

Food Safety Knowledge, Handling Practice and Associated Factors among Food Handlers of Hotels/Restaurants in Asosa Town, North Western Ethiopia

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Abbreviations AOR: Adjusted Odds Ratio; CI: Confidence Interval; ETB: Ethiopian Birr; HACCP: Hazard Analysis Critical Control Point; MOH: Ministry of Health; NDSC: National Disease Surveillance Center; OR: Odds Ratio; SPSS: Statistical Package for Social Sciences; USA: United States of America; UK: United Kingdom; WHO: World Health Organization

Abstract

Background: Food safety is a public health concern. An adequate supply of safe, wholesome and healthy food is essential to the health and well-being of humans. However food itself can cause a threat for health. People can get sick when they eat food contaminated with hazards, this referred to as food borne disease.

Food borne illness is a major health problem and more prevalent in both developing and developed countries. The toll in terms of human life and suffering is enormous. Thousands millions of people fall ill and may die as a result of eating unsafe food.

Objective: The purpose of this study is to assess food safety knowledge, Attitude, handling practice and associated factors among food handlers of Restaurants in Asosa town, western Ethiopia.

Methods: A cross-sectional study was conducted to assess food safety knowledge and handling practice of food handlers towards safe food handling from July 2017 to January 2018. Total number of restaurants and food handlers was obtained from trade and industry regional beareue. Food handlers by simple random sampling. One cooker and one waiter will be selected by lottery method from each selected restaurant. Structured and Pretested questionnaire will be developed for the purpose of data collection after reviewing relevant literature and views of professionals in the area. Logistic regression was used to analyze the explanatory variables. And the significance of the statistical association will be assured using OR, 95% C.I and $p < 0.05$.

Result: The level of knowledge among food handlers in this study was (75.8%). The overall practice of food handlers in Asosa town was (67.8%) and the factors that are associated with food safety practice of food handlers are: educational status AOR 3.40(1.90-6.08), Regular Supervision by concerned body AOR 7.25(3.83-13.65), ever had certificate in food safety/hygiene practice AOR 5.28(1.40-19.79) were found to be significantly associated with food safety practice.

This study will have a significant input, in the formulation of appropriate strategy, to modify and facilitate the overall regulatory activity, for program planning and evaluation.

Conclusion: Food safety practice and Knowledge in this group of population was relatively high, but which still needs further intervention.

Introduction

Background

Food safety is a public health concern [1]. An adequate supply of safe, wholesome and healthy food is essential to the health and well-being of humans [2]. Sometimes, food itself can cause a threat for health. People can get sick when they eat food contaminated with hazards; this is referred to as food borne disease [3].

Unsafe food has a human health problem since history was first recorded and many food safety problems encountered are not new. Although governments all over the world are doing their best to improve the safety of the food supply, the occurrence of food-borne disease remains a significant health issue in both developed and developing countries [4].

Food safety consists of several principles adopted to protect food from any chemical, microbiological or other type of contamination that can render it unfit for human consumption, to prevent the spread of communicable diseases associated with food and food processing and also to ensure that consumers of food are not fraudulently treated [5].

Thousands of millions of people became ill as a result of eating unsafe food and many die due to less knowledge and practice on the part of food handlers. Food contamination in developing countries is caused by many factors including traditional food processing methods, inappropriate handling of food, holding temperatures, and poor personal hygiene of food handlers, the safety of food handlers is therefore one of the most important health and safety issues facing most developing countries since it leads to both public health and social Problems [6].

It is difficult to estimate the global incidence of food borne disease, due to poor reporting system related to food born disease but it has been reported that 2.1 million people died each year from diarrheal diseases. A great proportion of these cases can be attributed to contamination of food and drinking water [7].

Worldwide contaminated food contributes to 1.5 billion cases of diarrhea in children <5 years each year, resulting in more than three million premature deaths. In South East Asia, approximately one million children under five years of age die each year from diarrheal diseases after consuming contaminated food and water [8].

In developed countries like in the United States food-related illnesses impose an increasingly important public health problem. It is estimated that 76 million illnesses, 325,000 hospitalizations and 5,000 deaths result from food borne disease annually-with a cost of \$23 billion [9].

