Addis Ababa University

College Of Health Sciences

School Of Public Health

Assessment of the Sanitary Conditions of Catering Establishments and Food Safety Knowledge and Practices of Food Handlers in Addis Ababa University Students' Cafeteria

By

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Abbreviations

AAU	Addis Ababa University
CDC	Center for Disease Control
FAO	Food and Agricultural Organization
FBD	Food Borne Disease
ISO	International Organization for Standardization
MPN	Most Probable Number
US- FDA	United States Food and Drug Administration
WHO	World Health Organizations

Abstract

Background: Every institution which provides food for a large group of consumers has the responsibility to keep the safety and wholesomeness of food otherwise it will result outbreaks of food borne illness. The most identified contributing factors of food borne illness in mass catering establishments were cross contamination, dirty work environment and poor personal hygiene practice by food handlers

Objective: The objective of this study was assessment of the sanitary conditions of catering establishments and food safety knowledge and practices of food handlers in Addis Ababa University students' cafeterias

Methods: A cross-sectional study complemented with qualitative method was conducted from January, 2013 to May, 2013. A total of 12 student catering establishments from 7 campuses were studied for sanitary condition of premises and a total of 302 food handlers were assessed for knowledge and practice status. For data collection questionnaires and appropriate checklists were used. Bacteriological examination was made from all catering premises following appropriate standard procedures. The data was entered by using EPI INFO version 3.5.1 and cleaned before transferring to SPSS version 16 statistical packages which was used for data management and analysis.

Results: Majority, 212(70.2%), of food handlers were females and their median age were 29. Among the 302 subjects, 197 (65.2%) of them had food hygiene training. All, 302 (100%), of food handlers were literate and 283 (93.7%) of them had adequate knowledge of food borne diseases. Twelve of premises had a clean wall and ceiling in their kitchen and dining rooms. Similarly all premises had openable window, adequate light and adequate ventilation. E. coli were not identified at all and in 1 (2.8%) of swabbed utensils S. aureus were identified. Overall practice scores revealed that 52.3% of food handlers had a poor food handling practice.

Conclusion and recommendation: This study revealed that the repair and sanitary conditions of premises were in a good condition. Nearly half of food handlers had a poor food handling practice. According to the swab result the dish washing activity was effective. Provision of training and basic sanitary facilities by management is recommended as improvement measure.

Keywords: Sanitary condition, Food handlers, Food safety, Food handling Practices, Food utensils, swab tes

1. Introduction

1.1 Background

Even though an adequate supply of safe and wholesome food is essential to the health and wellbeing of humans, there are plenty of conditions that food affects the health of people across the globe due to contamination. Even if the problem is worse in developing nations it is also common in developed countries. Even modern technological advance could not stop the occurrence of food related diseases (1, 2).

According to several studies a typical microbiological contamination of food occur in food and drink establishments due to dirty food contact surfaces, poor personal hygiene practices and inappropriate storage temperature (2).

Eating establishments in hospitals, universities, schools, restaurants etc provide meal service for a large number of consumers from the same source. Food prepared in large amount is vulnerable for contamination and may lead to the occurrence of food borne outbreaks unless basic sanitary practices are well maintained. Therefore, food establishment serving a large number of individuals are responsible to provide safe and wholesome food for their consumers (3).

1.2 Statement of the problem

As a result of eating unsafe food thousands of millions of people become ill and may die across the globe (4). Although the global incidence of food borne disease is difficult to estimate due to a number of factors, a report from WHO indicates that in 2008 alone an estimated of 1.8 million people died from diarrheal diseases across the globe in which a great proportion of these cases can be attributed to contamination of food and drinking water (4, 5, 6). Another study done in the United States alone indicates that, about 76 millions of illnesses, 325,000 hospitalizations, and 5,000 deaths are caused by foodborne pathogens each year (5). In developing countries, up to 70% of cases of diarrheal diseases are associated with the consumption of contaminated foods (6).

In absence of well maintained and proper food handling practices mass catering establishments have the potential to impart disastrous effect on human health because of their scale and complexity. In 1969/70 there were about 737 outbreaks of food borne disease with 52,011 cases reported to the US centers for disease control and prevention. Of those 33% of outbreaks occurred in mass catering services (7).

In developing countries like Ethiopia, the problem attains great proportions due to many reasons, basic among which are poverty and lack of public health awareness. Relevant and well organized data regarding the magnitude of food borne disease in Addis Ababa University does not exist. However, according to the existing reports from students clinic there were repeated occurrence of intestinal parasitic infections from students which could be attributed to consumption of unsafe food and water.

1.3 Significance of the study

It is very crucial to ensure food safety in institutional catering services where comparatively large number of clients served on a regular basis since a single contamination may lead to outbreaks. The major institutional foodservice operations include hospital and long-term care, schools and college and university foodservices.

Based on current fact Ethiopia showed a great transformation regarding education, infrastructure, and other economic activity. Accordingly radical expansion of universities observed through out the whole country. Therefore, it is very essential to ensure safe food handling and preparation practices because of protecting enrolled huge number of students in those universities from food borne diseases. However, in most universities data on sanitary condition of student catering establishments were not available.

Since there is no researches done in Addis Ababa University before, this study expected to draw attention to identifications of sanitary gaps in students cafeteria which will help the university administration to give emphasis and to allocate resources to improve the overall repair and sanitary conditions of premises and empowering and equipping food handlers with safe food handling practice working with in students cafeteria.

2. Literature reviews

Through all time food is a public health concern across the world (8). Even though food borne disease is the main problem across the globe, it is more severe in developing nations due to poor personal hygiene and food safety measures. Estimating the magnitude of food borne disease is difficult because in most countries reliable statistics are not available due to poor or non existent reporting system (7, 8, 9). However, some estimates indicates out of the 1.5 billion global annual cases of diarrhea about 70% or 1.05 billion cases are thought to be caused by biological contamination in food. Similarly according to a report from CDC every year in the United States alone an estimated of 48 million illnesses, 128, 000 hospitalization and 3000 deaths are attributed to food borne illness. 70% of cases of diarrheal disease in developing nations may be attributed to consumptions of contaminated food (11, 12).

