

## Intestinal Parasitic Infection and Associated Factors among Food Handlers in South Ethiopia: A Case of Wolaita Sodo Town

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### Abstract

**Background:** Intestinal parasites infection are one of the most common problem in developing countries and the spread of parasitic disease via food handlers is a common and persistent problem worldwide. The health and awareness of the food handlers is of great importance for maintaining hygienic quality of food prepared and served by them so the objective of this study is in order to determine the magnitude of intestinal parasite infection and associated factors among food handlers serving in Wolaita Sodo town food handling establishments.

**Methods:** Data on socio-demography and associated risk factors was collected using a pretested structured questionnaire and Stool specimen was collected from each food handler by using direct wet mount preparations in normal saline, iodine solution and formol-ether concentration sedimentation procedures as per the standards. The data was exported to SPSS version 16, then recoded, categorized and sorted to facilitate its analysis. Descriptive statistics, bivariate analyses, and multiple logistic regressions were used.

**Result:** A total of two hundred eighty eight food-handlers, (194 of females and 94 males) were included in the study. Their mean age was 24.38 years, Only 150 (52.08%) of the food-handlers had education above primary school. 153(53.12%) of food handlers serves for more than 1 year. 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%). there was a significance association between Hand washing after using toilet and the presence of intestinal parasites (P=0.016)

**Conclusion:** Relatively high prevalence of intestinal parasite is found in the current study which shows poor hygiene practice of the food-handlers working in catering establishments at the study site. Such infected food handlers can contaminate food and drinks and serve as source of infection to consumers via food chain. Therefore, several strategies like stool checkup, public education, the application of health regulations, controlling the validity of periodic medical checkup and training on parasitic infection transmission are mandatory.

### Introduction

Intestinal parasitic infections have a worldwide distribution, especially in developing countries with low socio-economic status and poor living conditions (Adamu *et al.*, 2006). More than 2 billion people are chronically infected with intestinal parasites (Alum *et al.*, 2010). Several studies indicated that intestinal parasitic infections result in malnutrition, morbidity, mortality and socioeconomic impact owing treatment cost and hospitalization. Intestinal parasites, which have direct life cycle, are transmitted by fecal oral route to human through poor personal hygiene (Abera *et al.*, 2010).

More than 70 species of protozoan and helminthic parasites can infect humans through food and water contamination (Ayeh-Kumi P *et al.*, 2009). The most common intestinal helminthes leading to digestive disorders include *Taenia saginata*, *Hymenolepis nana*, *Ascaris lumbricoides*, *Strongyloides stercoralis*, *Trichuris trichiura*, *Enterobius vermicularis* and *Hookworm* (Cheesbrough, 2007), and are usually transmitted from contaminated food, water or from the environment (Babiker *et al.*, 2009). The most common protozoans reported to lead to digestive disorders include *Giardia lamblia* and *Entamoeba histolytica* (Cheesbrough, 2007). In most cases, clinical features of the intestinal parasitic infections (IPIs) are asymptomatic, leading to difficulties in the eradication and control of these parasites due to the number of potential carriers, such as food handlers (Ayeh-Kumi *et al.*, 2009).

The food handling personnel play a vital role in the transmission of food-borne diseases (Dagnew *et al.*, 2012, Andargie *et al.*, 2008). 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 from their faeces via their fingers, then to food processing, and finally to healthy individuals (Andargie *et al.*, 2008). The spread of parasitic disease via food handlers is a common and persistent problem worldwide. Studies point out that most outbreaks result from improper food handling practices (Ehiri *et al.*, 1996).

More aggravated situations and challenges prevail in Ethiopia where food safety issues are not well understood and have received little attention. In Wolaita sodo town, eating and drinking in food services

establishments, such as hotels, restaurants and snack bars is becoming a common practice. The customers may be able to satisfy their taste and nutrition needs, but pays little attention to hygiene and food safety (Santosh , 2008). Information regarding food handlers' practices is the key to addressing the trend of food borne illnesses (Mudey, *et al.*, 2010). However, Information on intestinal parasites and associated factors among food handlers in the study area is limited.