Statement of the Problem

It is estimated that in developing countries, 70% of cases of diarrheal diseases are associated with the consumption of contaminated foods [10]. About 75% of food borne illness outbreaks is assumed to be related to improper food handling practices by employees in food establishments like inappropriate handling of food, holding temperatures, and poor personal hygiene of food handlers, the safety of food handlers is therefore one of the most important health and safety issues facing most developing countries since it leads to both public health and social Problem [11].

Evidences show that approximately 10 to 20% of food borne diseases outbreaks are due to direct contamination by food handlers [12]. The transmission of food borne diseases aggravated by unsafe food handling practices made by food handlers and they even often continue to work with food borne related disease symptoms like diarrhea or vomiting and possibly pass the disease through the food they are serving. Others can be asymptomatic and unaware of the increased risk of passing infection to others via the food they handle [13].

Food safety practices and general requirements in food businesses [14] establishments of food handlers must have skills and knowledge in food safety and food hygiene for the work they do. Researchers have attributed these food safety handling errors to a lack of adequate food safety knowledge [15].

Many countries have not yet established adequate surveillance or reporting mechanisms to identify and track food borne illness. Therefore, data on food borne diseases are extremely scarce and improvements are needed to better identify the causes of food borne diseases [13].

Literature review

Different Scholars indicate that Food borne diseases had significant public health risk, especially to young generation, the elderly and pregnant women in both developed and developing countries. As a result, food borne diseases may affect the consumers in different ways like causing health problems and loss of life and significant economic losses associated to cost related to medical treatments Outbreaks of food poisoning have been reported in several food services sectors especially in restaurants and hotels [16].

Studies reported that the Majority of outbreaks results from improper food handling practices. Therefore, to reduce food borne illnesses, it is crucial to gain an understanding of the knowledge and practices of food handlers. Several factors contribute to the spread of food borne outbreaks by food service workers. Among these factors are improper practices and low level of knowledge are considered to be the most crucial factors [16].

So food workers play a critical role in ensuring food safety, those who do not practice proper personal hygiene, including hand washing at the appropriate times and using appropriate methods can contaminate food [17]. Moreover good personal hygiene practices are an essential part of providing safe food to your customers [18].

Knowledge and practice of food handlers on food safety: A study conducted in food businesses in turkey Ankara shows the mean food safety knowledge scores were 43.4 ± 16.3 (100 possible points). Mean scores: knowledge of temperature control (45.5 ± 30.7), knowledge of cross-contamination (53.4 ± 19.2) and, knowledge of personal hygiene (31.8 ± 23.1) [19].

A reviewed summary studies conducted in different developed countries like USA, UK, Italy, Australia, New Zealand, Canada and Other many Countries from 1984-2003, generally there was good awareness of common food pathogens but poor knowledge of temperature control, especially regarding reheating and cooling even after training and there was improvement of good hygienic practice of food handlers in post-training inspection [15].

Study has done on Knowledge and attitude and practice of food Handlers in Bangkok, Thail and about 13.0% and 15.2% of the study participants have Adequate Knowledge and practice regarding food safety respectively [20].

Another study in Ijebu-Ode of Ogun State in Nigeria shows that about half of the respondents (50.7%) had average knowledge of food borne infection, 41.6% had poor knowledge and only 7.6% had adequate knowledge and about one-third (69.5%) of the respondents had good food safety practices [21].

Research study in Egypt showed that the mean knowledge score was 76.6 ± 19.6 and the mean practice score was 68.1 ± 22.4 . The majority of the study participants reported working while having flu, diarrhea or skin lesions (61%, 63% and 71%) respectively [22]. Study Conducted in India scores of KAP good knowledge (58.3%), attitude (81.7%), and practice (79.0%) [23] In Malaysia almost half (51.6%) had good knowledge [24].

Study done in Gondar town reported that about 30.30% of the respondents had good food safety practice [25]. Study done in Arbaminch Ethiopia shows about (32.6%) has good practice and (67.40%) have poor practice towards food sanitation [26]. Study conducted in Dredawa shows that 52.4% of food handlers have satisfactory practice [27].

Factors Associated with food handling practice of food Handlers: A study conducted in Iowa State University Hotel, Restaurant, and Institution Management indicates, Food employees with food safety certification (training) had higher knowledge scores than food employees without food safety certification (training) and full-time employee have higher knowledge than non-full time employee. Also food safety training had a significant positive influence on food safety practices [28].

Study Conducted in Nigeria shows Age, Level of education, Training on food safety and Knowledge of food safety are significantly and independently associated with safe food handling practice [29].

