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INTESTINAL PARASITES AND ASSOCIATED FACTORS AMONG FOOD HANDLERS OF FOOD AND DRINKING ESTABLISHMENTS IN GAMBELLA TOWN, SOUTH WEST ETHIOPIA

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JIMMA, ETHIOPIA

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ABSTRACT

Background:- Intestinal parasitic infection is distributed worldwide, especially in developing countries with low socio-economic status and poor living conditions. In Ethiopia, intestinal parasitic infection is a major public health problem throughout the country. However, the information on prevalence of intestinal parasites and the associated factors especially in food handlers in the area is limited.

Objectives:- This study was aimed to assess the prevalence of intestinal parasite and associated factors among food handlers of food and drinking establishments in Gambella town.

Methods:- Cross sectional study was used from March 1-26/2017 in Gambella Town, South Western Ethiopia. A total of 211 food handlers were enrolled in the study using lottery method. pretested structured questionnaire was used to collect data using interviewer administered technique. In addition to this, microscopy with concentration techniques was used to detect intestinal parasites from specimen. Data were analyzed using SPSS for windows version 21. Univariate, bivariate and multivariate analyses were done. Statistical tests was performed at 95% confidence intervals and a P-value < 0.05 were considered to declare a result as statistically significant.

Result:- Of 205 stool specimens examined, 90(43.9%) were positive for one or more intestinal parasites. Seven species of intestinal parasites were identified and from single intestinal parasite infection, predominant parasite infections were Giardia lamblia 20(39.21%) followed by Entameoba histolytica 18(35.29%). There was positive association between presence of intestinal parasite infection and hand washing after using toilet with water only [AOR: 3.77, 95% CI; (1.34-10.58)] and hand washing before preparing food with water only [AOR: 3.97, 95% CI; (1.37-11.55)].

Conclusion:- This study revealed a high prevalence of intestinal parasites among food handlers in the study area. The study also identified factors such as habit of hand washing after toilet and before food preparation that were associated with intestinal parasitic infections. Therefore, Gambella town health office and other relevant stakeholders should give health education on "Good hand washing technique" after using toilet and before preparing food.

key words:- *Intestinal Parasites, Food handlers, Gambella Ethiopia.*

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ABBREVIATIONS AND ACRONYMS

AOR	Adjusted Odds Ratio
BSc	Bachelor of Science
CDC	Centers for Disease control
CI	Confidence Interval
COR	Crude Odds Ratio
ETB	Ethiopian Birr
FMoH	Federal Ministry of Health
gms	Grams
IP	Intestinal Parasite
km	Kilo Meters
Neg.	Negative
NGOs	Non-Governmental Organizations
NTDs	Neglected Tropical Diseases
Pos.	Positive
rpm	Revolution Per Minute
SOP	Standard Operating Procedure
SPSS	Statistical Package for Social Science
U.S	United States
WHO	World Health Organization

CHAPTER ONE

1 INTRODUCTION

1.1 Background

Intestinal parasites are organisms that live in the host's intestine and take up the nutrition from the host and cause abdominal discomfort, dysentery, mechanical irritation of intestinal mucosa, malabsorption syndromes and obstruction[1]. Intestinal parasites are heterogeneous group of helminthes and protozoa that are responsible for billions of infections worldwide and are an important global health concern that have plagued humans since pre-historic times[2]. The parasites primarily infest the small intestines and colon in man and other animals[3]. Some of the parasites species responsible are associated with severe morbidity often resulting in mortality, particularly in less developed tropical and subtropical countries[4].

Transmission of intestinal parasites is affected directly/indirectly through objects contaminated with faeces. These include food, water, nails and fingers, indicating the importance of faecal-oral human-to-human transmission. Although various modes of transmission of intestinal parasites are known to exist, the highest mode of transmission is through hand to mouth or the higher magnitude of the parasites are transmitted through hand to mouth[5, 6].

The food handling personnel play a vital role in the transmission of food-borne diseases and the health of the food handlers is of great importance for maintaining hygienic quality of food prepared and served by them. Food handlers with poor personal hygiene and inadequate knowledge on food safety could be potential sources of infections of many intestinal helminthes and protozoa. Food-handlers who harbor and excrete intestinal parasites may contaminate foods and dishes from their faeces via their fingers, then to food processing and finally to healthy individuals (the customers) or the surrounding community, in addition to the risk of illness to the food handlers themselves[7-9]. Food sold in markets may be contaminated by hands that have not been washed after defecation increases the risk of transmission of intestinal parasites for consumers[9].

WHO emphasizes that outbreaks of food-borne diseases can be reduced if both professionals and domestic food-handlers understand the importance of correct hygienic food practices. Hand washing has been identified as the single most important means of preventing the spread of infection and if poorly or improperly implemented, can lead to food-borne illness outbreaks.

Food handlers in bigger eating establishments cater to a larger number of people, they are epidemiologically more important than domestic food handlers in spreading of food borne disease[10].

In developing countries, up to an estimated 70% of cases of diarrheal diseases are associated with the consumption of contaminated foods. Approximately, 10 to 20% of food-borne diseases outbreaks are due to contamination by the food handlers. Investigations of outbreaks of food-borne disease throughout the world show that, in nearly all instances, they are caused by the failure to observe satisfactory standards in the preparation, processing, cooking, storing or retailing of foods[11].

In Ethiopia, intestinal parasitic infection is a major public health problem throughout the country[12] and among sub-Saharan African countries, Ethiopia has the second-and the third-highest burden of *Ascaris lumbricoides* and hookworm, respectively[13]. The prevalence of parasitic infections was high in the lower altitudes including south western Ethiopia[14].

1.2 Statement of the problem

Intestinal parasitic infections have been described as constituting one of the greatest single most important worldwide causes of illness and disease[15]. According to Centers for Disease Control (CDC) food borne diseases cause an estimated 76 million illnesses, 325,000 hospitalizations, and 5,000 deaths in the U.S. each year. The cost of the most common food borne illnesses in the United States is estimated at $6.5–$34.9 billion annually[16].

According to the World Health Organization's estimates, 30% of the population suffers from foodborne diseases in developing countries, and two million deaths occur each year. The problem is more severe in developing countries[13].

Regarding to intestinal protozoan infections, *Giardiasis* caused by *Giardia lamblia*, is the most predominant protozoa infection with an estimated prevalence rates ranging from 2.0 to 7.0% in developed countries and 20.0 to 30.0% in most developing countries, affecting approximately 200 million people worldwide[17]. According to the World Health Organization, approximately 500 million people worldwide suffer from amoebiasis, with an annual mortality between 40,000 and 110,000[18]. Among intestinal helminthes, Ascaris lumbricoides, hookworm and Trichuri trichiura infect an estimated 1.2 billion, 740 million and 795 million people worldwide, respectively, from which thousands of deaths were reported [19].

In developed countries, an estimated one-third of the population are affected by intestinal parasitic agents each year but the infections are more severe in the tropical regions of the world[15]. Centers for Diseases Control (CDC) reported that approximately 20% of food-related infections are due to food handlers[10]. In developing countries, 70% of cases of diarrhea are associated with the consumption of contaminated food[13].

According to the Ethiopian Ministry of Health more than half a million annual visits of the outpatient services of the health institutions are due to intestinal parasitic infections, being the first or second most predominant causes of outpatient morbidity in the country [20, 21]. It is estimated that one third of Ethiopians are infected with A. lumbricoides, one quarter is infected with T. trichiura and one in eight lives with hookworm. As a result, Ethiopia has the second highest burden of ascariasis, the third highest burden of hookworm, and the fourth highest burden of trichuriasis in Sub-Saharan Africa[6].

Several factors like climatic conditions, poor sanitation, unsafe drinking water and lack of toilet facilities are the main contributors to the high prevalence of intestinal parasites in the tropical and sub-tropical countries[20]. In addition, intestinal parasitic agents increase in polluted environments such as refuse heaps, gutters and sewage units in and around human dwelling, living conditions of the people in crowded or unhealthy situations, ignorance of health promotion practices and impoverished health services[6, 20]. The low economic standard, poor sanitation and ignorance of simple health promotion practices favor the wide distribution of intestinal helminths in Ethiopia[14]. In most cases, clinical features of the intestinal parasitic infections are asymptomatic, leading to difficulties in the eradication and control of these parasites due to the number of potential carriers, such as food handlers[22].

Despite the fact that some parasites are well tolerated in healthy people, others debilitate the body through their repetitive damages. For example, *Giardia lamblia* disturbs the fat absorption process, some worms create anemia, and other parasites (each with special mechanisms, such as sensitivity reactions simultaneously with other diseases) make treatment more difficult and diagnosis more complicated[9].

Hence, a better understanding of the above factors, as well as how social, cultural, behavioral and community awareness affect the epidemiology and control of intestinal parasites may help to design effective control strategies for these diseases[20].