## **Materials and Methods**

### **Study design and setting**

Cross sectional study was conducted among food handlers in wolaita Sodo Town. Wolaita Sodo town is found in Wolaita zone, in SNNPR. The town is located at 380 Kms South of the capital Addis Ababa. The town is the largest city in wolaita zone, divided in to three sub-cities. According the Central Statistical Authority, the projected total population of the town is 86,050. The study was conducted from July 2014 to June 2015.

### **Study population**

All food handlers from selected food handling establishment (restaurants and cafeteria). Proportional allocation was considered to select 45 food handling establishments and all food handlers were taken in each establishment.

### **Inclusion and exclusion criteria**

#### **Inclusion**

Food handlers working in selected food establishment and given informed consent were included in the study.

#### **Exclusion criteria**

Food handlers who had taken anti-helminthics within the three weeks prior to the study were excluded.

### **Data Collection and laboratory investigation**

#### **Socio-demographic data and associated factors**

Data on socio-demography and associated risk factors was collected using a pretested structured questionnaire by trained nurses.

**Laboratory data-** Stool specimen was collected from each food handler with leak proof stool cup by experienced laboratory technologist and transported to Wolaita Sodo University Microbiology laboratory within 1 hour of collection. In the laboratory, the stool sample were examined microscopically for intestinal parasites following direct wet mount preparations in normal saline, iodine solution and formol-ether concentration sedimentation techniques as per the standards. The parasites identified in any one of the three techniques from a single specimen will be reported as positive.

### **Data Analysis**

The data was exported to SPSS version 16, then recoded, categorized and sorted to facilitate its analysis. Descriptive statistics (frequencies and crosstabs), bivariate analyses, and multiple logistic regressions were used. Those variables that show association with a cut of point  $p \leq 0.25$  in bivariate was candidate & run in multiple logistic regressions to see the proposed association & to adjust the confounder.  $p \leq 0.05$  were taken as statistical significance.

### **Ethical Issues**

The study is approved by Wolaita Sodo University ethical review board. The data was collected after written informed consent obtained from all study participants. Sample taken from each patient was coded and results obtained from each patient were kept confidential. The food handlers who were positive for intestinal parasitosis get appropriate treatment at Wolaita Sodo university teaching and referral hospital with the expense of the research budget.

## **Result and discussion**

### **Socio-demographic characteristics**

A total of two hundred eighty eight food-handlers, (194 of females and 94 males) were included in the study. Their mean age was 24.38 years, ranging from 12–57 years. The majority 204 (70.83%) of the food handlers were young adults aged 18–39 years. Only 150 (52.08%) of the food-handlers had education above primary school. 153(53.12%) of food handlers serves for more than 1 year. The educational levels, age category, sex and work experiences were shown in (Table 1).

In hand washing practices, 265 (92%) food handlers had a habit of hand washing after toilet. However, a few number (17%) of food handlers had a habit of hand washing after touching dirty materials and different body parts (hair, nose and ear) between handling of food items. The majority 176 (61%) of food handlers had

had medical checkup including stool examination previously. Only 17 (5.9%) food handlers were certified for training in food handling and preparation (Table 2).

**Table 1. Socio-demographic characteristics of food handlers working in Wolaita Sodo food handling establishments from July 2014 to June 2015**

Characteristics		Frequency	Percent (%)
Sex	Female	233	80.9
	Male	55	19.1
Age	13-17	49	17
	18-28	118	40.97
	29-39	86	29.86
	40-49	29	10.07
	50-59	6	2.08
Education level	Illiterate	46	15.97
	1-8	92	31.94
	9-12	118	40.97
	>12	32	11.11
Service year	<1yr	135	46.87
	1-2Yr	101	35.07
	>2yr	52	18.05

**Table 2 Hygienic practice of food handlers working in Wolaita Sodo town food handling establishments from July 2014 to June 2015**

Variables	Frequency	Percent (%)
Certified in food preparation and handling		
<b>Yes</b>	17	5.9
<b>No</b>	271	94.1
Medical check up		
<b>Yes</b>	176	61
<b>No</b>	112	39
Hand washing after using toilet		
<b>Yes</b>	265	92
<b>No</b>	23	8
Hand washing before preparing food		
<b>Yes</b>	279	96.87
<b>No</b>	9	3.13
Hand washing after touching body parts		
<b>Yes</b>	49	17
<b>No</b>	239	83

**Socio-demographic character in relation to intestinal parasites**

There were no significance associations between socio-demographic variables and intestinal parasite infections (Table 3).