Another study conducted in Nigeria among local food handlers in Ijebu-Ode of Ogun State shows that, Educational qualifications and monthly income are significantly associated with Food handling practice [21].

Study conducted in Gondar town shows age, marital status, service year, monthly income, food hygiene and safety training, attitude, knowledge and depth of knowledge were identified as factors affecting food safety practices [25]

Study in Diredawa shows educational background, food safety training, food safety attitude, and practical three Compartments dish-washing system was statistically significant with food safety practice [27].

Research study conducted in Arbaminch town, Food handler whose age greater than 29-34 and ≥35 years respectively, having supervisor and medical cheek up, those who take training on food sanitation in the past were the identified significant factors associated with food handlers practice [26].

Moreover food handlers in Restaurants and hotels can contaminate food by: working while they are sick; touching pimples or sores; touching their hair; not wearing a band-aid and single-use gloves over sores and wounds; and not washing their hands properly before, during, and after handling food. Additionally Jewelry, such as rings, bracelets, and watches, might get dirty and may be a source of harmful microorganisms [30] (Figure 1).

Justification of the proposed study

Asosa town is the capital city of Benishangul Gumuz Regional State; it showed rapid increase in urbanization, with the resultant increment in the number of business catering establishments especially restaurants. And the number of people eating outside their homes is expected to increase which in turn demands for more food establishments. As far as my knowledge is concerned there is no any research conducted on food safety knowledge and practice of food handlers working in Restaurants/Hotels in Asosa town and evidence based result was totally scarce in the country at large.

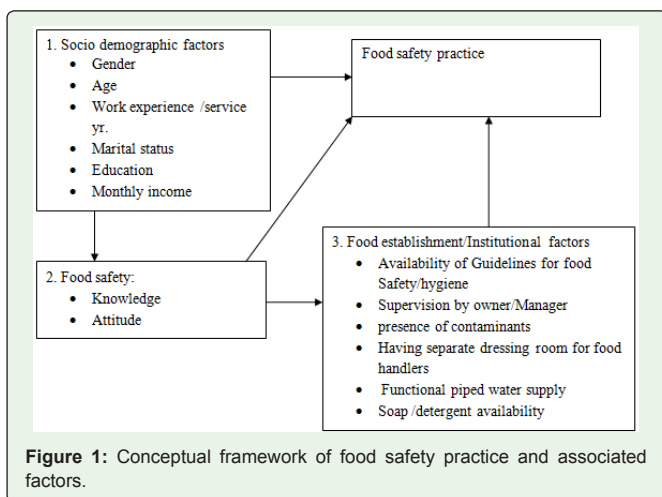


Figure 1: Conceptual framework of food safety practice and associated factors.

Understanding the base line of Food safety knowledge, Attitude, handling practice and associated factors among food handlers of Hotels/Restaurants is crucial for the development of effective training programs. However; the overall food and safety knowledge and practice of food handler in restaurants in Asosa town is not known. Therefore, this study will have a significant input, in the formulation of appropriate strategy, to modify and facilitate the overall regulatory activity, for program planning and evaluation as well as base line information for similar and related studies and interventions in the future.

Objectives of the study

General objective

The main objective of this study is to assess Food safety knowledge, Attitude, handling practice and associated factors among food handlers of Hotels/Restaurants in Asosa town, Northwest Ethiopia.

Specific objectives

- To determine knowledge level of food handlers towards food borne diseases and hygienic food handling.
- To determine the Attitudes of Food handlers towards safe food handling.
- To determine the level of safe food handling practice among food handlers.
- To identify the associated factors for safe food handling practice.

Methods and Materials

Study design

Community based quantitative cross- sectional study on Food safety knowledge, Attitude, handling practice and associated factors among food handlers of Hotels/Restaurants was conducted in Asosa town from July 2017 to January 2018.

Study area

The study area is Asosa town, the capital of Benishangul Gumuz National Regional State. It is Located in western Ethiopia (667 kms away from Addis Ababa) and it is located at 1810 m above sea level. The population size of the town is 104,147 of whom 52,968 were men and 51,179 were women, and the number of restaurant establishment in the town is increasing as a result of urbanization and active movement of people from place to place like other towns in our country. There are a total of 235 food establishments (restaurants and hotels in Asosa town) which was obtained from the town’s trade and industry.