Also, the Federal Ministry of Health (FMoH) of Ethiopia has prioritized intestinal parasitic infection as one of the Neglected Tropical Diseases (NTDs) in the National Master Plan of NTDs, to address the public health problems due to NTDs[6]. However, there is a need to undertake integrated control strategies which involve improved sanitation, health education and chemotherapy to effectively control intestinal parasitic infections in endemic African countries. This requires understanding of the knowledge of the target communities about intestinal parasites[12].

Gambella town is the capital of Gambella People's National Regional state of Ethiopia which is one of the chosen area for different types of investments, tourist destinations, refugee camps, and several Non-Governmental Organizations (NGOs) office. As a result of this and others, eating and drinking in food services establishments, such as hotels, restaurants and Groceries is becoming a common practice and food handlers are employed without being screened for

hygiene related infections like intestinal parasites. Information on intestinal parasites and associated factors among food handlers in the study area is limited. Therefore, this study was aimed to assess the prevalence of intestinal parasites and associated factors among food handlers working in food and drinking establishments in Gambella town.

CHAPTER TWO

2 LITERATURE REVIEW

2.1 Intestinal parasite infection in food handlers

The importance of food handlers as threats in the transmissions of parasitic diseases has been stressed. Intestinal parasitic infections are the most common infections around the world[23] Gastrointestinal parasites are frequently transmitted via food and contaminated drinking water, but may also be spread from person to person through fecal-oral contact. Over 70 species of protozoan and helminthic parasites can infect humans through food and water contamination. In developing countries, particularly those with tropical climates and at low altitudes, such infections remain a serious medical and public health problem[24]. Food handlers employed in hotels and restaurants could be potential sources of various bacterial, viral, and parasitic infections[25].

2.2 Prevalence of intestinal parasitic infection in food handlers

A majority of studies conducted elsewhere in low income countries indicated the high prevalence of intestinal parasitosis [14, 22].

In 2012 a study was conducted in Gaza Strip, Palestine. The study revealed an overall prevalence of parasites in food handlers was 52/214 (24.3%). The most common protozoan parasite was *E. histolytica/dispar* with a percentage of 19.2%, *G. lamblia 2.3%*, *E. coli 1.9%* while the other parasites were detected as 0.5% separately[26].

A study done in 2008 on patterns of infection with intestinal parasites in Qatar among food handlers and housemaids from different geographical regions of origin showed that overall prevalence of infections, all species combined was 33.9% (13.6% for nematodes and 24.8% for protozoa)[4].

A study in Shiraz, Iran in 2015 showed a prevalence of parasitic organisms was 10.4% in the food-handlers. The most species of the protozoan parasites were *G. lamblia*, *E. coli* and *B. hominis*; meanwhile, only one infection by *H. nana* (0.1%) was detected in this group. Mixed infections were observed in 13.2% (n=14/106) of positive cases[27].

A study done in Sari, Northern Iran in 2015 showed that the overall positive stool results were 161 (15.5%)[28].

According to the study conducted in 2012 in the City of Nairobi, Kenya, out of the 312 food-handlers sampled, 49 or 15.7% had different species of parasites and 6 of the 49 or 1.9% had Ascaris lumbricoides (A. lumbricoides), E. histolytica were found in 39 (12.5%) of the subjects while G. lamblia was found in 4 (1.3%)[3].

Prevalence of Gastrointestinal Parasitic Infections among Food Handlers in Eldoret municipality, Kenya in 2014, from the 335 food handlers sampled in this study, 79 tested positive for the intestinal parasite species, which represented an overall prevalence of 23.7%. This comprised both intestinal protozoans and helminth parasites[15].

A study conducted in the Holy City of Makkah, during Hajj Season in 2007 showed that out of 504 food handlers from twenty one countries (including 2 Ethiopians) were investigated for the infection of intestinal parasites. Of these 161 (31.94%) were infected with intestinal parasites[8].

In 2009, the frequency of intestinal parasites among food-handlers (n = 1500) in Khartoum, Sudan results showed that 29.4% of food-handlers were harbouring intestinal protozoa in stool samples: *Entamoeba coli* in 15.3%, *Giardia lamblia* in 9.7%, and *Enta. histolytica* in 4.3%. Moreover, 2.7% of food-handlers harboured intestinal helminths: *Hymenolepis nana* (1.6%), *Schistosoma mansoni* (0.7%), *Taenia saginata* (0.3%) and *Strongyloides stercoralis* (0.1%)[18].

In 2010 the prevalence of intestinal parasites among food handlers in Bahir Dar Town, Northwest Ethiopia, was 158 (41.1%). Mixed intestinal parasite infections were detected in 9 (2.3%) food handlers. The more prevalent intestinal parasite species were *E. histolytica* /dispar 49 (12.76%) and A. *lumbricoides* 45 (11.7%)[29].

A study of Intestinal Parasitic Infection among Food Handlers in South Ethiopia: A Case of Wolaita Sodo Town in 2016 Stool examination of food handlers revealed that 97(33.68%) had one or more intestinal parasites and 12(12.4%) food handlers have been diagnosed with mixed intestinal parasites. *Ascaris lumbricoides* was the most prevalent parasites 18(6.25%), followed by *hook worm* 17(5.9%)[7].

In 2014, the prevalence of intestinal parasitic infection among food handlers in Yebu Town, southwest Ethiopia was 44.1% (52/118). A. lumbricoides (17.8%) was the predominant parasite identified from stool of the study participants followed by hookworm spp (9.3%)[30].

2.3 Factors associated to intestinal parasite infection in food handlers

2.3.1 Socio-demographic factors

The association between age groups and intestinal parasitic infection was statistically significant[6]. A study done at Bahir Dar University, Ethiopia, showed that males food handlers were twice more likely to have intestinal parasites than females[13].

2.3.2 Hygiene factors

A study done at Arba Minch University, Ethiopia, showed that the finger nail status of the study participants had a significant association with the rate of intestinal parasitic infection ($p = 0.004$). The odds of parasitic infection was 2 times higher (AOR: 2.193, 95 % CI [1.29–3.72]) for food handlers who had untrimmed finger nail as compared to those who trimmed[6]. The practice of hand washing after toilet ($p = 0.029$) and before food handling ($p = 0.034$) was significantly associated with parasitic infection among the study participants. Food handlers who were using water only when they washed their hands after toilet had a more likely risk of infection (with 71%) for intestinal parasites [AOR: 1.71, 95 % CI; (1.057–2.765)] than food handlers who use water and soap[6]. The intestinal parasitosis was more likely to occur (with 69 %) among food handlers who washed their hands before food handling with water only [AOR: 1.69, 95 % CI (1.04–2.75)] than food handlers who wash their hand with water and soap[6].

In Wolaita Sodo Town, from hygienic practices of food handlers, there was significance association between hand washing after using toilet and the presence of intestinal parasites (P=0.016)[7].

In Yebu town, food handlers who had no regular practice of washing their hands before meal were seven times more likely to be infected with intestinal parasites than those who wash their hands regularly. The practice of hand washing after using the toilet was significantly associated with parasitic infection among the study participants. The finger nail status of the study participants had a significant association with the rate of intestinal parasitic infection. The odds

of parasitic infection was 14 times higher for individuals who had not trimmed their finger nail as compared to those did[30].

A study done at Mekelle university, Ethiopia, showed that Food handlers who were using soap when they washed their hands had a more likely protective effect (with 85%) from intestinal parasites infection than food handlers who did not use soap. The extent of intestinal parasites was less likely to occur (94% protective effect) among food handlers who washed their hands after toilet than food handlers who didn't wash their hand after toilet. The intestinal parasite was also less likely to occur (with 53% protective effect) among food handlers who had a practice of medical checkup at least once in last six month than food handlers who didn't have medical checkup in the last six months[11].

2.4 Conceptual framework

There are multiple and interrelated determinants for prevalence of intestinal parasitic infection. The conceptual frame work below shows these inter related factors associated with intestinal parasites. For this study, the determinant factors were grouped into three classes; socio demographic characteristics (age, sex, educational status, marital status, ethnicity and religion and monthly income status), Individual and behavioral factors (finger nail status, medical checkup, certified (trained) for food preparation and handling, hand washing habits, service year, knowledge status of type of IP and knowledge status of mode of transmission IP) and environmental related factors (Source of water and availability of toilet). Each of the factors with their constructs are linked with intestinal parasites as well some of them are related with each other as seen by the direction of linkage.