2.1 Repair and sanitary status of mass catering establishment

In catering establishment lack of basic sanitary facilities (toilet, hand washing basin, solid and liquid waste disposal sites, etc) and lack of proper waste storage facility can contribute to poor microbial quality of foods. US food and drug administration (FDA) identified cross contamination as the contributing factor of food borne illness and as a result of this maintaining repair and sanitary status of working environment like dining room, kitchen and storage room is critical to prevent food related problems . Additionally it mentioned time-temperature control in stored and other foods as a basic issue to keep food safe (13). According to a number of studies conducted mass catering establishments whether commercial or non commercial sectors are the important sources of food borne outbreaks if it is not built in a sanitary manner. It is estimated that food borne disease originated from this sector alone costs consumers $6 billion in health care costs and loss of productivity. Therefore, the structure of premises in any mass catering establishments should be constructed in the way of permitting good hygienic practices including protection against cross contamination of food surfaces between and during food operations. Additionally, windows should be provided in each room to allow adequate lighting. The dining room should be attractive in terms of cleanliness; lighting and natural ventilation and food handlers should be provided with separate latrines, hand washing and changing facilities at convenient location (14). However, Studies conducted in Addis Ababa and Zeway revealed that poor repair condition of premises, inadequate sanitary facility, improper waste management and

inadequate client's hand washing basin and utensil washing sinks were common features of catering establishments (9, 22).

2.2 Food safety knowledge and practices of food handler

Food safety issue is the main concern of 21st century. According to the definition of FAO/WHO *food safety is defined as the assurance that food is consumed in the usual manner does not harm to human health and wellbeing.* However, food is liable to contamination and may cause food borne disease if it is not handled properly. Most of the time food service establishments are the source of food borne illnesses (15). There are a number of contributing factors for the occurrence of food borne illnesses. Among these factors the prominent one is inappropriate and negligence practice of food handlers. For instance, poor personal hygiene, improper reheating and heating, inadequate hot holding, and cross contamination are some of them. For instance, a study done in USA suggested that improper food handling practices contributed to approximately 97% of food borne illness in food-service establishments. However, a study conducted in Mekele and Bahir Dar town indicated that food handling practice by majority groups were unsatisfactory or poor (1, 6). Practice of food handlers could be influenced with a number of factors (16). A study conducted in Canada on 630 restaurants across three provinces to compare the relationship between trained and untrained food handlers showed that food handler with better formal education and trained regarding food safety have better inspection score than the untrained and low formal education level (17). Similarly a number of observational studies showed that improper food handling practice by food handlers influenced by a number of background factors (18).

2.3 Bacteriological quality of food utensils

Based on several studies a typical microbiological contamination of food also occur in food and drink establishments due to *dirty and improperly cleaned and sanitized food contact surfaces*. Without effective cleaning, sanitizing and drying of food equipment and surfaces it is difficult to prevent food contamination (19). The microbial analysis of food contact surfaces/utensils used to indicate the actual status of the hygienic design of equipment and facilities available. *The standard microbiological swabbing* method was used to determine aerobic plate counts and E. coli/ coliform counts of $50cm^2$ (20).

Generally, this study aimed to help both the university students' dean office and other organization to undertake any appropriate measure to fill any identified gaps.

Conceptual frame work

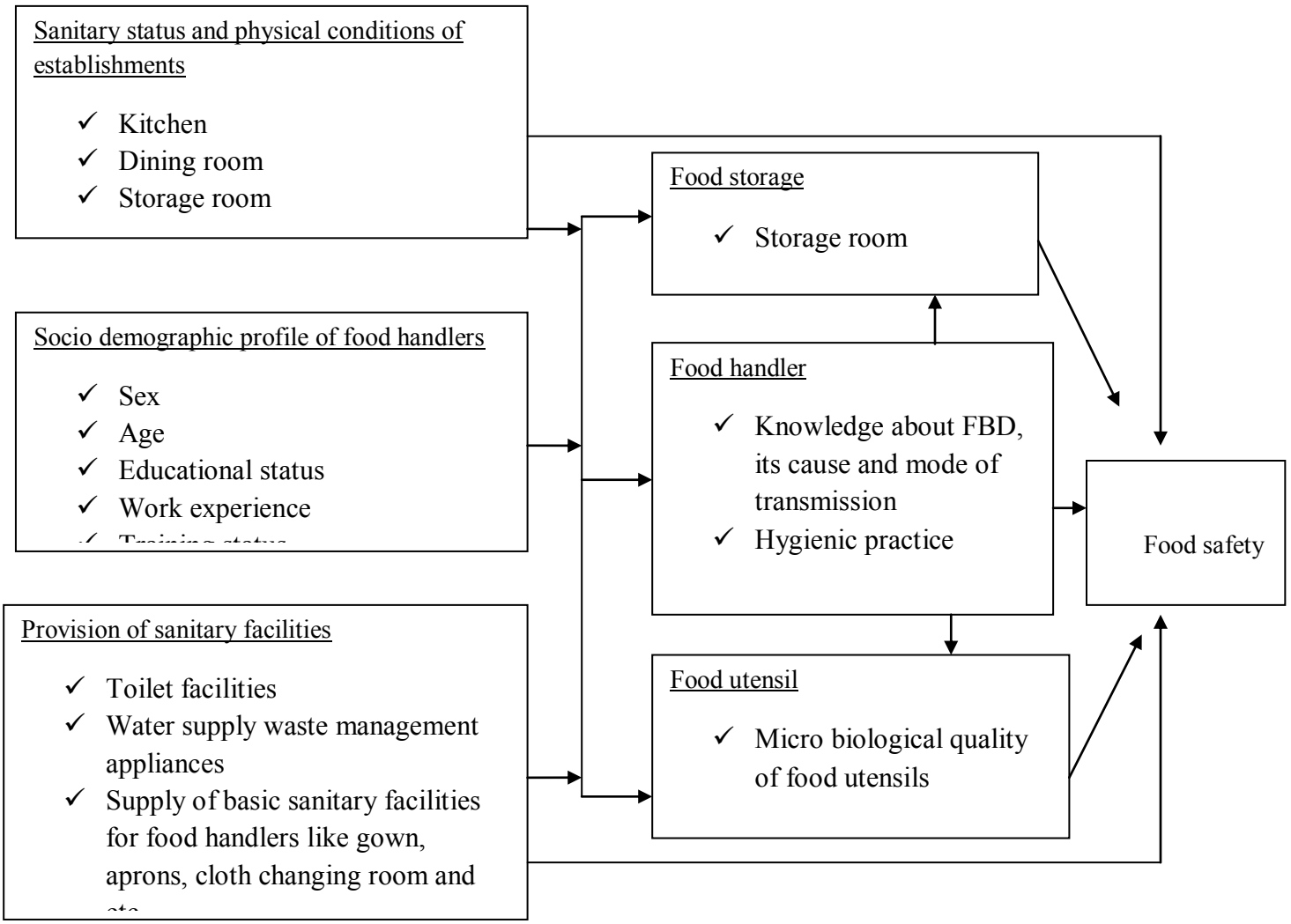

Figure 1: Factors that affect food safety in mass catering establishments, Addis Ababa University, 2013

