the university<br>2. It is our duty to keep it clean<br>3. Both of us to take the duty<br>4. Other(specify)_____ | | |
| 213 | Do you get personal hygiene and sanitation education? | 1. Yes →<br>2. No → | 214<br>215 | |
| 214 | If yes to Q213where do you mostly get it?<br>Circle only one | 1. From health professionals<br>2. Mass media<br>3. Teachers<br>4. Other(specify)_____ | | |
| 215 | What is the most preferred source of health information for you?<br>Circle only one | 1. From health professionals<br>2. Mass media<br>3. Teachers<br>4. Other(specify)_____ | | |

III. Personal hygiene and sanitation practice questions.

| Sr. No | Question | Response | Skip to | Code |
|---|---|---|---|---|
| 301 | At what times do you wash your hand? (Circle all that apply to you) | 1. Before eating<br>2. After eating<br>3. After visiting toilet<br>4. Other specify | | |
| 302 | Do you often use soap or other detergents when you wash your hand? | 1. Yes<br>2. No | | |
| 303 | How often do you wash your clothes? | 1. Once a week<br>2. Twice a week<br>3. Three times a week<br>Other specify | | |
| 304 | How frequently do you take a bath? | 4. Once a week<br>5. Twice a week<br>6. Three times a week<br>7. Other(specify)_____ | | |
| 305 | Do you often trim short/clean your finger nail? | 1. Yes<br>2. No | | |
| 306 | Do you often flush water on the latrine after using? | 1. Yes<br>2. No | | |
| 307 | If you share dormitory, how often do you clean it? | 1. Once a week<br>2. Twice a week<br>3. Three times a week<br>4. Other(specify)_____ | | |
| 308 | Do you often dispose solid waste properly in your dorm? | 1. Yes<br>2. No | | |
| 309 | Do you know the presence of mass cleaning program in the university? | 1. Yes ⟶<br>2. No ⟶ | 310<br>311 | |
| 310 | If yes to Q309, do you participate in this program? | 1. Yes<br>2. No | | |
| 311 | Do you often eat street foods | 1. Yes<br>2. No | | |
| 312 | If you share in dormitory which of the following hygiene related problems do you think most prevail in your campus? (circle three most important ) | 1. Campus sanitation<br>2. Dormitory cleanliness<br>3. Lack of continuous water supply<br>4. Lack of garbage/solid waste disposal<br>5. Poor hygienic cafeteria service<br>6. Poor hygienic lounge service | | |