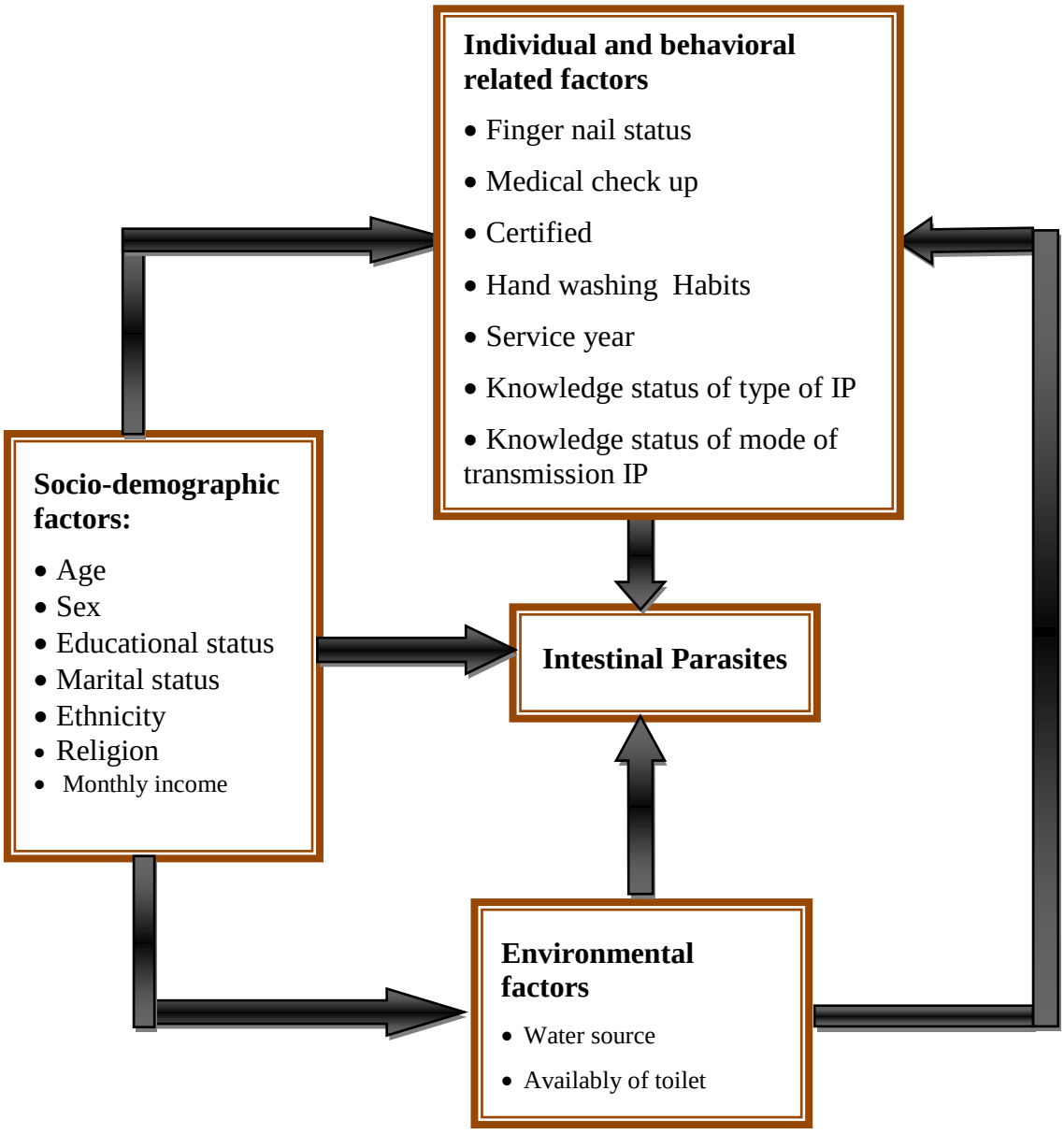

Figure 1 : Conceptual framework associated factors among food handlers of food and drink establishments developed after reviewing different literatures.

2.5 Significance of the study

The finding of the study will facilitate the development of effective planning and strategies for evidence-based intervention, creating awareness for the health professionals working in the study area and baseline information for further large scale study. For instance, the government organizations need to focus interventions related to the main associated factors of intestinal parasitic infection based on evidence. NGOs working in the study area need to manipulate their specific activities based on study findings. Therefore this study can help different stakeholders by paving the way to effective intervention in halting the morbidity and mortality associated with intestinal parasite.

CHAPTER THREE

3 OBJECTIVES

3.1 General objective

- To assess the prevalence of intestinal parasite and associated factors among food handlers of food and drinking establishments in Gambella town, South west Ethiopia, 2017.

3.2 Specific objectives

- To determine the prevalence of intestinal parasite among food handlers of food and drinking establishments in Gambella town.
- To identify factors associated with intestinal parasite among food handlers of food and drinking establishments in Gambella town.

CHAPTER FOUR

4 METHODS AND MATERIALS

4.1 Study area and period

The study was conducted in Gambella town which is the capital city of Gambella regional state located at a distance of 768 kilo meter in the south west away from Addis Ababa. The town is located on the Geographical coordinates of 8°15′ North Latitude and 34°35′ East Longitude and has an elevation of 526 meters above sea level having hot climatic condition at the temperature range of 27-36^{o}C. It has been divided by five kebeles and the town harbors different ethnic groups. The majority of ethnic groups residing in the town are Nuire and Agnuhak. However, there are also other ethnic groups including settlers from other parts of the country. Based on the 2007 census conducted by the Central Statistical Agency of Ethiopia, the projected total population of the town is 55,394 of whom 52.6% are men. According to Gambella regional health bureau and Gambella town health office the town has a total of 130 food and drink establishments (49 Hotels and 81retaurant) with an average of 3 food handlers working in the food and drink establishment. The town has one hospital, one health centers, two governmental health post and 15 private clinics. The livelihood of the population is mainly dependent on government work and trade. The study was conducted from March 1-26/2017 in Gambella Town, South Western Ethiopia.

4.2 Study design

Cross sectional study design was used.

4.3 Population

4.3.1 Source population

All food handler working in food and drinking establishments who full fill inclusion and exclusion criteria.

4.3.2 Study population

All randomly selected food handlers working in food and drinking establishments in Gambella town in the study period that met the inclusion criteria.

4.4 Inclusion and exclusion criteria

4.4.1 Inclusion criteria

- Food handlers Selected food handlers who were working in food and drinking establishment who full fill inclusion criteria.

4.4.2 Exclusion criteria.

- Food handlers who were severely sick and unable to communicate verbally at the time of data collection.

4.5 Sample size determination and Sampling technique

4.5.1 Sample size determination

The sample size was determined using the single proportion population formula. It was calculated based on expected prevalence of intestinal parasites in food handlers from south western Ethiopia 44.1% for any one of parasites [30] with a margin of error of 0.05 and a confidence level of 95%.

$$n = \frac{(z_{\alpha/2})^2 p(1-P)}{d^2} = \frac{(1.96)^2 \times 0.441(1-0.441)}{(0.05)^2} = \underline{\mathbf{379}}$$

Where: -

- n = The minimum possible sample size
- P = Prevalence of intestinal parasite among food handlers (44.1%)
- $Z_{\alpha/2}$ = Standard normal deviate (at 95% = 1.96)
- d = Margin of error (0.05)

Since the source population was less than 10,000 that was the total number of food handlers was (N=390) finite population correction was used to calculate the final sample size. n, was calculated by applying finite population correction formula as follows,

$$n_f = \frac{n}{1+n/N} = \frac{379}{1+0.971} = \mathbf{192.28 \sim 192}$$

Where

- n_f = Final sample size
- n = Sample size from the finite population
- N = Total number of food handlers in the town

Based on the correction formula the sample size becomes 192, Additional 10% was added to take care of non-responses and other unexpected events and so, the sample size becomes 211 food handlers which was comprised 54.1 % of all food handlers.

4.5.2 Sampling technique

Before one week of data collection period, first a census was conducted in each food and drinking establishments of the town to obtain the list of food handlers (sampling frame) and as a result 390 food handlers within 130 (49 Hotels and 81 Restaurants) establishments were registered. Simple random sampling technique was employed. Study participants were selected by lottery method from the lists of food handlers which was obtained from census data, followed by population to sample allocation.