3. Objectives

3.1 General objective

Assessment of the sanitary conditions of food service establishments and food safety knowledge and practices of food handlers in Addis Ababa University

3.2 Specific objectives

- To assess the sanitary conditions of student catering services in Addis Ababa University
- To analyze the food safety knowledge and practices of food handlers in student caterings of Addis Ababa University
- To identify factors affecting practice of food handlers in students cafeteria of Addis Ababa University
- To examine the bacteriological quality of food utensils in student caterings of Addis Ababa University

4. Methodology

4.1 Study design: A cross-sectional study complemented with qualitative method was conducted from January, 2013 to February, 2013.

4.2 Study area: The study area was Addis Ababa University, students' cafeteria. The University was found in Addis Ababa city, which is the capital city of Ethiopia. It covers 527 square kilometer and has an estimated population of 3,384,569. Addis Ababa University (formerly Haile Selassie I University) is a university in Ethiopia. It was originally named "University College of Addis Ababa" at its founding, then renamed after the Ethiopian emperor Haile Selassie I in 1962, before receiving its current name in 1975. It has seven campuses; six in Addis Ababa and one in Bishoftu about 45 kilometers away. In 2009/10 there were 20,701 enrolled undergraduate students, 7,127 graduate students, and 14,669 continuing education students, making a total student body of 42,497. The study was focused only in six campuses which were found in Addis Ababa city. Accordingly around 302 food handlers are currently working in 6 different campuses which had a direct contact with food and food contact surfaces.

4.3 Source population: All student catering establishments of Addis Ababa University were the source population.

4.4 Study population: All students cafeterias of Addis Ababa University was the study subjects and all food handlers in all student catering services were enlisted for knowledge and practice assessment.

4.5 Inclusion and exclusion criteria's

Inclusion criteria's

- All Addis Ababa University students cafeterias that serve students were part of the study subjects

Exclusion criteria'

- Catering establishments like patient cafeterias, student lounges, and staff lounges were out of the study subjects

4.6 Sample size determination

Sample size of food handlers for knowledge and practice assessment was calculated based on the assumption of a 54% proportion (p) (7), 0.05 expected margins of error (d) and with 95% confidence interval ($Z_{\alpha/2}$) and 10% contingency. Based on the result indicated below the required sample size were 419

$$n = \frac{(Z_{\alpha/2})^2 \times p\,(1-p)}{d^2}$$

$$n = \frac{(1.96)^2\, 0.54(1-0.54)}{(0.05)^2} \qquad n = 381+38 = 419$$

However, the calculated sample size was higher relative to the total number of food handlers found with in the university which were 302. But it was taken purposely to maximize the precision of the study. If not, the requisite sample size for this study after calculating using a formula with small source population could have been 185 including 10% contingency for non response. Therefore all 302 food handlers working in Addis Ababa University students cafeteria were enrolled for knowledge and practice assessment.

For overall assessment of sanitary conditions of premises all 12 student cafeterias in seven campuses were included in the study. Microbiological swab test was done in all 12 student catering services of Addis Ababa University. Number of swabs taken was restricted to fit within the time, financial and resource parameters of the project. As a result of this three swabs were submitted from each student catering establishments. One swab was obtained from bowls and the remaining two swabs were obtained from plates. Therefore, a total of 24 swabs from plates and a total of 12 swabs from bowls were taken.

4.7 Sampling procedure

First information was gathered about the number of cafeteria employees working in each campus to obtain sampling frame. Since the study includes all food handlers data was gathered from all employees according to the list. A total of 302 food handlers were selected from all campuses which had a direct contact with food related activity for knowledge and practice assessment.

Food utensils for bacteriological swab test examination selected from a group of utensils which were cleaned and sanitized and stored for direct use. All students' cafeterias were selected for bacteriological examination of food utensils.