| | | | | |
|---|---|---|---|---|
| | | 7. Other(specify)_____ | | |

**መጠይቅ**(Amharic version)

**ካምፓስ/ፋኩልቲ_____ የህክምና ካርድ ቁጥር _____**

## I. ተማሪው በግቢው ውስጥ ያለው ነባራዊ ሁኔታ

| ተራ. ቁ | ጥያቄ | መልስ | ወደ | ኮድ |
|---|---|---|---|---|
| 101 | እድሜ | _____ዓመት | | |
| 102 | ፆታ | 1. ወንድ<br>2. ሴት | | |
| 103 | የትምህርት አመት | 1. 1ኛ<br>2. 2ኛ<br>3. 3ኛ<br>4. 4ኛ<br>5. 5ኛ | | |
| 104 | የምትማረው/ሪው ፊልድ | 1. የተፈጥሮ ሳይንስ<br>2. የማህበራዊ ሳይንስ<br>3. ምህንድስና | | |
| 105 | የእናት/ያሳዳጊ የትምህርት ደረጃ | 1. ያልተማሩ<br>2. የተማሩ(ያጠናቀቁት ክፍል ይገለጽ) | | |
| 106 | የአባት/ያሳዳጊ የትምህርት ደረጃ | 1. ያልተማሩ<br>2. የተማሩ(ያጠናቀቁት ክፍል ይገለጽ) | | |
| 107 | የመጣህበት/ሽበት ቦታ | 1. አዲስ አበባ<br>2. ሌላ ቦታ | | |
| 108 | የመኝታ አገልግሎት ትጠቀማለህ? | 1. እጠቀማለሁ<br>2. አልጠቀምም | | |
| 109 | በግቢው ውስጥ የምግብ አገልግሎት ትጠቀማለህ/ሚያለሽ? | 1. እጠቀማለሁ ⟶<br>2. አልጠቀምም ⟶ | 110<br>111 | |
| 110 | ተ.ቁ 110 እጠቀማለሁ ከሆነ የትኛው ግቢ? | 1 ዋናው ግቢ<br>2 የተፈጥሮ ሳየንስ<br>3 ቴክኖሎጂ | | |
| 111 | ተ.ቁ 110 አልጠቀምም ከሆነ የት ትጠቀማለህ/ሚያለሽ? | 1. እቤቴ/ እራሴ አዘጋጅቼ<br>2. ከግቢ ውጪ ባሉ ካፍቴሪያዎች<br>3. ሌላ ካለ ይገለጽ | | |
| 112 | ባለፈው 2 ሳምንት ውስጥ | 1. አዎ ⟶ | 113 | |

| | | | | |
|---|---|---|---|---|
| | ሆድህን/ሽን አሞህ/ሽ ያውቃል? | 2. አያውቅም ⟶ | ክፍል 2 | |
| 113 | ተ.ቁ 112 አዎ ከሆነ ምን አይነት ስሜት ነበረህ/ሽ? አዎን ከሆነ 1 አያውቅም ከሆነ 2 አክብብ/ቢ | 1. አዎ<br>2. አያውቅም<br>ደም የተቀላቀለበት ተቅማጥ(1,2)፤ውሃ ተቅማጥ(1,2)፤ሆድ መጮህ ወይም ማስፈሳት(1,2) ሌላ ካለ ይገለጽ _____ | | |

II. የተማሪው እውቀትና አመለካከት በግልና በአካባቢንፅህና ዙሪያ

| ተራ. ቁ | ጥያቄ | መልስ | ወደ | ኮድ |
|---|---|---|---|---|
| 201 | የግል ንጽህና ማለት ምን ማለት ነው? (የምታውቀውን/ቂውን ብቻ አክብብ/ቢ) | 1. ልብስን ማጠብ<br>2. ገላን መታጠብ<br>3. እጅን መታጠብ<br>4. ጥፍርን ማጽዳት/መቁረጥ<br>5. ሌላ ካለ ይገለጽ___ | | |
| 202 | የአካባቢ ንጽህና ማለት ምን ማለት ነው? (የምታውቀውን/ቂውን ብቻ አክብብ/ቢ) | 1. ዶርሚተሪን ማጽዳት<br>2. መጸዳጃ ቤት በአግባቡ መጠቀም<br>3. አካባቢን ለጤና አመቺ እንዲሆን ማድረግ<br>4. ሌላ ካለ ይገለጽ___ | | |
| 203 | በግልና በአካባቢ ንጽህና ጉድለት የሚመጡ በሽታዎች የትኞቹ ናቸው? (የምታውቀውን/ቂውን ብቻ አክብብ/ቢ) | 1. ተቅማጥ<br>2. ጥገኛ የሆድ ውስጥ ትላትል<br>3. ትራኮማ<br>4. የቆዳ በሽታ<br>5. ሌላ ካለ ይገለጽ___ | | |
| 204 | በሰው ዓይነ ምድር የሚተላለፉ በሽታዎችን እንዴት መከላከል ይቻላል? (የምታውቀውን/ቂውን ብቻ አክብብ/ቢ) | 1. ከመጸዳዳታችን በፊት ውሃማፍሰስ<br>2. ከተጸዳዳን በኃላ ውሃ ማፍሰስ<br>3. የመጸዳጃ ቤቱን ንጽህና መጠበቅ<br>4. ሌላ ካለ ይገለጽ___ | | |
| 205 | የሆድ ውስጥ ትላትል ማለት ምን ማለት ነው? | 1. አየር ላይ የሚኖሩ በአይን የማይታዩ | | |