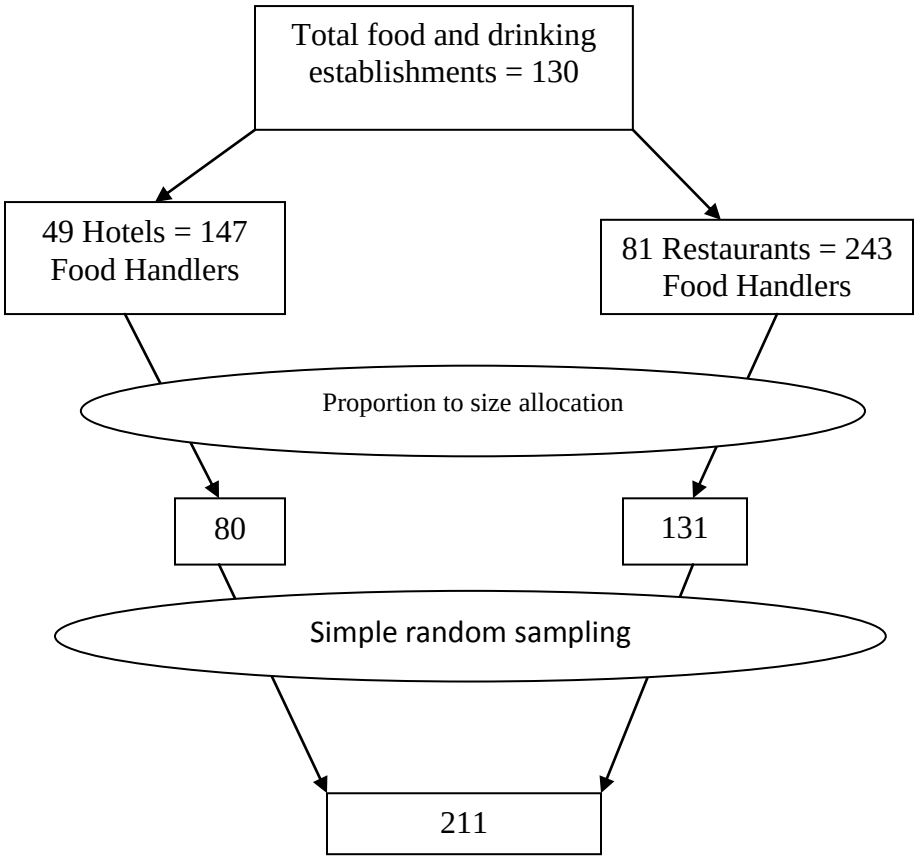

Figure 2: Schematic presentation of sampling procedure of food handlers of food and drinking establishments in Gambella town, South west Ethiopia, 2017

4.6 Variables

4.6.1 Dependent variable

Intestinal parasite infection status.

4.6.2 Independent variables

Socio demographic characteristics:-

- Age, sex, educational status, marital status, ethnicity and religion and income level.

Individual and behavioral factors:-

- Finger nail status, medical checkup, food handling training, hand washing habits, service year, knowledge of types of IP and knowledge of mode of transmissions of IP.

Environmental related factors:-

- Source of water and availability of toilet.

4.7 Data collection instrument and procedures

4.7.1 Data collection instrument

Questionnaires:-

Structured questionnaire was used to collect data using interviewer administered technique which was developed after reviewing related studies. The questionnaire had two sections that was used to obtain socio-demographic characteristics and individual and behavioral factors.

Laboratory materials:- leak proof stool cup, pieces of applicator sticks, ice-pack and cold box were used.

4.7.2 Data collection procedures

Data were collected by face to face interview using pretested structured questionnaire which was translated to the local language which was Amharic and information about socio-demographic characteristics and individual and behavioral characteristics were collected by four BSc. medical laboratory technologists and who were supervised by one BSc. Environmental health officer.

The food handlers after interview were given labeled (which relates the questionnaire and the laboratory request format), clean, dry and leak proof stool cup and pieces of applicator sticks to

bring fresh stool after orientation on how to collect the stool specimen by a trained laboratory technician. Every food handlers was instructed to bring her/his own sufficient amount (about 4 gm) of stool. After collection, the samples were transported to Gambella town Health Center laboratory within 1 hour using ice box.

4.7.2.1 Microscopic Examination (Saline Preparation)

It was carried out on the faecal sample collected using wet preparation. A drop of fresh physiological saline was placed on a clean slide. Using an applicator stick, a small amount of stool specimen was emulsified in saline solution. The preparation was covered with cover slip and examined under the microscope for the presence or absence of intestinal parasite. The entire saline preparation was systematically examined for larvae, ciliates, helminthes eggs, cysts and oocysts using 10× objective with condenser iris closed sufficiently to give good contrast, while 40× objective was used to assist in the detection and identification of eggs, cysts and oocysts (Annex one).

4.7.2.2 Concentration technique (Formol-ether concentration)

An estimated 1 g of formed stool sample or 2 ml of watery stool was emulsified in about 4 ml of 10% formol water contained in a screw-cap bottle. A further 3 ml of 10% formol water was added and mixed well by shak- ing. The emulsified faeces was sieved through a coffee strainer and the sieved suspension transferred to a conical (centrifuge) tube made of strong glass, polypropylene. 3 ml of diethyle ether was added and the tube was stoppered mixed for 1 minute with a tissue wrapped around the top of the tube, the stopper was loosen. It was then centrifuged at 3000 rpm for 1 minute. Using a stick, the layer of faeces debris from the side of the tube was loosen and the tube inverted to discard the ether, faecal debris, and formol water leaving behind the sediment. The tube was returned to its upright position and the fluid from the sides of the tube allowed draining to the bottom. The bottom of the tube was taped to re-suspend and mix the sediment. The sediment was transferred to a slide and covered with a cover glass and examined microscopically using the 10x objective for focusing and 40× objective for proper identification (Annex one).

4.8 Operational Definitions

Food and drinking establishment: is an institution which provides food and drink services to users in the form of breakfast, lunch and dinner for public consumptions.

Food Handlers: Food handlers are persons who have contact with food at the time of preparation only.

Intestinal parasites: are intestinal parasites, a group of protozoan and/or helminths that can be transmitted from food handler to consumers through faecal oral transmission mainly.

Positive for intestinal parasite: the presence of at least one intestinal parasite under investigation of microscopic examination of the stool specimen of the study participant.

Negative for intestinal parasite: absence of any pathogens of intestinal parasites under investigation of microscopic examination of the stool specimen of the study participant.

Mixed infections: are the simultaneous infections of a food handler/s by two or more intestinal parasites.

Regular medical checkup:- Food handlers those who have an experience of every three months examination for intestinal parasites and can show the card during data collection time.

Certified food handler:- Food handlers those who are trained on food preparing and handling from any college or institution and can show the certificate during data collection time.

Regular hand washing :- washing hands all ways when after using latrine, before meal and before preparing food without missing.

Knowledge status :- Categorized

- Good knowledge: scores >80% of the question related to types intestinal parasite and mode of transmission.
- Fair knowledge: scores 60-80% of the question related to types intestinal parasite and mode of transmission
- Poor knowledge: scores <60% of the question related to types intestinal parasite and mode of transmission[11].

4.9 Data processing and analysis

Data were checked manually for its completeness and coded manually, then data were entered in Epi-Data 3.1 version software. After cleaning the data using Epi-Dta data were exported to SPSS version 21 and recoding, counting, computing and other statistical tests were done. Data exploration and descriptive analysis was done. Binary logistic regression was done to identify candidate variable for multivariable regression. Multivariable regression analysis was done by using backward elimination method. All explanatory variables that were associated with the outcome variable in bivariate analysis with p-value of 0.25 or less were included in the multivariable logistic regression analysis. The crude and adjusted odds ratio together with their corresponding 95% confidence intervals was computed. A P-value < 0.05 was considered to declare a result as statistically significant in this study. The result was presented in text and tables based on the types of data.

4.10 Data quality assurance

Both the data collectors (four BSc. medical laboratory technologists) and supervisor (BSc. Environmental health officer) were trained for two days on the objective and methods of the research, data collection and interviewing approach, laboratory testing methods and data recording.

Questionnaire was prepared in English and translated into Amharic and translated back into English to check its consistency.

Before conducting the actual study, pre-test was done on 5% of the total sample size (food handlers) living in Itang town (Special woreda), which is located 38km far from Gambella town, that was not included in the main study. Finally, data collection tool was refined based on the findings from the pretesting.

Supervisor and principal investigator checked for the collected questionnaire on daily base for their completeness and consistency.

The expiry date of normal saline, ether and formol was checked before stool sample preparation and examination. Microscopic slides, cover glasses were checked for cleanliness.

Standard operating procedure (SOP) was used for every laboratory procedures during stool specimen collection, transportation and storing. Closer supervision was undertaken during data collection and problems faced was discussed on a daily basis with data collectors and supervisor.

Multi-collinearity was checked by using variance inflation factor before entered to multivariable regeration. The model fitness was checked by using hosmer-lemeshow goodness of fit testes.

4.11 Ethical considerations

Ethical clearance was obtained from Jimma University institute of health, department of Epidemiology. Letters of permission was secured from Gambella regional health bureau, Gambella town health office. Informed consent was also obtained from each owner of food and drinking establishment and study participant after offering adequate information about the study (see annex 2). Results of participants were kept confidentially and privacy of the respondent was maintained and those participants with parasitic infection were treated accordingly by an assigned Health Officer freely at the health center.