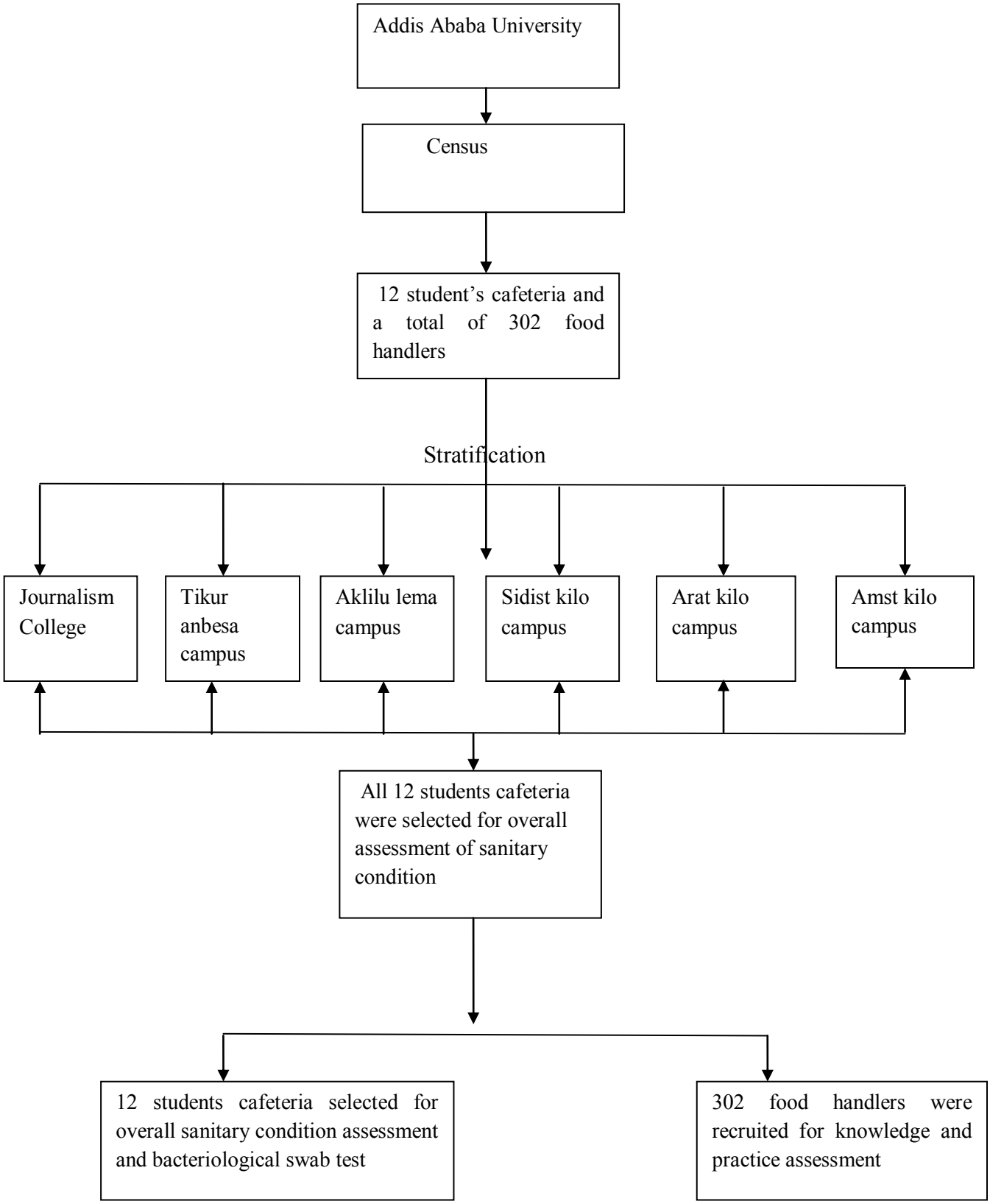

Figure 2:- Sampling procedure of sanitary condition assessment of premises and food handlers selection of Addis Ababa University, 2013

4.8 Data collection procedures

Structured questionnaire and checklist were developed for the purpose of data collection after reviewing relevant literature and views of professionals in this area. The questionnaire was structured and designed to accommodate the response of respondents and the physical observation of data collectors and was designed to obtain information on sanitary condition of premises and knowledge and practice of food handlers. It was prepared originally in English and then translated into Amharic and back to English by two different Environmental health professionals in order to obtain content validity. Finally the questionnaire was administered in Amharic. Check list was prepared and used as a tool during swab sample collection. Standard swab sample collection and transportation procedure was implemented for microbiological food utensil examination. Environmental health and medical laboratory professionals were recruited for data collection and microbiological analysis of food utensils respectively. Data collectors and supervisors were trained and after the training the questionnaire was pretested in cafeterias that were not included in the actual study to ensure the quality and validity of data. Regular supervision and reviewing the completed questionnaire was carried out by two environmental health professionals and by the principal investigator daily to maintain data quality. For the qualitative method the data collectors used the pre designed checklist to probe the desired answers from the cafeteria managers.

4.9 Operational definitions (5, 24, 25)

Food and drink establishments: **-** is an institution which provides food and drink services to a relatively large number of users in the form of breakfast, lunch, dinner or beverages.

Food handler - any person who directly handles packaged or unpackaged food, food equipment and utensils, or food contact surfaces and is therefore expected to comply with food hygiene requirements

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

Food hygiene - all conditions and measures necessary to ensure the safety and suitability of food at all stages of the food chain.

Contaminant - any biological or chemical agent, foreign matter, or other substances not intentionally added to food which may compromise food safety or suitability.

Contamination - means to make unfit for use by the introduction or potential introduction of unwholesome or undesirable elements

Disinfection - the reduction, by means of chemical agents and/or physical methods, of the number of micro-organisms in the environment, to a level that does not compromise food safety or suitability.

Easily Cleanable - means surfaces which are readily accessible and fabricated of such materials and finishes that residue can be effectively removed by normal cleaning methods.

Food-Contact Surfaces - means those surfaces of equipment and utensils with which food normally comes in contact

Perishable food: a food that can easily spoil by microbial action e.g. meat, egg, etc

Non-perishable food*:* a food that can persist for a long period of time without spoilage e.g. flour, sugar etc

Personal hygiene - refers to those protection measures primarily with the responsibility of the individual, which promote and limit the spread of infectious disease, like hand washing using soap and water, keep body clean etc.

Good repair condition: - shall mean absence of big cracks or detached areas, holes and lack of painting for food preparation areas/kitchens, dining room or service room; and being free of breaks (open seams), corrosion, and cracks and easily cleanable for food utensils and equipments.

Adequate lighting: - is to mean that a healthy person (without major visual problem) can see or easily identify objects in the room comfortably without straining of the eye.

Adequate ventilation: - is to mean that a room is free of reasonably disagreeable odor and have at least one openable window.

Properly managed toilet: - shall mean when a toilet/latrine was found free of litters, tissue/anal cleansing paper, fly access and other dirty materials like faeces or urine around the latrine.

Proper storage in this paper context is to mean:-

- When garbage /refuse are stored in receptacle which is durable, have tight fitting cover, moisture proof and light to lift and transport.

Cleanliness/clean: - shall mean absence of dust particles, grease, finger and other marks for food utensil and being free of spider webs, dust and smoke particles for kitchen and dining /service room.

Sign of spoilage: - means the change of the physical characteristics (color change, bad odor) of perishable foodstuffs that can be easily detected by observation.

Personal hygiene - refers to those protection measures primarily with the responsibility of the individual, which promote and limit the spread of infectious disease, like hand washing using soap and water, keep body clean etc.