| | | | | |
|---|---|---|---|---|
| | (የምታውቀውን/ቂውን ብቻ አክብብ/ቢ) | ትላትሎች<br>2. በየትኛውም ቦታ የሚኖሩ በአይን የማይታዩ ትላትሎች<br>3. በመሬት ውስጠ ወይም በተበከለ ምግብና ውሃ ውስጥ የሚኖሩ ትላትሎች<br>4. ሌላ ካለ ይገለጽ___ | | |
| 206 | በሽታን እንዴት ከሰው ወደ ሰው ሊያስተላልፉ ይችላሉ? (የምታውቀውን/ቂውን ብቻ አክብብ/ቢ) | 1. ከተበከለ ምግብና ውሃ<br>2. ነፍሳቶች<br>3. ከግልና አካባቢ ንጽህና ጉድለት<br>4. ሌላ ካለ ይገለጽ | | |
| 207 | ደረቅ ቆሻሻ ማለት ምን ማለት ነው? (የምታውቀውን/ቂውን ብቻ አክብብ/ቢ) | 1. የተጠቀምንባቸው ወረቀቶች<br>2. ያገለገሉ ፌስታልና ላስቲኮች<br>3. የጠመኔ ብናኝ<br>4. የተጠቀምንባቸው ሶፍቶች<br>5. በጣም ያደጉ ሳሮች<br>6. ሌላ ካለ ይገለጽ___ | | |
| 208 | ደረቅ ቆሻሻ በአግባቡ ካልተወገደ ምን ሊያስከትል ይችላል? (የምታውቀውን/ቂውን ብቻ አክብብ/ቢ) | 1. የዝንብ መራቢያ ይሆናል<br>2. መጥፎ ሽታ ያመጠል<br>3. የጤና ችግር ያመጣል<br>4. የአካባቢን እይታ ያበላሻል<br>5. ሌላ ካለ ይገለጽ___ | | |
| 209 | ደረቅ ቆሻሻን እንዴት ታስወግዳለህ/ጃለሽ? (የምታውቀውን/ቂውን ብቻ አክብብ/ቢ) | 1. የቆሻሻ መጣያዎችን መጠቀም<br>2. ማቃጠያ ቦታ ላይ ማቃጠል<br>3. በመቅበር<br>4. ሌላ ካለ ይገለጽ___ | | |
| 210 | ሁሉም መፀዳጃ ቤቶች በየጊዜው ይጸዳሉ ብለህ/ሽ ታስባለህ/ቢያለሽ? | 1. አዎ<br>2. አይጸዱም | | |
| 211 | ስለ ዩኒቨርሲቲው ንጽህና ምን የምትለው/ትይው | 1. ጥሩ<br>2. መጥፎ | | |

| | | | | |
|---|---|---|---|---|
| | አለህ/አለሽ? | 3. ጥሩም መጥፎም | | |
| 212 | የካምፓሱን ንጽህና ለመጠበቅ ምን ማድረግ አለብን ትላለህ/ትያለሽ? | 1. የዩኒቨርሲቲው ሀላፊነት ነው<br>2. የዩኒቨርሲቲውን ማጽዳት የኛ ሀላፊነት ነው<br>3. የዩኒቨርሲቲውና የኛ ሀላፊነት ነው<br>4. ሌላ ካለ ይገለጽ___ | | |
| 213 | ስለ ግልና አካባቢ ንጽህና አጠባበቅ ትምህርት አግኝተህ/ሽ ታውቃለህ/ቂያለሽ? | 1. አውቃለሁ ⟶<br>2. አላውቅም ⟶ | 214<br>ክፍል 3 | |
| 214 | ተ.ቁ 213 አውቃለሁ ከሆነ ከየት አግኝተሀል/ሻል? | 1. ከመምህራን<br>2. ከጤና ባለሞያ<br>3. ከመገናኛ ብዙሀን<br>4. ሌላ ካለ ይገለጽ | | |
| 215 | ስለ ግልና አካባቢ ንጽህና አጠባበቅ ትምህር ከየት ብታገኝ/ኚ ትመርጣለህ/ጫለሽ? | 1. ከመምህራን<br>2. ከጤና ባለሞያ<br>3. ከመገናኛ ብዙሀን<br>4. ሌላ ካለ ይገለጽ___ | | |