4.12 Dissemination plan

The finding of this study will be disseminated to Jimma University institute of health, department of Epidemiology. The copy of this thesis results will be submitted to Gambella regional health bureau. Furthermore a copy of this study will be provided to Gambella town health office and all attempts will be made to publish the result of the study on national or international journal.

CHAPTER FIVE

5 RESULT

5.1 Socio demographic characteristics

A total of 211 food handlers were enrolled in the study with the response rate of 97.15%. From two hundred five food handlers, 138(67.3%) were females. The median age was 26 with a majority, 143(69.8%) were 20-35 age group. Regarding religion, the 120(58.5%) were Orthodox religion followers. As to ethnicity Oromo 98(47.8%) accounts for higher proportionn of the study participants. Regarding educational status, 30 (14.6%) cannot read and write and the majority 121(59.0%) were 1-8 Grade. Concerning marital status, majority 121(59.0%) were Single, followed by 60(29.3%) were married. The mean monthly income of the respondents was 880.54 ETB (ranged from 450 to 1900 ETB) (Table 1).

Table 1. Socio-demographic characteristics of food handlers of food and drinking establishments in Gambella town, South west Ethiopia, 2017

Socio demographic variables	Frequency (n = 205)	Percent (%)
Sex		
Female	138	67.3
Male	67	32.7
Age Group		
< 20	30	14.6
20-35	143	69.8
>35	32	15.6
Religion		
Orthodox	120	58.5
Muslim	23	11.2
Protestant	62	30.2
Educational status		
Cannot read and write	30	14.6
1- 8 Grade	121	59.0
9- 12 Grade	41	20.0
> 12 Grade	13	6.3
Marital status		
Single	121	59.0
Married	60	29.3
Divorced	17	8.3
Widowed	7	3.4

Ethnicity		
Oromo	98	47.8
Amhara	42	20.5
Tigre	21	10.2
Others *	44	21.5
Monthly Income (In Birr)		
≤ 950	120	48.5
> 950	85	41.5

NB. *Others *= Agniwa, Gurage, Kefa, Wolaita and Daworo*

5.2 Prevalence of Intestinal parasites among food handlers

Out of the total 205 participants 90 (43.9%) were positive for one or more of intestinal parasites. From those 90 positive food handlers, majority, 51(56.7%) of them had infection with single parasite (Table 2).

Table 2. Prevalence of intestinal parasites among food handlers of food and drinking establishments in Gambella town, South west Ethiopia, 2017

Variables	Frequency	Percent (%)
Stool Exam for Intestinal parasite (n=205)		
Positive	90	43.9
Negative	115	56.1
Intestinal parasite infection by number of species (n=90)		
Single	51	56.7
Mixed	39	43.3
Parasite species of single infection (n=51)		
E. histolytica	18	35.29
G. lamblia	20	39.21
Taenia species	4	7.84
A. lumbricoides	2	3.92
T. trichuria	1	1.96
Hookworm	5	9.80
H.nana	1	1.96

5.3 Bivariate analysis of socio-demographic factors

Bivariable analysis was done in order to identify the candidate variables. Accordingly, age and educational status were candidate for multivariable logistic regression (Table 3).

Table 3. Bivarite analysis of socio-demographic factors for intestinal parasite among food handlers of food and drinking establishments in Gambella town, South west Ethiopia, 2017

Variables	Category	Intestinal Parasite		COR(95%CI)	P-value
		Pos.(%)	Neg.(%)		
Sex	Female	62(68.88)	76(66.09)	1.14(0.49-1.59)	0.671
	Male	28(31.12)	39(33.91)	1	
Age group	< 20 years	15(16.66)	15(13.4)	0.78(0.29-2.11)	0.622
	20-35 years	57(63.33)	86(69.56)	0.516(0.24-1.12)	0.094
	> 35 years	18(20)	14(12.17)	1	
Religion	Orthodox	54(60)	66(57.39)	1	
	Muslim	6(6.67)	17(14.78)	0.43(0.159-1.170)	0.099
	Protestant	30(33.33)	32(27.82)	1.15(0.62-2.12)	0.664
Educational status	Can't Read and Write	13(14.44)	17(14.78)	4.21(0.79-22.36)	0.092
	1-8 Grade	51(56.67)	70(60.89)	4.01 (0.85-18.86)	0.079
	9-12 Grade	24(26.67)	17(14.78)	7.76(1.52-39.62)	0.014
	> 12 Grade	2(2.22)	11(9.56)	1	
Marital status	Single	50(55.56)	71(61.74)	1.76(0.33-9.44)	0.509
	Married	30(33.33)	30(26.8)	2.50(0.45-13.91)	0.295
	Divorced	8(8.89)	9(7.82)	2.22(0.33-14.80)	0.409
	Widowed	2(2.22)	5(4.34)	1	
Ethnicity	Oromo	43(47.79)	55(47.82)	1.03(0.50-2.11)	0.938
	Amhara	21(23.33)	21(18.26)	1.32(0.56-3.08)	0.527
	Tigre	7(7.78)	14(12.17)	0.658(0.22-1.95)	0.450
	Others	19(21.11)	25(21.74)	1	
Monthly Income (In Birr)	≤ 950	50(55.56)	70(60.87)	1	
	>950	40(44.44)	45(39.13)	1. 24(0.71-2.18)	0.444

5.4 Bivariate analysis of individual and behavioral related factors

Bivariable analysis was done in order to identify the candidate variables. Accordingly, hand washing after using toilet, hand washing after using toilet with water only and detergents, finger nail status and service years were candidate for multivariable logistic regression (Table 4).

Table 4. Bivariate analysis of individual and behavioral related factors for intestinal parasite among food handlers of food and drinking establishments in Gambella town, South west Ethiopia, 2017

Individual and behavioral characteristics	Category	Intestinal Parasite		COR (95%CI)	P-value
		Pos.(%)	Neg.(%)		
Hand washing after using toilet	Yes	27(30)	84(73.04)	1	
	No	63(70)	31(26.5)	6.32 (3.43-11.64)	<0.001
Hand washing after using toilet**	With water and detergents	7(25.93)	56(66.67)	1	
	With water only	20(74.07)	28(33.33)	5.71 (2.16-15.12)	<0.001
Hand washing before meal regularly	With water and detergents	38(42.22)	60(52.17)	1	
	With water only	52 (57.78)	55(47.82)	1.16 (0.66-2.05)	0.605
Hand washing before preparing food regularly	With water and detergents	22(24.44)	60(52.17)	1	
	With water only	68(75.56)	55(47.82)	3.37 (1.84-6.17)	<0.001
Finger nail status	Trimmed	39(43.33)	87(75.65)	1	
	Untrimmed	51(56.67)	28(24.35)	4.06 (2.24-7.37)	<0.001
Information about IP	Yes	21(23.33)	24(20.87)	1	
	No	69(76.67)	91(79.13)	0.87 (0.45-1.68)	0.672
Service Years	< 1year	4(4.44)	12(10.43)	0.19 (0.05-0.79)	0.023
	1 - 5 years	50(55.56)	77(66.95)	0.37(0.15-0.95)	0.038
	6-10 years	22(24.44)	18(15.65)	0.70 (0.24-2.03)	0.510
	> 10 years	14(15.56)	8(6.95)	1	
Knowledge about type of IP	Poor Knowledge	88(97.78)	113(98.26)	0.78 (0.11-5.6)	0.804
	Fair Knowledge	2(2.22)	2(1.74)	1	
Knowledge about mode of transmission of IP	Poor Knowledge	87(96.67)	105(91.30)	2.49 (0.49-12.63)	0.272
	Fair Knowledge	1(1.11)	4(3.48)	0.75 (0.05-11.31)	0.835
	Good Knowledge	2(2.22)	6(5.22)	1	

**n=111

5.5 Factors associated with intestinal parasites among food handlers.

Multivariable logistic regression was fitted in order to identify independent predictors of intestinal parasitosis. Accordingly, hand washing after using toilet regularly with water only and hand washing before preparing food regularly with water only were independent predictors of intestinal parasite (Table 5).

Food handlers those who had habit of washing their hands after using toilet with water only were about nearly 3.8 times more likely to acquire intestinal parasitic infection than food handlers who had habit of washing hands with water and detergents [AOR: 3.77, 95% CI; (1.34-10.58)].

Food handlers those who had habit of washing their hands before preparing food with water only were almost 4 times more likely to acquire intestinal parasites than those who had habit of washing hands before preparing food with water and detergents [AOR: 3.97, 95% CI; (1.37-11.55)].

Table 5. Factors independently associated with intestinal parasites among food handlers of food and drinking establishments of Gambella town.