Sanitary condition: means effective systems which help to ensure adequate and appropriate maintenance and cleaning, control pests, manage wastes and monitor effectiveness of maintenance and sanitation procedures

4.10Study Variables

4.10.1 Dependent variable

- Sanitary conditions and availability of Sanitary facilities like ,water supply, toilet facility ,utensil cleanliness ,hand washing basin availability, waste disposal mechanism
- Knowledge of food handlers
- Hygienic practice of food handler
- Microbiological quality of food utensils

4.10.2 Independent variables

- Educational level, age and gender
- Work experience and training status of food handlers
- Income status of food handlers
- Average working hour per day
- Inspection status of establishments by experts

4. 11 Data analysis

The data was entered by using EPI INFO version 3.5.1 and cleaned before transferring to SPSS version 16 statistical package which was used for data management and analysis. Cross tabulations and chi-squared tests (5% significance level) were used to determine the influence of gender, age, educational level, and training status of food handlers on their practice score. Where cells had a value with less than 5, Fisher's exact test had to be used for testing significance. The score of practice was categorized as: good or poor based on the summation of individual scores of the variables .The score range was between 0 – 10 and the scores were converted to 100 points and food handlers who had a score of above 70% were categorized as good and below it as poor. The variables used for scoring overall practice were Food handlers wear outer garments/gown during inspection, hair covered with appropriate aprons, wear finger ornaments during food handling, finger nail cut short, wash hands before starting food preparation today (this morning), cook foods thoroughly before ready for consumptions, check ingredients expiry date before using for food preparations, cover mouth with tissue paper when coughing or sneezing accidentally during food preparation, dry washed utensils before ready for use and use separate utensils for raw and cooked foods. The score range for knowledge of food handlers was between 0-4 and the scores were converted to 100 points and food handlers who had a score of below 75% were categorized as good and below it as poor. The variables used to score the knowledge of food handlers were knowledge about food borne disease, about cause of food borne disease, about mode of transmission for food borne disease and about cause of food contamination. Potential influencing factors towards practice were examined by using univariate and multivariate analyses. Variables that were found statistically significant in univariate analysis and those under main interests of the study were included in multivariate analysis. The results were presented by appropriate tabulations based on the determined variables, crude or adjusted odds ratio with 95% confidence interval and its corresponding p-values.

4.12 Data quality management

The principal investigator was performed data entry and cleaning. The quality of data was ensured through training of data collectors, close supervision and prompt feedback, reviewing each of completed questionnaires daily and re-interviewing certain student's cafeterias randomly. Data consistency and completeness was made all the way during data collection, data entry and analysis. Two week earlier to the actual data collection period, pretest was conducted on 20 food

handlers working in one of student's cafeteria of Addis Ababa University. Data collection facilitators and supervisors were trained for a day before and after pretest. Well experienced lab technician was recruited for microbiological analysis.

4.13 Ethical consideration

The ethical approval and clearance of were obtained from Research and Ethics committee of the school of public health, Addis Ababa University; formal letter of support was submitted to Addis Ababa University student's directorate office and respective cafeteria managers and permission was obtained. Data were collected with the consent of study participants after they were informed about the objective of the study, how long it takes the interview and the measurements. The identity of the respondent was protected by code and participants were reassured of the confidentiality of the information they provided. Advice regarding basics of personal hygiene and environmental sanitation were provided.

4.14 Dissemination of results

The finding of this study was presented as partial fulfillment of the degree of Master of Public Health to the School of Public Health, Addis Ababa University. Copies of the final report will be provided to student's dean office and students directorate office. Furthermore; it was disseminated through publication in local and international journals and presented on relevant scientific conferences.

4.15 Laboratory procedure for bacteriological examination of food utensils (33, 34)

The main purpose of bacteriological examination was assessing the effectiveness of cleaning and disinfecting food utensils and washing facilities. Collection of samples was followed a standard procedure and practice. Fifteen plate/bowls were selected from each student catering establishments for swab test. Samples were selected before lunch time since utensils were cleaned and sanitized as well they become ready for use for serving students during that time. Plates/bowls counted as they are in chairs and systematically the required amounts of sample units were recruited. Swabbing one sterilized cotton swab on wooden applicator stick was used for each group of sampling units (i.e. five plate/bowls) which were two groups of utensils in each of 12 student catering establishments. The assessment of effectiveness of cleaning and sanitizing food utensils was done based on the number of bacteria found per cm^2. To cover an equivalent

area of selected sampling units approximately $50cm^2$ (2.5cm by 20cm, 5cm by 10cm or other dimensions) of them Roll or drag moist cotton swab across sample area slowly and firmly 3 times reversing the direction each time. Since samples must reach the laboratory in a microbiologically unchanged condition from the existing condition at the time of sampling contamination of the sample and microbial growth or death during sampling, transport and storage should be avoided. Therefore the samples were kept refrigerated in an ice box and were transported to the laboratory by considering the standard time which is between 24-48 hrs in which the result would be valid. Then in the laboratory the swab samples were directly cultured into solid media of MacConkey, blood agar (BA) and yeast extract agar to isolate the possible organisms. The Petri dishes were incubated at 37^0C for 48 hours to detect the presence of total coliform and similarly swab sample was also inoculated into test tubes containing MacConkey broth and incubated for 24-48 hours at 37^0C and 44^0C to determine the growth of E.coli. Biochemical tests were performed according to the essence in the identification of bacteria species for further confirmation.

5. Results

General information about managers and study units

Based on the information obtained from Addis Ababa University student's directorate office there were a total of 12 student caterings in 7 different campuses. All those 12 student caterings were included under the study subjects. The average number of students consumed in each catering establishment was 2011 with the minimum number of 1184 and maximum of 2700 students. In the past six months 10 of student catering establishments were inspected by sanitarian and according to the manager response inspections done in all 10 student caterings were with education and it was beneficial for the establishment. About 8 of managers were male and the remaining 4 were females. Their median age was 39 with the minimum and maximum age of 30 and 42 respectively. All managers completed a higher education program.