Source of population

The Source populations for the study will be all food handlers working in restaurants and hotels of Asosa town.

Study population

Randomly selected food handlers currently working in preparation and service areas from the selected restaurants and hotels of Asosa town will be the study subjects.

Inclusion and Exclusion Criteria's

Inclusion Criteria: Any Food handlers working in preparation and service areas of restaurants and hotels at the time of the study regardless of their sex, and employment status will be included in the study.

Exclusion Criteria: Food handlers those with unable to hear, mental illness or generally those who could not communicate due to serious illness will be excluded from the study.

Sample size and sampling procedures

Sample size Determination: Sample size is determined using the formula for single population proportion and assuming that the proportion of practicing safe food handling among food handlers is (p = 50) %, 95% level of confidence and 5% margin of error. Therefore, sample size is determined as follows:

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

$$n = \frac{(1.96)^2 0.5(1 - 0.5)}{(0.05)^2} = 384$$

The sampling procedure: Total list of restaurants and hotels will be obtained from the town's trade and industry. The list of existing restaurants and hotels. The restaurants and hotels obtained from trade and industry was being served as the sampling frame. Restaurants were allocated proportionally to each kebele proportional to their number and the restaurants were selected by simple random sampling. Then food handlers; one cooker and one waiter were selected by lottery method from each of the selected restaurant until final sample is reached (Figure 2).

Variables of the study

Dependant variables:

- Knowledge and practice of food handler

Independent variables

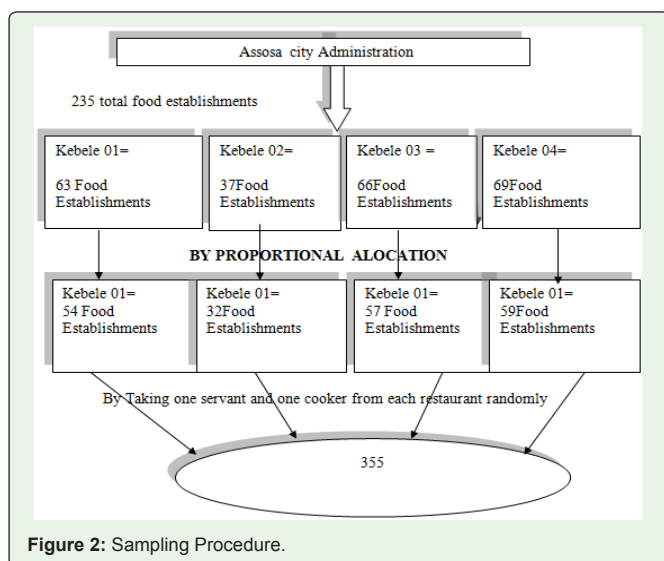


Figure 2: Sampling Procedure.

- age
- sex
- educational status
- health status
- marital status
- religion
- work experience
- work responsibility
- training
- license
- building of ownership / rent or owned
- toilet facility
- water supply(source)
- waste disposal/management facility
- availability of soap(detergent)
- food storage facilities/shelf or cupboard, refrigerator
- Knowledge & attitude of safe food handling
- Manager/sanitary inspection

Data collection procedures

Instrument: Data was collected using structured and pre-tested standard questionnaire which have been developed based on the related published studies with certain modification. The questionnaire was prepared in English version and it was translated to Amharic and back to English to confirm the correctness of the translation. The questionnaire composed of three parts as the basic socio-demographic characteristics and questions related to the knowledge and practice of the study population towards safe food handling. Data collection was administered by data collectors. Interview was employed by data collectors to the selected restaurants to collect the data.

Personnel: Three supervisors having BSc degree in environmental health science and ten diploma nurse data collectors have been participated in the data collection process.

Quality control: Training for data collectors and supervisors was also being given for three days by the investigators. The questionnaire will be pre-tested to identify potential problem areas, unanticipated interpretations and cultural objections to any of questions for food handlers in Bambasi town by taking 10% of the sample size. Based on the pre test results, the questionnaire was additionally adjusted contextually and terminologically, and administered on the whole sample size questioners. Counter checking of daily filled questionnaire and regular supervision have been made by supervisors and by the investigators.

Structured questionnaire was developed for the purpose of data collection after reviewing relevant literature and views of professionals in the area. The questionnaire was structured and designed to accommodate the response of respondents and

physical observation by data collectors. And it was also designed to generate such pertinent information as the basic socio-demographic characteristics and questions related to the knowledge and practice of the study population towards safe food handling. It was prepared originally in English and then translated to Amharic and back to English in order to obtain content validity. Finally the questionnaires have been administered in Amharic.