		Intestinal Parasite		COR	AOR
Variables	**Category**	Pos.(%)	Neg.(%)	**(95%CI)**	**(95%CI)**
Hand washing after using toilet regularly	With water and detergents	7 (25.93)	56 (66.67)	1	3.77 (1.34-10.58)*
	With water only	20 (74.07)	28 (33.33)	5.71 (2.16-15.12)	
Hand washing before preparing food regularly	With water and detergents	22 (24.44)	60 (52.17)	1	3.97 (1.37-11.55)*
	With water only	68 (75.56)	55 (47.82)	3.37 (1.84-6.17)	

**=p-value<0.05, Hosmer and Lemeshow test X^2=9.96 and p-value 0.07*

CHAPTER SIX

6 DISCUSSION

This study showed the prevalence of intestinal parasitic infection among food handlers of food and drinking establishments in Gambella town, South west Ethiopia, was 43.9%. This finding is almost in agreement with studies conducted in Yebbu Town (44.1%), Southwest Ethiopia[30], in Addis Ababa University students' cafeteria (45.3%), Addis Ababa, Ethiopia[16] but this is lesser than studies conducted in Mekele University (49.3%) [11]. However, this finding is higher than the studies done in Bahir Dar Town (41.1%), Northwest Ethiopia[29], in India 40.5% [31]. in Southern Ethiopia (36 %)[6], in wolaita Sodo Town (33.68%), South Ethiopia[7], in Makkah (31.94%)[8], in Khartoum (30.5%), Sudan[18], in Gondar Town (29.1%), Northwest Ethiopia[5], in Gaza Strip (24.3%), Palestine[26], in Eldoret Municipality (23.7%), Kenya[15], in Accra (21.6%), Ghana[24] and at Bahir Dar University (12.9%), Ethiopia. The reason for difference of overall prevalence between the present study and other studies could be geographical conditions, the time of study, sample size, socio-economic conditions, sanitation and hygienic knowledge and practice of the participants of the studies. The predominant parasite detected in this study was Giardia lamblia which is similar with the studies done in *Ahvaz East Health Center, Iran* Shiraz, Iran and Sari, northern Iran[23, 27, 28].

In this study, the prevalence of Giardia lamblia infection was 39.21%, this finding was lower when compared with the study done in Ahvaz (85.35%), Iran[23] but it was higher from studies conducted in Addis Ababa University students' cafeteria (18.8%), Ethiopia[16], in Khartoum (9.7%), Sudan[18], in Bahir Dar Town(7.0%)[29] and in Southern Ethiopia(5.22%)[6].

In this study, The prevalence of Entameoba histolytica was 35.29%, this finding was in agreement with studies conducted in Mekelle university students' cafeteria (36.6%), Mekelle[11], this finding was lower when compared with the studies conducted in Addis Ababa University students' cafeteria (70.8%), Ethiopia[16] and in Enugu State(52.4%), Nigeria[32], but higher in Southern Ethiopia (14%)[6], in Bahir Dar Town (12.76%), Ethiopia[29], in the City of Nairobi(12.5%), Kenya[3].

The current study also showed the prevalence of Hookworm was 9.80%. This finding comparable with the studies done in Makkah (7.54%)[8], at Bahir Dar University (6.3%), Ethiopia[13] and in Bahir Dar Town (8.1%), Ethiopia[29], but higher than the study conducted in

Wolaita Sodo Town (5.9%)[7]. However lower than the study conducted in Enugu State (19.8%), Nigeria[32].

In this study, The prevalence of Taenia species was 7.84%, which was higher than the studies conducted in Addis Ababa University students' cafeteria (5.2%)[33], in Wolaita Sodo Town (4.86%) [7] and in Bahir Dar Town (1.3%), Ethiopia[29],

The current study revealed that the prevalence of Ascaris lumbricoides was 3.92%, which was comparable with in Addis Ababa University students' cafeteria (2.1%)[33], in Accra(5%), Ghana[24] and in Wolaita Sodo Town(6.25%)[7]. However, the finding was lowest when compared with studies conducted in Enugu State (23.8%), Nigeria[32], in Southern Ethiopia (9.27 %)[6] and in Bahir Dar Town(11.7%), Ethiopia[29],

In this study, the prevalence of Trichuris trihuria was 1.96%, the finding was in agreement with in Addis Ababa University students' cafeteria(1.1%)[33] and in Wolaita Sodo Town (1.04%)[7]. This finding was higher than in Bahir Dar Town (0.5%), Ethiopia[29] but also lower than the finding in Makkah (10.70%)[8].

The current study also showed the prevalence of Hymenlopis nana was 1.96%, which was in line with studies conducted in Wolaita Sodo Town (2.43%)[7] and in Mekelle university students' cafeteria (1.3%), Mekelle Ethiopia[11] and lower than in Bahir Dar Town (0.5%), Ethiopia[29]. Variation in prevalence rates and frequency of different parasites may be due to variable cultural factors, food habits and geographical conditions.

The independent predictors of intestinal parasites infection in food handlers identified from multivariable analysis were hand washing after using toilet regularly with water only and Hand washing before preparing food regularly with water only remained significant factors.

Food handlers those who had habit of washing their hands after using toilet with water only were more likely to acquire intestinal parasitic infection than food handlers who had habit of washing hands with water and detergents.

This finding is comparable with study done in Southern Ethiopia, food handlers who were using water only when they washed their hands after toilet had a more likely risk of infection for intestinal parasites than food handlers who use water and soap[6].

This finding is also supported by study done in Mekelle university students' cafeteria, Mekelle, Ethiopia, Food handlers' who were using soap when they washed their hands had a 85% less likely to acquire intestinal parasites infection than food handler's who did not use soap[11].

Food handlers those who had habit of washing their hands before preparing food with water only were more likely to acquire intestinal parasites than those who had habit of washing hands before preparing food with water and detergents. This finding is comparable with study done in Southern Ethiopia, hand washing before food handling with water only than food handlers who wash their hand with water and soap[6].

6.1 Strength of the study

- The study has focused on one of the most potential source groups (food handlers) of the population especially to intestinal parasites infection.
- Concentration technique was used to increase sensitivity of parasite diagnosis.

6.2 Limitation of the study

- The current analysis did not assess the potential seasonal patterns of intestinal parasites among food handlers.

CHAPTER SEVEN

7 CONCLUSION AND RECOMMENDATION

7.1 CONCLUSION

The present study showed a high prevalence of intestinal parasites among food handlers in Gambella town, South west Ethiopia.

This study also identified factors such as habit of hand washing after toilet and before food preparation that were associated with intestinal parasitic infections of the food handlers.

This indicates that the food handlers could become a potential source of infection and therefore are responsible for parasite transmission in the study area and calls for immediate measures.

7.2 RECOMMENDATIONS

- Gambella town health office in collaborating with its stakeholders should give health education on "Good hand washing technique" of after using toilet and before preparing food.
- Gambella town health office in collaborating with its stakeholders should give health education about the transmission of intestinal parasitic infection and control methods for food handlers.
- Gambella town health office should implement regular medical checkup (screening) of intestinal parasites among food handlers.
- Owners of food and drinking establishments should encourage and monitor for food handlers to practice good hand washing techniques regularly with water and detergents.
- Further studies should be conducted, which track these conditions over time, would be better suited for understanding and exploring the temporal nature of the relationship between intestinal parasite and associated factors among food handlers.

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ANNEXES

ANNEX 1. Standard Operating Procedure

1.1. Wet mount /direct examination of faecal specimens

1 Place one drop of 0.85% NaCl on the slide.
2 Take a small amount of faecal specimen and thoroughly emulsify the stool in saline
3 Place a 22mm cover slip at an angle into the edge of the emulsified faecal drop.
4 Systematically scan the entire 22mm cover slip with the 10x objective.
5 Switch to high dry (40X objective) for more detailed study of any suspect eggs

1.2. Formol-ether concentration technique

1 Using a stick, emulsify an estimated 1g of faeces in about 4ml of 10% formol water contained in a screw –cap bottle or tube.
2 Add further 3-4ml of 10% formol water, cap the bottle and mix well by shaking.
3 Sieve the emulsified faeces, collecting the sieved suspension in a beaker.
4 Transfer the suspension to a conical tube and add 3-4 ml of diethyl ether.
5 Stopper the tube and mix for 1 minute.
6 With a piece of wrapped around the top of the tube, loosen the stopper.
7 Centrifuge immediately at 3000 rpm for 1 minute.
8 Using a stick, loosen the layer of faecal debris from the side of the tube and invert the tube to discard the ether, fecal debris and formol water.
9 Return the tube to its upright position and allow the fluid from the side of the tube to drain to the bottom. Tap the bottom of the tube to re-suspend and mix the sediment.
10 Transfer the sediment to the slide, and cover with cover glass.
11 Examine the preparation microscopically using the 10x objective with the condenser closed sufficiently to give good contrast. Use 40X objectives to examine cysts.