Table 1:- Socio demographic conditions of managers and general information of student caterings of Addis Ababa University, 2013 (n=12)

Variable	Frequency	Percent (%)
Age (years)		
30-40	10	83.3
>40	2	16.7
Sex		
Male	8	66.7
Female	4	33.3
Educational status		
12^{+}	12	100.0
Cafeteria inspected past 6 month		
Inspected	10	83.3
Not inspected	2	16.7
Inspection with education and beneficial	10	100.0
Number of students consumed per day		
1001-2000	4	33.3
Above 2000	8	66.7

Socio-demographic profile of food handlers

According to the information obtained from the employee's roster there were a total of 302 food handlers working in all 12 student caterings. Fortunately, all food handlers were on duty during data collection time and therefore the non response rate was zero. Majority of food handlers, 212 (70.2), were females and 90(29.8) were males. Nearly half, 156 (51.7%), of them were aged between 22 and 29 and their median age were 29 with a minimum and maximum age of 22 and 47 respectively. About 156(45%) of them were educated from grade 9-10 and 153 (50.7%) of them were married. Almost all, 296(98%), of food handlers had an income ranged between 501 and 1000 birr and their mean work experience were about 2.41years. (Table-2)

Table -2: Socio-demographic profile of food handlers in student caterings of Addis Ababa University, 2013, (n = 302)

Variable	Frequency	Percent (%)
Age (years)		
19-29	156	51.7
30-40	138	45.7
>40	8	2.6
Sex		
Male	90	29.8
Female	212	70.2
Educational status		
Grade 1-6	1	0.3
Grade 7-8	77	25.5
Grade 9-10	136	45
Grade 11-12	88	29.1
Income status (Birr)		
Below 500	6	2.0
501-1000	296	98.0
Marital status		
Single	128	42.7
Married	153	50.7
Divorced	12	4.0
Widowed	5	1.7
Separated	4	1.3
Work experience (years)		
Below 2 year	183	60.6
2-4 year	96	31.8
Above 2 year	23	7.6

Physical and repair conditions of kitchen and dining rooms

Kitchen

All, 12, student catering establishments inspected based on a pre designed checklist. Accordingly, 11 of the premises had kitchen floor without any cracks and detached areas. About 11 of premises' kitchens' wall and ceiling were free of any dust, smoke or other dirt and 11of them have a wall and ceiling without any cracks and detached areas. All 12 had openable window, adequate light and adequate ventilation during inspection. Similarly all kitchens of student caterings are free of infestation with any vectors and rodents.

Dining room

All, 12, student catering dining rooms were in a good repair condition. Majority, 11, of them had a clean wall and ceiling. About 11of premises dining room had a wall and ceiling without any cracks and detached areas. All, 12, of dining rooms have openable windows, adequate light and adequate ventilation. Most 11 of dining rooms were not infested with any vectors and rodents during inspection time.

Table 3- Sanitary and physical conditions of dining room and kitchens of student caterings of Addis Ababa University, 2013 (n=12)

Variable	Frequency
Kitchen (n=12)	
Floor had no cracks and detached areas	11
Wall and ceiling clean	11
Wall and ceiling had no cracks and detached areas	11
Had openable windows	11
Had adequate light	12
Had adequate ventilation	12
Had no any infestation of vectors and rodents	12
Dining room (n=12)	
Floor had no cracks and detached areas	12
Wall and ceiling clean	11
Wall and ceiling had no cracks and detached areas	11
Had openable windows	12
Had adequate light	12
Had adequate ventilation	12
Had no any infestation of vectors and rodents	11

Food storage and refrigerator condition

About 11 of premises had storage room for perishable and non perishable foods and from those establishments 9 of them have free space and sufficient air circulation in the room. All, 12, of establishments had a walking type of refrigerator. All 12 of those premises had not a refrigerator with a fixed thermometer. In most, 9, of the premises there was no any sign of spoilage on stored foods.

Sanitary facilities and water supply

Sanitary facilities

Latrine and lavatory services

All, 12 of establishments had toilet facility and nearly all, 11 of them use dry pit latrine type. Majority, 8 of those latrine facilities were clean and of them were open for use during inspection time. All, 12, of establishments desludge by vacuum truck when latrine is full. About 8 of student catering establishments lack urinals. Lavatory facilities were available in 7 of establishments and in all of them it was separated for food handlers and other customers. In 6 of those establishments with lavatory service there were detergent during inspection and almost all 7 of them had a fixed wash basin type. All, 7 of establishments with lavatory service were open for service during inspection. Nearly all, 11 of catering establishments use drainage system for disposal of waste water form kitchen and hand washing services.

Solid waste management

Half, 6 of the premises had container for temporary storage facility and all of them use barrel type. All, 6, of those establishments had a durable, tight fitting and light to carry solid waste storage container. About 5 of them placed the solid waste storage container at appropriate site during inspection. In all , 12, of student catering establishments the final disposal of solid waste undertaken using municipal tractor/lorry.

Accessibility of water and dish washing facilities

Nearly all, 11, of inspected student catering establishments had adequate running water in kitchen and all, 12, of them had both cold and running water at the same time. Majority, 10, of establishments use machine to wash soiled dish and 2 of them wash manually. Those 2 of

establishments who wash utensils manually was compartmentalized with 3 sinks. Nearly all, 11, of student caterings used hot water and detergents for washing dishes

Knowledge and practice of food handlers

Knowledge of food handlers about food borne disease, its cause and route of transmission

About 283(93.7%) of food handlers were aware of at least one type of food borne disease. Main source of information were sanitarian during inspection and mass media, 136(45%) and 128(42.4%) of them respectively. Nearly half, 202(66.9%), of food handlers had responded germs as cause of disease and majority 245(81.1%) of them knew that contaminated food could be the main route of transmission for food borne disease. About 214 (70.9%) and 152 (50.3%) of food handlers aware of that dirty hand and dirty utensils are the main means of food contamination respectively. According to overall score, the knowledge of food handlers regarding food borne disease, its cause, mode of transmission and cause of food contamination were good. (Table-4)

Table 4: Knowledge of food handlers regarding food borne disease, mode of transmission and way of food contamination in student caterings of Addis Ababa University, 2013

Variable	Frequency	Percent (%)
Knowledge of food handlers about food borne disease		
Yes	283	93.7
No	19	6.3
Source of information about FBD*		
Health center	100	33.1
Sanitarian during inspection	136	45.0
Mass media	128	42.4
School	82	27.2
Response on cause of FBD*		
Germs	202	66.9
Chemicals	74	24.5
Do not know	50	16.6
Knowledge about route of transmission for FBD*		
Contaminated food	245	81.1
Contaminated water	91	30.1
Vectors	89	29.5
Do not know	18	6.0
Knowledge on cause of food contamination*		
Dirty hand	214	70.9
Infected food handler	91	30.1
Dirty utensils	152	50.3
Vectors	83	27.5
Dirty work environment	104	34.4
Do not know	18	6.0

NB. Those with asterisk (*) will not add up to 100% because of multiple responses