From hygienic practices of food handlers, there was no significance association between certified in food preparation and handling and with the presence of intestinal parasites ( $P=0.288$ ). Medical checkup also was not significantly associated with the presence of intestinal parasites (09.21). However; there was significance association between Hand washing after using toilet and the presence of intestinal parasites ( $P=0.016$ ) (Table 4).

**Table 3. Socio-demographic characteristics in relation to intestinal parasites detected in Wolaita Sodo town food handling establishments from July 2014 to June 2015**

Characteristics	Intestinal Parasite		Association	
	Negative	Positive	X <sup>2</sup> and P value	
Sex				
	Female	152	83	X <sup>2</sup> =1.535
	Male	39	14	P=.215
Age				
	13-17	33	16	X <sup>2</sup> =3.667
	18-28	80	39	P=.453
	29-39	52	34	
	40-49	23	6	
	50-59	3	2	
Education level				
	Illiterate	27	19	X <sup>2</sup> =6.273
	1-8	57	35	P=.099
	9-12	88	30	
	>12	19	13	

**Table 4. Hygienic practice of food handlers in relation to intestinal parasitosis in Wolaita Sodo food handling establishments from July 2014 to June 2015**

Variables	Intestinal Parasite		Association
	no		
	Negative	Positive	X <sup>2</sup> and P value
Certified in food preparation and handling			
Yes	14	4	X <sup>2</sup> = 1.129
No	177	93	P=.288
Medical check up			
Yes	117	60	X <sup>2</sup> = .010
No	74	37	P= .921
Hand washing after using toilet			
Yes	181	84	X <sup>2</sup> =5.838
No	10	13	P= .016
Hand washing before preparing food			
Yes	180	84	X <sup>2</sup> = 5.073
No	6	9	P=.024
Hand washing after touching body parts			
Yes	38	11	X <sup>2</sup> =3.335
No	153	86	P=.068

**Prevalence of Intestinal parasites among food handlers**

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. The consistency of stool was 213(73.9%) formed, 51(17.7%) semi formed, 20(6.9%) diarrheal and 4(1.34%) dysenteric. *Ascaris lumbricoides* was the most prevalent parasites 18(6.25%), followed by *Hook worm* 17(5.9%) on the other hand *Shistosoma mansoni* was the least prevalent (<1%).

**Table 5 Prevalence of intestinal parasites isolated from 288 food handlers in Wolaita Sodo food Handling establishments from July 2014 to June 2015**

Parasite	Frequency	Percent (%)
<b>Protozoa</b>		
<b>Giardia lamblia</b>	10	3.47
Trophozoite form	4	1.39
Cyst form	6	2.08
<b>Entamoeba histolytica/dispar</b>	13	4.51
Trophozoite form	2	0.69
Cyst form	11	3.82
<b>Helminthes</b>		
<i>Ascaris lumbricoides</i>	18	6.25
<i>Strongloides stercolaris</i>	13	4.51
<i>Taenia species</i>	14	4.86
Hook worm	17	5.90
<i>Schistosoma mansonii</i>	2	0.69
<i>Trichuris tricurua</i>	3	1.04
<i>Hymenloopsis nana</i>	7	2.43
<b>Total</b>	<b>97</b>	<b>33.68</b>

### Discussion

Infection of asymptomatic persons, especially workers dealing with food (food handlers), could become a potential cause of dissemination of variety of pathogens including intestinal parasites. Intestinal parasitic infection is one of the problems that affect human health, especially in developing countries. If food handlers are contaminated with parasites which have the potential to be directly transmitted from one person to another, they can transmit contamination to food, dishes and finally to the people who use them. Different studies have been conducted in the field of intestinal parasite prevalence in food handlers.