ANNEX 2. CONSENT FORM

Verbal informed consent form before conducting interview

Dear Sir/madam; My name is _____ I am a post graduate student in Jimma University & working a research, entitled Prevalence and association factors of Intestinal Parasites among Food Handlers of Gambella town food and drinking establishments. we are requesting you to voluntarily participate in this study. The finding of the study will be used as a basis for better planning and best prevention strategy which is acceptable and effective in local settings. What we expect from you is to be examined for Intestinal Parasitic infections as well as to answer a few questions regarding risk factors. The laboratory examination involves collection of stool samples that should be collected using a sterile and disposable plastic container. Giving stool doesn't have any harm to your health and any other aspects like your job rather you will be benefited. That is, if there is a positive finding in laboratory examination, you will be provided treatment and health education. Any information that we collect about you during this research will be kept in secret. Information about your identity will be put away after re-coding your file; and kept in a secured place. We assure you that the reports will not bear any information of your personality like name and identity.

Since participation in this study is entirely voluntary, you can refuse to participate in this study at any time. Your refusal to participate will not affect any of your benefits.

Are you willing to participate?

1. If yes, proceed to the next page,
2. If no pass to the next participant.

Name of interviewer _____ signature _____

Date of interview _____ time started _____ time finished_____

Supervisors name _____ signature _____

ANNEX 3. QUESTIONNAIRE

JIMMA UNIVERSITY INSTITUTE OF HEALTH

DEPARTMENT OF EPIDEMOLOGY

English Version Questionnaire on assessment of intestinal parasites and associated factors among food handlers of food and drinking establishments in Gambella town, South west Ethiopia, 2017.

INSTRUCTION

The questionnaires have interview questions type which were pre-coded response, only read (ask) as it is written and record the response of the respondents exactly.

Date ____/_____/_____ Label number_____			
Socio-demographic characteristics			
S.no	**Questions**	**Response**	
1	Types establishment	Hotel.....1 Restaurant 2	
2	Sex	Female.....1 Male.....2	
3	How old are you?	_____(completed years)	
4	What is your marital status?	Single.....1 Married.....2 Divorced.....3 Widowed.....4	
5	What is your ethnicity?	Oromo .....1 Amhara .....2 Tigre .....3 Others(specify) 4___	-
6	What is your religion?	Orthodox.....1 Muslim..... 2 Protestant .....3 Others(specify)___4	
7	What is your educational	Cannot read and write ……...1	

	status?	Only read and write ....2 Literate ____grade /__/	
8	Are you certified in food preparation and handling?	Yes……...1 No ……2	
9	Do you have an experience of regular medical checkup?	Yes……...1 No ……2	
10	Do you wash your hands before a meal regularly?	Yes……...1 No ……2	If no, go to Q12
11	If yes for Q10, with what?	Water & detergents .....1 Water only.....2	
12	Is there Latrine facility?	Yes……...1 No ……2	If no, go to Q15
13	If yes for Q12, Do you wash your hands after using toilet regularly?	Yes……...1 No ……2	If no, go to Q15
14	If yes for Q13, with what?	Water & detergents .....1 Water only.....2	
15	Do you wash your hands before preparing food regularly?	Yes……...1 No ……2	If no, go to Q17
16	If yes for Q15, with what?	Water & detergents .....1 Water only.....2	
17	What is finger nail status?	Trimmed……..…1 Untrimmed…….....2	

18	How many years of work experience do you have?	.....year	
19	What is your water source for drinking?	Pipe…….....…1 Hand pump……....2 River..... 3 Others(specify)….....4	
knowledge related questions to food handlers			
20	Have you ever heard about Intestinal parasitic disease?	Yes .....1 No 2	If no, go to Q22
21	If yes for Q20, what was your source of information? (Circle all responses)	Formal training certification.....1 Health professionals .....2 Written display. .....3 Mass Medias .....4 Others(specify_____)5	
22	What types of intestinal parasites do you know? (Circle all responses)	- E. histolytica .....1 - G. lamblia .....2 - Taenia species.....3 - A. lumbricoides .....4 - T. trichuria .....5 - Hookworms.....6 - Others(specify_____)...7	
23	How can Intestinal parasitic disease be transmitted? (Circle all responses)	- Exposure to flies .....1 - Food handling in contaminated environment (area).....2 - Using of dirt equipment .....3 - Using of contaminated water for	

		equipment washing..... 4 .Using of contaminated water for food preparation (raw edible foods).....5 - Dirt hands .....6 - Using the same container for cooked and raw foods.....7 - Other (specify) _____ 8	
23	What is your annual Income?	_____	
Laboratory Data			
24	Parasite isolated from stool	**Positive_____**	**Negetive_____**
		A. lumbrcoid .....1 S. stercoralis .....2 Giardia lamblia .....3 T. trichuria .....4 Hookworm species.....5 Entamoeba histolytica/dispar.....6 Others/ (specify) _____ 7 Mixed ____, _____ & _____ 8	

Thank you for your time and concern!!!

ANNEX 4. LABORATORY REPORT FORM

<table>
<tr><td colspan="3">JIMMA UNIVERSITY INSTITUTE OF HEALTH

DEPARTMENT OF EPIDEMOLOGY</td></tr>
<tr><td colspan="3">A descriptive study of the carrier status of intestinal parasites among food handlers of food and drinking establishments in Gambella town, South west Ethiopia, 2017.</td></tr>
<tr><td colspan="3">LABORATORY REQUEST FORM</td></tr>
<tr><td colspan="2">Label number:_____</td><td rowspan="2">Time of sample collection
____/_____</td></tr>
<tr><td colspan="2">Age _____</td></tr>
<tr><td colspan="2">Sex F□ M□</td><td>Date of sample collection
____/_____/_____</td></tr>
<tr><td>Laboratory Result/s</td><td colspan="2">Identified Intestinal Parasites (Write Name/s)</td></tr>
<tr><td rowspan="3">Microscopic Examination</td><td colspan="2"></td></tr>
<tr><td colspan="2"></td></tr>
<tr><td colspan="2"></td></tr>
<tr><td rowspan="3">Concentration technique</td><td colspan="2"></td></tr>
<tr><td colspan="2"></td></tr>
<tr><td colspan="2"></td></tr>
<tr><td colspan="3">Name of laboratory personnel _____ Signature _____</td></tr>
</table>

ANNEX 5. AMHARIC VERSION OF CONSENT FORM AND QUESTIONNAIRE

<u>ጅማ ዩኒቨርሲቲ</u>

<u>የጤና ሳይንስ ኢነስቲቲዩት የኤፒዲሞልጂ ትምህርት ክፍል</u>

<u>ስምምነት መጠየቂያ ቅፅ፡-</u>

ጤና ይስጥልኝ: ስሜ _____ ይባላል፡ እኔ በጅማ ዩኒቨርሲቲ የድህረ-ምረቃ ተማሪ እና በጋምቤላ ከተማ በምግብ እና መጠጥ ድርጅቶች ውስጥ በሚሠሩ የምግብ አዘጋጆች ላይ የአንጀት ጥገኛ ተህዋሲያን ያለውን ስርጭት እና ተያያዥ ምክንያቶችን ለማወቅ ጥናትና ምርምር እየሠራሁ እገኛለሁ፡፡ የጥናቱ ውጤት በተጨባጭ መረጃ ላይ የተመሰረተ የመከላከል ስልትን ለመዘርጋት ይጠቅማል፡፡ እናም ከጥናቱ ጋር ተየያዥነት ያላቸውን ጥያቄዎችን እንዲመልሱልንና የሰገራ ናሙናም ለምርመራ የሚሆን ይስጡን ዘንድ እንጠይቃለን፡፡

የላብራቶሪ ምርመራው ሂደት የሰገራ ናሙና መሰብሰብ ደህንነቱ በተጠበቀ በላስቲክ እቃ በመጠቀም ይሆናል፡፡ የሰገራ ናሙና መስጠት የእርሶን ጤናም ሆነ ሌላ ሁኔታዎችን እንዲሁም ሥራዎን አይጎዳም ይልቁንስ ተጠቃሚ ይሁኑበታል እሱም፤ በላብራቶሪ የምርመራው ውጤት የአንጀት ጥገኛ ተህወሲያን ከተገኘ ህምና እና የጤና አጠባበቅ ትምህርት የሰቶታል፡፡ ማንኛውንም እርስዎ የሰጡንን መረጃዎ ይፋ አይደረግም፡፡ ማንነትዎን የመገልፅ መረጃ በሚስጢር ይያዛል፡፡ በዘገባው ላይ የእርሶን ማንነትና ስም እንደማያካትት አረጋግጥሎታለሁ፡፡

ተሳትፎዎት በፍቃደኝነት ላይ የተመሠረተ በመሆኑ በፈለጉት ሰዓት ከጥናቱ የማቋረጥ መብት አሎዎት፡፡ የእርስዎ ከጥናቱ ማቋረጥ የእርሶን ማንኛውንም ጥቅምዎን እይጎዳቦትም፡፡

ለመሣተፍ ፍቃደኛ ነዎት?