Practice of food handlers

About 210(69.5%) of food handlers worn gown during inspection among those who had gown 136(45%) of them kept their gown clean. Half, 160(53%), of them covered hair with restraints and 179 (59.5%) of them did not worn any finger ornaments during inspection time. About 219 (72.5%) of food handlers' finger nail trimmed properly and almost all, 295 (97.7%), of them wash hands always before starting any activity. About 152 (50.3%) of food handlers check ingredients expiry date before they use them. Nearly half, 137 (45.4%), of food handlers had not done medical check-up in the past one year and 141(44.4%) of them did check up before one year ago. Most, 197(65.2%), of them took training on basics food safety before they were recruited in this establishment. (Table 5)

Table 5: Food handling practice of food handlers in student caterings of Addis Ababa University, 2013

Variable	Frequency	Percent (%)
Food handlers worn white gown during inspection		
Yes	210	69.5
No	92	30.5
Food handler's gown		
Clean	136	45.0
Not clean	74	24.5
Food handler's hair covered		
Yes	160	53.0
No	142	47.0
Food handlers wear finger ornaments during food preparation		
Yes	123	40.7
No	179	59.3
Food handlers finger nail cut short		
Yes	219	72.5
No	83	27.5
Food handlers wash hands frequently before any event		
Yes	295	97.7
No	7	2.3
Food handlers check expiry date of ingredients		
Yes	152	50.3
No	150	49.7
Food handlers take training regarding food preparation and handling		
Yes	197	65.2
No	105	34.8

According to the result displayed in table -6 there was statistically significant difference in the number of trained and untrained food handlers with regard to practices of wearing gown, washing hands before any food handling event, checking expiry date before consumptions, drying washed utensils before ready for use and using separate utensils for raw and cooked food.

Table-6: Food handler's hygienic practice in relation to training status of student catering services of Addis Ababa University, 2013

Practice of food handlers	**Training status of food handlers**		
	Yes	**No**	**OR (95% CI)**
Food handlers wear gown			
Yes	142	68	1.469 (1.886, 2.437)
No	54	38	1.00
Food handlers hair covered			
Yes	103	57	0.952 (0.593, 1.529)
No	93	49	1.00
Food handlers wear finger ornaments during food preparations			
Yes	71	52	0.590 (0.365, 0.953)
No	125	54	1.00
Food handlers cut finger nails short			
Yes	140	79	0.854 (0.500, 1.460)
No	56	27	1.00
Food handlers wash hands before food handling event			
Yes	194	101	4.802 (2.915, 25.189)
No	2	5	1.00
Cook foods thoroughly before consumptions			
Yes	187	96	2.164 (0.851, 5.505)
No	9	10	1.00
Check expiry date before food preparations			
Yes	110	42	1.949 (1.205, 3.152)
No	86	6	1.00
Dry washed utensils before ready for use			
Yes	178	86	2.300 (1.157, 4.571)
No	18	20	1.00
Use separate utensils for raw and cooked food			
Yes	191	87	8.343 (3.017, 23.071)
No	5	19	1.00

Based on the summation of individual scores 52.3% of food handlers had a poor food handling practice. Individual who scored 7 out of 10 practice questions were categorized under good food handling practice. (Table-7)

Table 7: Food handling practice score of food handlers in Addis Ababa University, 2013

Practice score	**Frequency**	**Percent (%)**
Good	144	47.7
Poor	158	52.3
Total	**302**	**100.0**

On univariate analysis, there were significance difference between good and poor practice regarding educational status, work experience, sex and training status of food handlers. Age of food handlers did not influenced the practice score of food handlers. (Table - 8)

Table 8: Univariate analysis between socio demographic profile of food handlers and food hygiene practice score, Addis Ababa University, 2013

Socio-demographic variables	**Overall practice score**		**P- value**
	Good	**Poor**	
Age (years)			
19-29	68	88	0.236
30-40	73	65	
>40	3	5	
Educational status			
Grade 1-6	0	1	0.030
Grade 7-8	32	45	
Grade 9-10	62	74	
Grade 11-12	50	38	
Work experience			
Below 2 year	80	103	0.037
Above 2 year	64	55	
Sex			
Male	38	52	0.016
Female	106	106	
Training status			
Trained	105	91	0.005
Not trained	39	67	

On multivariate analysis as shown in table 11 variables that were found as significant potential influencing factors were sex of food handlers with adjusted odds ratio (AOR) = 1.66, 95% confidence interval (CI) = 1.395-2.123, P = 0.012, training status of food handlers with adjusted odds ratio (AOR) = 1.752, 95% confidence interval (CI) = 1.056, 2.907, P = 0.03 and educational status predominantly mainly secondary school (between grade 9 and 10) with odds ratio = 1.497, confidence interval (CI) 1.250-2.987, P = 0.046 . (Table 9)

Table 9: Multivariate analysis between significant variables and food handling practice, Addis Ababa University, 2013

Socio-demographic variables	**Adjusted OR (95% CI)**	**P-value**
Sex		
Male	1.0	-
Female	1.666 (1.395, 2.123)	0.012
Work experience		
Below 2 year	1.0	-
Above 2 year	0.742 (0.436, 1.264)	0.273
Training status		
Trained	1.752(1.056, 2.907)	0.030
Not trained	1.0	-
Educational status		
Grade 1-6	0.00	0.263
Grade 7-8	0.00	1.00
Grade 9-10	1.497 (1.250, 2.987)	0.046
Grade 11-12	0.750(0.424, 1.326)	0.322
Age (years)		
19-29	0.00	0.335
30-40	1.125(0.240, 5.280)	0.882
Above 40	1.634(0.362, 7.379)	0.523

Bacteriological Examination of food Utensils

From all 12 student catering services which are found in 7 campuses a total of 36 sample swabs were collected 3 sample swabs (each sample swab comprise of 5 food utensils) from each establishment. These swab samples consisted of 28 (77.8%) swabs from the eating plates and 8 (22.2%) swabs from the drinking bowls. ISO procedures for microbiological analysis and data collection of food utensils were used in the laboratory.

Cleaned food utensils stored on table with a cover in all, 12 (100%), of student catering establishments. The repair condition and cleanliness of the food utensils as observed by naked eye, 29(80.6%) were new and tidy and the remaining 7(19.4%) were old, stained and cracked.