III. የተማሪው ተግባር በግልና በአካባቢ ንጽህና አጠባበቅ ዙሪያ

| ተራ. ቁ | ጥያቄ | መልስ | ወደ | ኮድ |
|---|---|---|---|---|
| 301 | መቼ መቼ ነው እጅህን/ሽን የምትታጠበው/ቢው? (የምታደርገውን/ጊውን ብቻ አክብብ/ቢ) | 1. ምግብ ከመመገብህ/ሽ ፊት<br>2. ምግብ ከተመገብክ/ሽ በኋላ<br>3. መጸዳጃ ቤት ከተጠቀምክ/ሽ በኋላ<br>4. ሌላ ካለ ይገለጽ | | |
| 302 | እጅህን/ሽን ስትታጠብ/ቢ አብዛኛውን ጊዜ ሳሙና ትጠቀማለህ/ሽ? | 1. እጠቀማለሁ<br>2. አልተቀምም | | |
| 303 | ልብስህን/ሽን በየስንት ጊዜው ታጥባለህ/ቢያለሽ? | 1. በሳምንት አንድ ቀን<br>2. በሳምንት ሁለት ቀን<br>3. በሳምንት ሶስት ቀን<br>4. ሌላ ካለ ይገለጽ | | |

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|---|---|---|---|---|
| 304 | ገላህን/ሽን በየስንት ጊዜው ትታጠባለህ/ቢያለሽ? (የምታደርገውን/ጊውን ብቻ አክብብ/ቢ) | 1. በሳምንት አንድ ቀን<br>2. በሳምንት ሁለት ቀን<br>3. በሳምንት ሶስት ቀን<br>4. ሌላ ካለ ይገለጽ | | |
| 305 | ጥፍሮችህን ሁልጊዜ ታጸዳለህ/ጃለሽ ትቆረጣለህ/ጫለሽ? | 1. አጸዳለሁ/እቆረጣለሁ<br>2. አላጸዳም/አልቆረጥም | | |
| 306 | ሽንት ቤት ከመጠቀምክ/ሽ በኋላ ውሃ ታፈሳለህ/ሻለሽ? | 1. አፈሳለሁ<br>2. አላፈስም | | |
| 307 | ዶርም ካለህ/ሽ በየስንት ጊዜው ታጸዳላችሁ | 1. በሳምንት አንድ ቀን<br>2. በሳምንት ሁለት ቀን<br>3. በሳምንት ሶስት ቀን<br>4. ሌላ ካለ ይገለጽ | | |
| 308 | ዶርማችሁ ውስጥ ደረቅ ቆሻሻን በአግባቡ ታስወግዳለህ/ጃለሽ? | 1. አስወግዳለሁ<br>2. አላስወግድም | | |
| 309 | በዩኒቨርሲቲ ውስጥ የጽዳት ዘመቻ እንዳለ ታውቃለህ/ቂያለሽ? | 1. አውቃለሁ ⟶<br>2. አላውቅም ⟶ | 310<br>311 | |
| 310 | ተ.ቁ 309 አውቃለሁ ከሆነ በዘመቻው ትሳተፋለህ/ፊያለሽ? | 1. እሳተፋለሁ<br>2. አልሳተፍም | | |
| 311 | በመንገድ ዳር የሚሸጡ ምግቦችን ትጠቀማለህ/ሚያለሽ? | 1. እሳተፋለሁ<br>2. አልጠቀምም | | |
| 312 | ዶርም የምትጠቀም ከሆነ የትኛው ችግር ነው ከንጽህና ጋር በተያያዘ ጎልቶ የሚታይህ/ሽ? ሶስት ዋና ዋናዎቹን በቅደም ተከተል አስቀምጥ/ጪ | 1. የግቢው ንጽህና<br>2. የዶርም ንጽህና<br>3. ተከታታይ የሆነ የውሃ እጥረት<br>4. የደረቅ ቆሻሻ መጣያ እጥረት<br>5. ንጽህና የጎደለው የካፍቴሪያ አገልግሎት<br>6. ንጽህና የጎደለው ላውንጅ አገልግሎት<br>7. ሌላ ካለ ይገለጽ_____ | | |