In this study, the overall prevalence of intestinal parasite among food handlers were 97(33.68%), consistent with the study done in North West Ethiopia, Gondar town with the prevalence of 25% (Mulat, *et al.*, 2010), and 29% (Gashaw, *et al.*, 2008), Turkey (29.3%) (Yazici *et al.*, 2007), Khartoum, Sudan (30.5%) (Babiker *et al.*, 2009). But the finding of our study were lower than studies conducted at North East Ethiopia, Bahir Dar town, 41.1% (Bayeh, *et al.*, 2010) and in Jimma, 44.1% (Tefera *et al.*, 2014) were higher than this study which could be due to poor personal hygiene practices and environmental sanitation and ignorance of health-promotion practices in the current study.

Among intestinal parasites, *A. lumbricoides* was the leading parasites isolated alone or in combination with other parasites (6.25%) from food handlers. Similar finding has been reported in previous study conducted in Ethiopia (18.11%) (Gashaw *et al.*, 2008), 9.6% (Moges, 2011) and another study conducted in Irbid, Jordan, (4.9%) (Al-Lahham *et al.*, 1990).

The Helminthes *A. lumbricoides* 18(6.25%), *H. worm* 17 (5.90%), *Taenia species* 14 (4.86%) and *S. stercolaris* were 13(4.51) reported in this study, note that this parasites are not food borne pathogens. However, the presence of such pathogens may indicate low personal hygiene in food handlers and the habit of open field defecation of the community. Infected food handlers can directly transmit protozoan's *G. lamblia* (10(3.47%) and *E. histolytica* (13(4.51%)) to consumers if ingested via contaminated food and water because *G. lamblia* cysts and *E. histolytica* cyst do not need environmental maturation. Thus, food handlers should be in a good health and those suffering from diarrhea and dysentery must be excluded from work until they have been completely free of symptoms and must get rest.

No significant association has been found between socio-demographic parameters and intestinal parasitosis which is in coherent with studies conducted in Ethiopia, Moges *et al.*, 2010, Mulat *et al.* 2010 and Bayeh *et al.*, 2010).

Food handling certification, medical checkup, hand washing practice after touching dirty materials and before food preparation have no any significant association with intestinal parasite prevalence which is in line with other studies conducted in the country, north Ethiopia, Bahirdar (Bayeh A *et al.*, 2010) and north west Ethiopia, Gondar (Mulat *et al.* 2010) but hand washing practice after toilet have significant association with parasite prevalence which is in harmony with studies conducted by Bayeh *et al.*, 2010, Mulat *et al.*, 2010 and Tefera *et al.*, 2014.

Most regions of Wolaita Zone have been announced as free of open field defecation but high prevalence of intestinal parasite and the fact that the first top ten diseases of the town health centers are diarrheal disease may indicate there is a gap between the reality and the reports. So we would like to recommend for infection

prevention officials, sanitary professional, clinicians and the government that there are still issues to address and they should have to continue the good work.

Therefore, in order to further reduce intestinal parasitic infections in food handlers, several strategies are recommended such as stool examinations in every three months, public education, the application of health regulations, controlling the validity of periodic medical checkup and training on parasitic infection transmission.

### Competing interests

The authors declare that they have no competing interests.

### Authors' contributions

Fiseha Wadilo and Fithamlak Solomon is the primary investigator, conceived the study, designed, participated in data collection, conducted data analysis, drafted and finalized the manuscript for publication. Yisihak Abriham and Amsalu Arota assisted in data collection and reviewed the initial and final drafts of the manuscript. Fiseha Wadilo, Fithamlak Solomon, Yishak Abraham and Amsalu Arota interpreted the results, and reviewed the initial and final drafts of the manuscript. All authors read and approved the final manuscript.

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