Data processing and analysis

Data was entered using EPI INFO version 2002 statistical software and then exported to SPSS version 20.0 for further analysis. Descriptive statistics of the collected data have been done for most variables in the study using statistical parameters: percentages, means and standard deviations. Bivariate and multivariate analysis was used primarily to check which variables have association with the dependent variable individually. Variables found to have association with the dependent variables have been entered in to multivariate logistic regression for controlling the possible effect of confounders and finally the variables which have significant association was identified on the basis of AOR, with 95%CI,OR and p-value to fit into the final regression model.

Operational definitions

Food safety: assurance that food will not cause harm to the consumer when it is prepared and/or eaten according to intended use.

Food safety Knowledge: Those respondents who know the four critical food safety factors (food borne diseases, contamination/cross contamination, personal health and hygiene and temperature control.

Adequate knowledge: if respondent's knowledge score is 70% and above for critical food safety factor related questions.

Inadequate knowledge: If respondent's knowledge score was below 70% for critical food safety factor related questions.

Positive attitude: if respondents score for attitude related questions was above 70%.

Negative attitude: if respondents score for attitude related questions was below (70 %).

Practice status: The reported food handling practice among food handlers in terms of food safety (satisfactory and unsatisfactory).

Satisfactory practice: if respondents score for food safety/hygiene practice related questions was greater than or equal to 70%.

Unsatisfactory practice: if respondents score for food safety/hygiene practice related questions was less than 70 %.

Food handlers are persons who work in selected types of food establishments and who handles packaged/unpackaged food, food equipment and utensils or food contact surfaces.

Ethical Consideration

The ethical approval and clearance was obtained from Asosa University. Prior to data collection, the objective of the study discussed with the concerned officials of the town administrative council, health desk, and municipality and written consent have been obtained. Verbal consent was obtained from owners/managers of the establishments and study subjects (food handlers). Their privacy was

also be maintained. They were also informed that the information obtained from them will be not being disclosed to third person/body. Restaurant owners/managers/ was be advised to corrective measure when a gross sanitation and hygienic problem will be observed during data collection.

Results

The study was conducted on 355 participants that incorporated waiters, cooks, and managers/owners of 104 selected food establishments and had a 100% response rate. The results mainly fall into two categories: status of food safety practice and associated factors.

Socio-demographic Characteristics

This distribution is dissimilar to sex wise distribution of respondents i.e. 105(29.6%) were male and 250(71.4%) were females. The age interval of 18 to 28 years has dominated the entire food establishment and the mean age of respondents was 27 years. While looking in to educational background of the sample 276(77.7%) are literate can able to write and read and about 79(22.3%) are illiterate cannot able to write and read. In terms of religion about 209(58.9%) are orthodox Christian followers and 94(26.5%) are protestant followers r. The work experience of the food handlers was nearly more than 90% have worked in the sector below 10 years with median work experience of one year. In addition 22(33.8%) from hotel, 45(40.9%) from restaurants, 24(24.7%) from cafeteria and 13(15.5%) from butcher shops reported that they had participated in food safety/ hygiene training (Table 1).

Food Safety Knowledge of Food Handlers

According to the result of knowledge assessment, 288(81.1%) of food handlers had adequate knowledge (score >= 70%) and (18.9%) have inadequate knowledge (score <70%) (Table 2).

Food Safety Attitude of Food Handlers

The result of attitude assessment shows majority 269(75.8%) of the respondents had positive/favorable attitude followed by 86(24.2%) unfavorable attitude (Table 3).

Table 1: Socio-Demographic Characteristics.

Sr. No	Variable	Frequency	Percent	
1	Sex	Male	105	29.6
		Female	250	70.4
2	Religion	orthodox	209	58.9
		Muslim	52	14.6
		Protestant	94	26.5
3	Educational status	literate	276	77.7
		illiterate	79	22.3
4	have you ever trained	Yes	59	16.6
		No	296	83.4
5	have certificate	Yes	32	9
		No	323	91

Table 2: Knowledge on Food Safety Practice of food handlers in Asosa town 2018.