1. አዎ _____ ጥያቄዎቹን ቀጥሉ

2. አይደለሁም _____ ወደ ሚቀጥለው ተጠያቂ ይሂዱ

የጠያቂው ስም _____ ፊርማ _____

የተጠየቀበት ቀን_____ የተጀረበት ሰዓት _____ የተጨረሰበት ሰዓት _____

የተቆጣጣሪው ሥም _____ ፊርማ _____

<u>ቃለ መጠይቅ</u>

ጅማ ዩኒቨርሲቲ

የጤና ሳይንስ ኢነስቲቲዩት የኤፒዲሞልጂ ትምህርት ክፍል

በጋምቤላ ከተማ በምግብ እና መጠጥ ድርጅቶች ውስጥ በሚሠሩ የምግብ አዘጋጆች ላይ የአንጀት ጥገኛ ተህዋሲያን ያለውን ስርጭት እና የተያያዥ ምክንያቶች መጠይቅ

ደቡብ ምዕራብ ኢትዮጵያ 2009 ዓ.ም

የመጠይቅ አሞላል መምሪያ

ለአብዛኞቹ መጠይቆች መልስ ሊሆኑ ይችላሉ ተብለው የታመነባቸው አማራጮች በዝርዝር ተቀምጠዋል፡፡ ስለዚህ መጠይቆችን በምትሞላበት/በምትሞይበት ጊዜ የሚከተሉትን መመሪያዎች ተከትለህ/ሽ መጠየቅና መልሱን ማስፈር አስፈላጊ ነው፡፡

1. **ሥራ ከጀመረ/ች አንድ ወር ያልሞላው/ላት ሆኖ/ና ከከተማው ውጪ (ከሌላ አካባቢ) የመጣ/ች የምግብ አዘጋጆች በዚህ ጥናት ውስጥ አይካተቱም**
2. **መረጃ በሚሰበሰብበት ወቅት በጠና የታሙና ማናገር የማይችሉ የምግብ አዘጋጆች በዚህ ጥናት ውስጥ አይካተቱም**
3. **እያንዳንዱ ጥያቄ መጠይቁ ላይ እንደሰፈረው መጠየቅ አለበት፡፡**
4. **ለያንዳንዱ ጥያቄ መልስ ይሆናሉ ተብለው የተጻፉ አማራጭ መልሶች መጠይቅ ለሚደረግላቸው ሰዎች መግለጽ አስፈላጊ አይደለም፡፡**
5. **ተጠያቂዎች የሚሰጡትን መልስ በትክክል ማዳመጥና ለተሰጡት መልሶች ከተቀመጡት አማራጮች በበለጠ የሚመሳሰለውን በመምረጥ የክብ ምልክት መደረግ አለበት፡፡**

ቀን____/_____/_____ የመለያ ቁጥር _____			
ማሕበራዊ ሁኔታ			
ተ.ቁ	**ጥያቄዎች**	**መልስ**	
1	የድርጅቱ አይነት	ሆቴል.....1 ሬስቶራንት 2	
2	ፆታ	ሴት.....1 ወንድ.....2	
3	እድሜዎ ስንት ንው?	_____(ያጠናቀቁት ዓመት)	
4	የትዳር ሁኔታ?	ያላገባ/ች.....1 ያገባ/ች.....2 የተፋታ/ች.....3 የሞተባት/በት.....4	
5	ብሔርዎ ምንድነው?	ኦሮሞ .....1 አማራ .....2 ትግሬ .....3 ሌላ(ይገለጽ) ....4____	
6	ሃይማኖትዎ ምንድነው?	ኦርቶዶክስ.....1 ሙስሊም..... 2 ፕሮቴስታንት .....3 ሌላ(ይገለጽ) .....4 _____	

7	የትምህርት ደረጃ/ሁኔታ?	ያልተማረ……..1 ማንበብ እና መፃፍ ....2 የተማረ .... 3 _____ ክፍል/__/	
8	በምግብ አዘገጃጀት እና አያያዝ የምስክር ወረቀት አሎት?	አዎን…….1 የለም……2	
9	መደበኛ የጤና ምርመራ የማድረግ ልምድ አሎት?	አዎን…….1 የለኝም ……2	
10	ከመመገብዎ በፊት ሁል ጊዜ እጅዎን ይታጠባሉ?	አዎን…….1 የለኝም ……2	የለኝም ከሆነ ወደ ጥ.ቁ 12 ይሂዱ
11	አዎን ከሆነ ለጥ.ቁ10, በምን?	ውሃ እና ማፅጃ (ሣሙና፣ ኦሞ፣ አመድ....) ……..1 ውሃ ብቻ.....2	
12	የሽንት ቤት አገልግሎት አለን?	አዎን…….1 የለም ……2	የለም ከሆነ ወደ ጥ.ቁ 15 ይሂዱ
13	አዎን ከሆነ ለጥ.ቁ 12፣ ከሽንት ቤት መልስ ሁል ጊዜ እጅዎን ይታጠባሉን?	አዎን…….1 የለም ……2	የለም ከሆነ ወደ ጥ.ቁ 15 ይሂዱ
14	አዎን ከሆነ ለጥ.ቁ 13፣ በምን?	ውሃ እና ማፅጃ (ሣሙና፣ ኦሞ፣ አመድ....) ……..1 ውሃ ብቻ.....2	
15	ምግብ ከማዘጋጀትዎ በፊት	አዎን…….1	የለም ከሆነ ወደ

	እጅዎን ሁል ጊዜ ይታጠባሉን?	የለም 2	ጥ.ቁ 17 ይሂዱ
16	አዎን ከሆነ ለጥ.ቁ 15፤ በምን?	ውሃ እና ማፅጃ (ሳሙና፤ ኦሞ፤ አመድ....) .....1 ውሃ ብቻ.....2	
17	የእጅ ጣትዎ ጥፍር ሁኔታ?	አጠር ተደርገው የተቆረጡ.....1 አጠር ተደርገው ያልተቆረ 2	
18	የስንት ዓመታት የሥራ ልምድ አሎት?	.....ዓመት .....ወር	
19	የመጠጥ ውሃ ከየት ነው የሚያገኙት (የውሃ መገኛ?	ቧንቧ.....1 የእጅ ፓምፕ.....2 ወንዝ..... 3 ሌሎች(ይገለጽ) 4	
ለምግብ ዝግጅት ሠራተኞች ከዕውቀት ጋር የተያያዘ መጠይቅ			
20	ስለየአንጀት ጥገኛ ተህዋሲያን በሽታ ሰምተው ያውቃሉን?	አዎን .....1 የለም 2	የለም ከሆነ ወደ ጥ.ቁ 22 ይሂዱ
21	ስለየአንጀት ጥገኛ ተህዋሲያን በሽታ ሰምተው የምታውቅ ከሆነ የመረጃ ምንጭዎ ምንድን ነው?	መደበኛ የስልጠና ተቋም/ሰረቲፊኬሽን.....1 ከጤና ባለሙያዎች.....2 ከበራሪ ጽሑፎች. .....3 ከማስ ሚዲያ.....4 ሌላ(ይገለጽ _____) 5	

22	ምን አይነት የአንጀት ጥገኛ ተህዋሲያን ያውቃለ? (ምላሾቹን ይክበቡት)	- አሜባ .....1 - ጃርዲያ .....2 - የኮሶ ትል.....3 - የወስፋት ትል .....4 - የመንጠቆ ትል .....5 - ሌላ(ይገለጽ_____).....6	
23	የአንጀት ጥገኛ ተህዋሲያን እንዴት ሊተላለፉ ይችላለ? (ምላሾቹን ይክበቡት)	- በዝንቦች አማካኝነት .....1 - በተበከለ አካባቢ የምግብ አያያዝ..2 - የቆሸሸ የምግብ ቁሳቁሶችን በመጠቀም .....3 - የተበከለን ውሃ ለመመገቢያ ዕቃዎች ማጠቢያነት ሲውል ..... 4 - የተበከለን ውሃ ለምግብ ዝግጅት መጠቀም (ጥሬያቸው የሚበለ ምብቦች) .....5 - በቆሻሻ እጆች .....6 - የበሰለ እና ጥሬ (ያልተቀቀለ) ምግቦችን አንድ እቃ ውስጥ ማስቀመጥ .....7 - ሌላ (ይገለጽ) _____8	
23	ዓመታዊ ገቢዎ ስንት ነው?	_____	

አመሠግናለሁ!!!