## Annex3: Observation Check list for Student Cafeteria and Dormitory Toilet Of the three Campuses

| Building Exterior | Science | Main | Technology |
|---|---|---|---|
| Garbage storage area<br>• Garbage store area is/are located adequate distance from the building.<br>• Area is on well-drained surface concrete, asphalt, gravel<br>• Area around garbage cans and dumpsters is free from spilled liquids or garbage<br>• Garbage storage area are sealed properly<br>• Area is located on hard, cleanable surfaces | G/P | G/P | G/P |
| Garbage handling system<br>• Trash cans sealed properly or with tightly fitting lids<br>• All waste is sealed in plastic bags before disposal | G/P | G/P | G/P |
| Roof areas<br>• Roof areas and other overhang structures free from bird nests<br>• Roof gutters are clear of leaves and debris | G/P | G/P | G/P |
| Drainage areas<br>• Cracks in plumbing are properly sealed | G/P | G/P | G/P |
| surrounding landscape<br>• Adequate visibility between plantings and buildings<br>• Building free from direct contact with trees, shrubs, and vines<br>• Water drains away from building | G/P | G/P | G/P |
| Rodent-proofing<br>• Rodent-proofing is free from repair | G/P | G/P | G/P |

| **Building Interior** | | | |
|---|---|---|---|
| Walls<br>• Interior walls are free from cracks and crevices | G/P | G/P | G/P |
| Floors<br>• All floors are swept and mopped on a daily basis, including all corners and baseboards. | G/P | G/P | G/P |
| Ceilings<br>• Kitchen and cafeteria ceilings are free from broken and damaged tile, signs of pests | G/P | G/P | G/P |
| Floor drains<br>• Floors are clean (free of spillage) by end of day, especially under food prep area | G/P | G/P | G/P |
| Lighting<br>• Sufficient lighting | G/P | G/P | G/P |
| Ventilation/Air handling equip<br>• Air handling equipment functions properly and turned on | G/P | G/P | G/P |
| **Food Storage** | | | |
| Dry food storage area<br>• Stored dry food products rotated on "first in first out" basis<br>• Food items are stored in tightly closed containers overnight (e.g. bread, cookies, flour, etc.)<br>• Food stored in pest-proof containers<br>• Store rooms neat and organized | G/P | G/P | G/P |
| Damaged/spoiled dry food<br>• Damaged/ spoiled dry food are taken out at the end of each day | G/P | G/P | G/P |
| Empty container storage<br>• Packaging and shipping materials are promptly removed from food storage areas | G/P | G/P | G/P |
| Refrigerated areas<br>• Refrigerated areas are regularly cleaned of grease deposits<br>• Is the refrigerator, including walk-ins and milk coolers having an accurate thermometer | G/P | G/P | G/P |