	Correct	Incorrect	Total
	No (%)	No (%)	No (%)
Transmission of food borne diseases			
Fresh meat always has microbes on the surface	289 (81.4)	66(18.6)	355(100)
Canned foods may have harmful microbes	215 (60.6)	107 (30.1)	355(100)
Healthy people can cause illness by carrying germs to food	147 (41.4)	208 (58.6)	355(100)
Lettuce and other raw vegetables might have harmful microbes	284(79.8)	54(15.2)	356(100)
Cooked foods do not have microbes	230(64.7)	114(32.2)	355(100)
Personal health and hygiene			
You can prepare food with a wound on the hand if the wound is covered with a bandage	145(40.8)	210(59.1)	355(100)
After using the toilet, we should always wash hands with soap and water	298(83.9)	57(16.1)	355(100)
Hands should be washed if fondling body parts happen	342(96.3)	13(3.7)	355(100)
When wearing gloves, you can handle cooked foods after handling raw meat	87(24.5)	268(75.5)	55(100)
Wearing clean uniform and cap while cooking or serving is necessary	297(83.7)	58(16.3)	355(100)
Hands should be properly washed after sneezing or blowing your nose	314(88.5)	41(11.5)	355(100)
Over all Knowledge	Adequate Knowledge	Inadequate Knowledge	
Food safety knowledge of food handlers	269(75.8%)	86(24.2%)	

Status of Food Safety Practice of Food Handlers

Food safety practice of participants with score greater than or equal to 70% were classified as satisfactory and those with a score less than 70% as unsatisfactory status. Following this procedure study found that 265(74.6%) of food handler had satisfactory food safety practice and 90(25.4%) had unsatisfactory practice.

As per the study result, majority 287(80.8%) of food handlers reported as they always practice thawing frozen foods at room temperature and 33(9.2) practice it sometimes. Towards temperature control, majority 304(85.6) of food handlers reported as they never use thermometer to control the temperature of the food. In addition, 189(53.23) of respondents reported, as they never practice using gloves when serving unwrapped foods. Besides 243(54.2) report as they always wash hands before glove use. Furthermore 20(5.6) of food

handlers reported as they always come to work while having illnesses like diarrhea (Table 4).

Associated Factors for Food Safety/Hygiene Practice

Bivariate analysis results of associated factors of Food Safety/Hygiene Practice: Sex of respondents, Educational status, Regular Supervision by concerned body, Trained manger on food safety/hygiene practice, Over all attitude, over all Knowledge on food safety/hygiene practice, ever had trained in any food safety/hygiene practice, ever had certificate in food safety/hygiene practice, were found to be P value of <0.2 and entered in to multivariate analysis to reduce the effects of confounding factors.

Multivariate analysis of associated factors of Food Safety/Hygiene Practice: Educational status, Regular Supervision by concerned body, ever had certificate in food safety/hygiene practice were found to be significantly associated with food safety practice.

Table 3: Attitude on Food Safety Practice of Food handlers in Asosa town 2018.

Food safety attitude	Strongly disagree No (%)	Disagree No (%)	Neutra No (%)	Agree No (%)	Strongly disagree	Total
Temperature Control is an effective method of reducing the number of cases of food poisoning	61(17.2)	18(24.7)	69(19.)	137(38.6)	70(19.7)	355(100)
All food handlers should have a food safety training qualification	6 (1.7)	61(17.2)	219(6.1)	354(100)	-	355(100)
Lack of food safety training affects safe food handling	61(17.2)	8(2.3)	4(1.1)	219(61.7)	63(17.7)	355(100)
Unavailability of food handling guideline can affect food safety	63(17.7)	84(23.4)	71(20.0)	133(37.5)	4(1.1)	355(100)
Insufficient dry and wet storage can affect food-handling practice	40(11.2)	4(1.1)	12(3.4)	212(59.7)	91(25.6)	355(100)
Lack of supervisor commitment affect safe food handling	63(17.7)	4(1.1)	20(5.6)	200(56.3)	68(19.2)	355(100)
Overall attitude	Favorable Attitude	Unfavorable Attitude				
Attitude on food safety practice	269(75.8%)	86(24.2%)				

Table 4: Self-Reported Food Safety Practice of Food handlers in Assosa town.

Food safety/hygiene	Always No (%)	Sometimes No (%)	Never No (%)	Total No (%)
Do you wash your hands after touching unwrapped raw foods?	245(69.0)	70(19.7)	40(11.26)	355(100)
Do you wash your hands before touching cooked foods?	152(42.3)	138(38.9)	65(18.3)	355(100)
Do you use separate utensils when preparing raw and cooked foods	292(82.2)	33(9.2)	30(8.4)	355(100)
Do you thaw frozen foods at room temperature?	287(80.8)	47(13.2)	21(5.9)	355(100)
Do you check the expiry dates of all products?	301(84.8)	42(11.8)	12(3.3)	355(100)
Do you use a thermometer to check temperature?	23(6.4)	287.8)	304(85.6)	355(100)
Do you use gloves while serving unwrapped foods?	114(32.1)	52(14.6)	189(53.23)	355(100)
Do you wash your hands before using gloves?	170(47.8)	33(9.3)	153(43)	355(100)
Do you wash your hands after using gloves?	243 (54.2)	55(9.8)	128(36)	355(100)
Do you wear uniform when serving food?	287(80.6)	11(3.1)	57(16.05)	355(100)
Do come to work when ill a fever, upset stomach?	20(5.6)	29(8.1)	306(86.9)	355(100)
Do you wear a hat or head covering when serving food?	287(80.8)	47(13.2)	21(5.9)	355(100)
Do you wear jewelry when serving food?	23(6.4)	287.8)	304(85.6)	355(100)
Do you disinfect cutting boards after each use?	301(84.8)	42(11.8)	12(3.3)	355(100)
Do you sanitize utensils after washing them	287(80.6)	11(3.1)	57(16.05)	354(100)
Over all reported practice	Satisfactory practice		Unsatisfactory practice	
Food safety practice of food handlers	241(67.8%)		114(32.2%)	

Table 5: Multivariate analysis results of Food Safety/Hygiene Practice among food handlers of Assosa town Benishangul gumuz regional state August 2018 using Back ward step wise regression.

Variables	Level of Practice		COR (95%CI)	AOR (95%CI)
	Satisfactory	Unsatisfactory		
Sex of respondents				
Male	82	23	2.04(1.20-3.36)	***
female	159	91	1	1
Educational status				
literate	208	68	4.26(2.52-7.2)	3.40(1.90-6.08)
illiterate	33	46	1	
Regular Supervision by concerned body				
Yes	222	66	8.4(4.67-15.45)	7.25(3.85-13.65)
No	19	48	1	1
Trained manger				
Yes	92	35	1.39(0.86-2.24)	
No	149	79	1	1
Over all attitude				
Satisfactory	206	63	4.76(2.84-7.92)	***
Unsatisfactory	35	51	1	
Over all Knowledge				
Knowledgeable	188	81	1.82(0.932, 3.571)	***
Non Knowledgeable	53	33	1	
Ever had trained				
Yes	42	17	1.20(0.65-2.22)	***
No	199	97	1	
Training certificate				
Yes	29	3	5.06(1.50-16.98)	5.28(1.40-19.79)
No	212	111	1	

NB *** indicates variables removed from the model (not significant) in the multivariate analysis.

Educational status was found to be significantly associated with food safety practice. According to this study those who have education (able to write and read) were 3.40 times more likely to practice food safety than with no education (unable to write and read) AOR 3.40(1.90-6.08).

Regular Supervision by concerned body was found to be significantly associated with food safety practice. Those students who have regular supervision by concerned body were 7.25 times more likely to practice food safety when compared to those who did not have regular supervision by concerned body AOR 7.25(3.85-13.65).

Ever had certificate in food safety/hygiene practice was also found to be significantly associated with food safety practice. Those who had certificate in food safety/hygiene practice were 5.28 times more likely to practice food safety than who have no certificate in food safety/hygiene practice AOR 5.28(1.40-19.79) (Table 5).

Discussion

This study revealed the status of food safety practice and associated factors among food handlers. Based on this, the food safety status was satisfactory among (67.8%) food handlers. Factors like educational background, Educational status, Regular Supervision by concerned body, ever had certificate in food safety/hygiene practice were statistically significant in multivariable logistic regression analysis. So far results of this study discussed below.

The satisfactory food safety practice of food handlers which is (67.8%) in this study was inconsistent with studies conducted in Dangila, Ethiopia (52.5%) and Jamaica 50% [31]. This may be due to difference socio demographic characteristics. On the other hand this finding is greater than the findings of other studies in Ethiopia, Addis Ababa (47.7%) [30], Gondar, Ethiopia which is 30.3% [25]. Such differences where the satisfactory food safety practice was higher in this study could be the sensitivity of foods due to the hot weather made those food handlers better conscious in the study area.