| | | | |
|---|---|---|---|
| **Kitchen Areas** | | | |
| Dishwashing areas<br>• Dishwashing areas are clean<br>• Pests (evidence of the pest, damage or the pest itself)<br><br>Garbage/Trash areas<br>• Trash cans are clean and lined with trash bags, daily<br>• Pests (evidence of the pest, damage or the pest itself)<br><br>Tray return area<br>• Tray return area regularly cleaned<br>• Pests (evidence of the pest, damage or the pest itself)<br>Spaces around equipment<br>• Floor spaces around equipment shall be cleaned after spills and after periods when food is served.<br><br>Food serving lines<br>• The food service area is clean and free of food and grease deposits<br>Storage area for pots/pans/plates<br>• All storage area for pots/pans/plates area are cleaned and dried by end of day | G/P<br><br>G/P<br><br>G/P<br><br>G/P | G/P<br><br>G/P<br><br>G/P<br><br>G/P | G/P<br><br>G/P<br><br>G/P<br><br>G/P |
| **Adequate water availability** | | | |
| • Enough or proportional amount of water | G/P | G/P | G/P |
| **Toilet area of cafeteria** | | | |
| • A minimum number of toilets: 1 for 1-5 people, 2 for 6-25 and so on. More may be needed to avoid undue delay e.g. if breaks are taken at set times<br>• privacy for users, including a lock on individual doors, not being able to see into the toilets when exit/entrance doors are opened and obscured windows to prevent people being able to look in from the outside<br>• Faeces are not seen outside<br>• Enough water availability at least 2 Tap for 3 toilets<br>• Proper disposal facilities for sanitary wastes | G/P | G/P | G/P |
| **Dining hall area** | | | |
| Table/chair other specify<br>• The cafeteria table and chairs shall be cleaned and sanitized between each use.<br>• Dining hall area cleaned daily<br>• Furniture moves easily for cleaning | G/P | G/P | G/P |

| **Observation of dormitory toilet** | **Science campus** | **Main campus** | **Technology campus** |
|---|---|---|---|
| Adequacy of toilet<br>• At least 1 seat for 6 people | G/P | G/P | G/P |
| Cleanness of inside toilet<br>• No used tissue paper and feces are seen | G/P | G/P | G/P |
| Condition or status of the toilet<br>• Function properly | G/P | G/P | G/P |
| Adequacy of water toilet area<br>• At least 2 Tap for 3 toilets | G/P | G/P | G/P |
| Stored and disposed solid waste<br>• Properly stored in container | G/P | G/P | G/P |
| Water tested for its safeness<br>• Water test in every three month | G/P | G/P | G/P |
| Proper liquid waste disposal system in toilet area<br>• Proper sewerage system | G/P | G/P | G/P |

NB: G/P: Good or Poor

(35, 40)

Name of health professional _____ signature Date _____

Supervised by _____ signature_____ date _____

## Annex4: Discussion guide for Focus Group Discussion Question for AAU student Cafeteria Workers

**The guide lines will be as follow**

1. Greeting
2. Ask the willingness of the cafeteria workers in the discussion
3. Explain the objectives and procedure of the study and FGD
4. Tell the participants that confidentiality will be maintained

**Topic to be discussed**

1. Have you ever talked with students, colleagues, bosses or other bodies about intestinal parasites, other transmitted disease and their transmission and control, personal hygiene or sanitation?
2. Have you ever discussed about the sanitation of the cafeteria in related to transmitted disease with your colleagues, bosses or other bodies?
3. What is the most difficult part for you to taking an action for sanitation and preventing of any transmitted disease?
4. Where do you prefer (in what condition) to have education about intestinal parasites, other transmitted disease, personal hygiene or sanitation?
5. Did any bodies or departments who were voluntarily given awareness about intestinal parasites, other transmitted disease, personal hygiene or sanitation?
6. Did you have medical checkup?
7. Is it important to discuss about intestinal parasites, other transmitted disease, personal hygiene or sanitation?
8. What are the barriers for not communicating or discussing about intestinal parasites, other transmitted diseases, personal hygiene or sanitation? How do we solve those barriers?