In assessing the food safety practice of food handlers 86% of them reported as they always or sometimes thaw frozen foods with room temperature. This finding had similar nature with study in Jamaica that is 73% of food handlers practiced it always or sometimes [31]. This may be related to lack of facilities like running water as well as lack of awareness towards the risk of the practice. In this study, 23.3% of respondents reported as they always or sometimes continue working with having illnesses like diarrhea, which is in fact the potential channel for food borne diseases transmission. Previous studies also show similar findings, 25.5% in Malaysia, 22.4% in India, 19.1% in Jamaica [31]. The possible reason for the similarities could be the concerned authorities did not perform awareness rising activities on the risk of the practice.

In temperature control of food, 73.4% of food handlers in this study reported as they never use thermometer which is different from the practice in Jamaica which 33% [31] and this difference could be related to the local trend in the study area in which thermometers not available with refrigerators in the market. In this study only some of respondents (26.6%) reported as they always use gloves while touching/serving unwrapped foods whereas study Saudi Arabia the practice was (88.9%). The possible reason where the practice was higher in the referenced Saudi Arabia study could be related to

accessibility of resources like gloves and difference in awareness. On the contrary however, the practice of hand washing before touching cooked food was similar in the two mentioned studies; 83.5% in this study and 87.5% in the Saudi Arabia and 79% in Jamaica [31]. The reason behind could be the feasibility of the practice in terms of resource and time. In this study, (40.6 %) food handlers did report as they always or sometimes wear jewelry while serving food which is less than the study in Bahir Dar, Ethiopia (53.2%). The difference could be related to interventions like training where 29% of food handlers attended where as 21.8% in the referenced study.

While looking in to the result of associated factors, food handlers with only primary education were 77% less likely to have satisfactory food safety practice compared with food handlers holding Diploma or Degree. In other studies also educational status was identified as statistically significant factor, Malaysia Nigeria [29] and Addis Ababa [30]. The reason behind may be education enables/supports/ food handlers to improve knowledge and awareness about the nature of work they are assigned. Another variable identified statistically significant in this study was training, the food handlers with food safety training were two times more likely to have satisfactory food safety practice compared with those without food safety training. This result was supported by different studies across globally, (Thelwell, 2014), (Gizaw et al., 2014) and (Asrat et al., 2015). The reason behind could be the training raise their awareness and concern for food borne diseases.

Food safety attitude of food handlers was also among the statistically significant factors. Food handlers with neutral and negative attitude toward food safety were 63% and 51% less likely to have satisfactory food safety practice respectively compared to food handlers with positive attitude. Other studies support this finding (Gizaw et al., 2014). This could arise from the fact that food handlers with positive attitude try their best to handle foods safely regardless of challenges. Furthermore the model indicated that food handlers working in establishments where three Compartment dish washing system functions were twice more likely to practice satisfactory food safety. The reason could be availability of practical institutional facilities pave the way to practice safe food handling.

Limitations and Strengths

Limitations

The limitation of this study was food handlers working only in selected types of food establishments were considered.

Strength

The investigator tried to include four different types of selected food establishments in the study.

Besides, data collection includes both self-reported and observation on food safety practices.

Conclusion

- Food safety Knowledge in this group of population was relatively high, but which still needs further intervention.
- The level of Attitude toward food safety was good but still needs further effort to improve the misconception on food safety/hygienic practice.

- All most three fourth of the study participants are satisfactory practice regarding food safety practice, which is still prone to food borne illnesses.
- The associated factors of food safety practice are Educational status, Regular Supervision by concerned body, ever had certificate in food safety/hygiene practice were found to be significantly associated with food safety practice.

Recommendations

To overcome the unsatisfactory food safety practices;

Authorities like (FMHACA) need to set national wide specific standards to improve the food safety practice by food establishments.

Health bureau in collaboration with cultural and tourism bureau need to conduct awareness raising activities like training for all food handlers and employers.

Food establishments need to make all their facilities functional besides physically availing.

Food handlers has to make effort for self-learning and update.

Hence resources could affect food-handling practice of food handlers, researchers need to consider assessing such probable factors in their studies.

Besides researchers need to consider the food safety practice of other types of food establishments not included in this study.

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