የአዲስ አበባ ዩኒቨርሲቲ የተማሪዎች ምግብ ቤት ሰራተኞች ስለ ሆድ ውስጥ ጥገኛ ትላትሎች ፣ ስለ ሌላ ተላላፊ በሽታዎች ፤ ስለ ግልና የቤት ወይም የአካባቢ ንጽህና አጠባበቅ በጋራ የሚወያዩባቸው ነጥቦች፡፡

I. ሰላምታ ማቅረብ
II. በውይይቱ ለመሳተፍ ፈቃደኛ ስለመሆናቸው መጠየቅ
III. ስለ ጥናቱ አላማና ጠቀሜታ ማስረዳት
IV. በውይይቱ የሚነሱ ጉዳዮች በሙሉ ሚስጥሩ የሚጠበቅ መሆኑን ማረጋገጥ

1. በእስከዛሬ ቆይታችሁ ከተማሪዎች ፣ከስራ ባልደረቦቻችሁ ፣ ከቅርብ ሀላፊዎቻችሁ ወይም ከሌሎች አካላት ጋር ስለ ሆድ ውስጥ ጥገኛ ትላትሎች ፣ስለ ሌሎች ተላላፊ በሽታዎች መቆጣጠርና መከላከል ፣ስለ ግልና የቤት ወይም የአካባቢ ንጽህና አጠባበቅ ተወያይታችሁ ታውቃላችሁ
2. ስለ ካፍቴሪያውና አካባቢው ንጽህና በተመለከተ ከስራ ባልደረቦቻችሁ ፣ከቅርብ አለቆቻችሁ ወይም ከሌላ አካላት ጋር ተወያይታችሁ ታውቃላችሁ
3. እስካሁን የተነጋገራችሁትንነገር ወደ ተግባር ለመቀየር ምን ምን እንቅፋቶች ይኖራሉ
4. ስለ ሆድ ውስጥ ጥገኛ ትላትሎች ፣ ስለ ሌላ ተላላፊ በሽታዎች ፤ ስለ ግልና የቤት ወይም የአካባቢ ንጽህና አጠባበቅ ተምህርት የት እና በምን አይነት ሁኔታ ብታገኙ ትመርጣላችሁ
5. ማንኛውም አካል ወይም የስራ ክፍላችሁ ስለ ሆድ ውስጥ ጥገኛ ትላትሎች ፣ ስለ ሌላ ተላላፊ በሽታዎች ፤ ስለ ግልና የቤት ወይም የአካባቢ ንጽህና አጠባበቅ የማንዛቤ ማስጨበጫ ስልጠና ሰጥቶዋችሁ ያውቃል
6. የጤና ምርመራ (medical checkup) ይደረግላችኋል?
7. ስለ ሆድ ውስጥ ጥገኛ ትላትሎች ፣ ስለ ሌላ ተላላፊ በሽታዎች ፣ ስለ ግልና የቤት ወይም የአካባቢ ንጽህና አጠባበቅ መወያአት ጠቃሚ ነው ብላችሁ ታምናላችሁ
8. ስለ ሆድ ውስጥ ጥገኛ ትላትሎች ፣ ስለ ሌላ ተላላፊ በሽታዎች ፣ስለ ግልና የቤት ወይም የአካባቢ ንጽህና አጠባበቅ መረጃዎችን ለመለዋወጥ ወይም ለመወያየት እንቅፋት ሊሆኑ የሚችሉ ጉዳዮች ምንድን ናቸው መፍትሔዎቻቸውስ

## Annex 5: Declaration

I, the under signed, declared that this is my original work, has not been presented for a degree in this or any other University, and that all source of material used for this thesis has been fully acknowledged.

Name Emnet Neda

Signature _____

Place Addis Ababa, Ethiopia

This thesis has been submitted for Examination with my approval as University advisor.

Name Worku Tefera (MPH, PhD fellow)

Signature _____