Aerobic mesophilic bacteria, E. coli and S. aureus as well as total and faecal coliforms were isolated. Aerobic mesophilic bacteria were grown in 10(27.8%) of the swabbed utensils with an average of 37 colonies per utensils, but only 1(2.8%) of the swabbed utensils were found above the acceptable level of aerobic mesophilic bacteria (>100 colonies/utensils). S. aureus were isolated from 1(2.8%) of swabbed utensils and E. coli were not detected from all the swabbed utensils. Acid and gas formation in 7(19.4%) of the examined utensils would also confirm the presence of total and faecal coliform.

Table 10: Bacteriological swab test of food utensils in all student catering establishments of Addis Ababa University, 2013 N = 36

Type of identified microorganisms	Frequency	Percent (%)
Aerobic mesophilic bacteria, colony/plate		
No growth	26	72.2
1-25	5	13.9
26-50	3	8.3
51-100	1	2.8
>100	1	2.8
Fecal coliforms, MPN/100ml		
No growth	29	80.6
1-10	3	8.3
11-50	2	5.5
51-250	1	2.8
500-1100	1	2.8
Eschericia coli	0	0
Staphylococcus aureus	1	2.8

Result of qualitative data from an in-depth interview for cafeteria managers

Seven questions were prepared and in-depth interview were made for cafeteria managers. Their answer was nearly similar except variation in expression.

Based on the answers regarding pre-placement check of health and training status of food handlers during recruitment all of them said that *"We do not know whether they were checked of health and training status during recruitment. Because activities like checking the health and training status of food handlers and other activities related with recruitment done only by personnel office"*. Additionally some of them replied that there was a pre-instruction given for employers regarding the basic rules of cafeteria.

Regarding routine supervision of food handlers' during their work and posting certain updated information about safe food handling practice, they responded that *"always we perform a continuous supervision and follow up for them, however, we had no habit of posting anything regarding food safety rather during recruitment food handlers instructed with certain basic rules regarding food handling practice around students cafeteria"*.

About availability of sanitary facilities they replied that *"certain sanitary facilities like shower and toilet specially designed for food handlers are available but some of them were not functional and as well the services are not sufficient as required. For instance, gowns and aprons were not supplied frequently so food handlers were forced to buy from their own pocket. These conditions become a problem to supervise and punish those without gown and aprons during work time"*.

Food handlers with any type of communicable diseases allowed taking rest until they become healthy in all campuses students cafeteria and they are not allowed to do any activity which has contact with food.

Related to training they replied that there were no provision of training related with basics of food handling and preparation for food handlers. The main problem could be top managers did not consider training of food handlers as a priority issue to promote safe food handling practice. And also time constraints could be the reason to arrange a training session for food handlers.

Generally we do not have any sufficient reason why training could not be provided for food handlers because it is the function of top managers.

Regarding waste management they said that "we did not face any problem related with waste management. Sometimes there may be closure of drainage system. However, the problem alleviated immediately before it brings further problem".

Finally they were asked whether there were any occurrence of food borne outbreaks ever before and the reason and measure undertaken after the outbreak. Almost all of them responded that there were no had any observed occurrence of food related outbreaks ever before. One respondent said that "*Still now we did not had any occurrence of outbreak related with food contamination. Some times some student reports certain type of abdominal disease after break."* As he said that those conditions were not originated in this cafeteria rather they developed them outside the campus.

6. Discussion

All parts of the premises including the floor, wall and ceiling of kitchens, dining rooms, storage rooms or other parts of the establishment should be constructed in the way that could prevent contamination of food due to dirty work environment, cross contamination of food utensils and infestation of vectors and rodents (21). Based on the result from this study cleanliness of wall and ceiling were found in a good conditions during inspection in 11and 11 of kitchen and dining room respectively. Similarly all 12 premises kitchen had openable window, adequate light and adequate ventilation which were in a better condition than a similar study conducted in Mekele, Awash Sebat-Kilo, and Zeway (1, 22, and 23). The repair condition and cleanliness of dinning room were in a better condition than the kitchens. Perhaps this could be resulted due to majority of house keepers spend their all time through cleaning the dining room and give more consideration for it.

Each student catering establishment had to be provided with adequate, conveniently located toilet facilities accessible to the employees at all times to prevent occurrence of food borne outbreaks due to contamination of foods by employers or by insects (24). Thus all, 12, of establishments in AAU students catering had toilet facility. About 11 of toilets were clean during inspection.

All catering establishments need adequate washing facilities for staff. As well they must be provided with a sufficient number of suitable hand wash basins for the use of all persons engaged in the handling of food on or around the premises, and the basins should be conveniently placed in an accessible position. It also should be provided with an adequate supply of hot and cold water. Finally soap or other suitable detergents, and clean towels or other drying facilities must also be supplied (25). However, the findings of this study reveal that only 7of student catering establishments had lavatory facility for food handlers. But, 6, of those establishments with lavatory services had adequate supply of soaps and other detergents during inspection time.

Suitable provision must be made for the removal and storage of garbage and refuse originated in the premises. Waste storage place must be kept appropriately clean and a sufficient number of watertight containers of durable and with tight fitting or self closing lids shall be provided for the storage of food waste and other refuse (25). According to the result half, 6, of premises had container for different waste storage and all, 6, of the establishments had a proper waste storage

container. Although availability and condition of solid waste storage container in AAU much better than other private establishments it was very much low according to the reality. Because the remaining 6 of premises had not any temporary solid waste storage container during inspection time as a result this condition may result breading of insects and rodents and it could lead to cross contamination.

In this study area neatly all, 11, of inspected student catering establishments had adequate running water in kitchen house and all, 11, of them had both cold and running water at the same time. Since those student caterings were governmental and serve large number of students there should be more consideration to enhance continuous supply of water more than this.

If you clean food utensils manually a sink with at least three compartments shall be provided for washing, rinsing, and sanitizing equipment and utensils. Each compartment of the sink shall be supplied with hot and cold potable running water (25). In this study almost all 10 of establishments use machine to wash soiled dish and only 2 of them wash manually. Those 2 of establishments which wash utensils manually had a compartmentalized sink. However, none of catering establishments in other study areas use machine to wash food utensils rather they use manual hand washing system. Based on the findings, only half, 54.2%, of catering establishments had three compartment sinks in Awash Sebat-Kilo in which is much lower. Majority , 11(91.7%), of surveyed student caterings were use hot water and detergents for washing dishes which was better than a similar study conducted in Mekele in which only 8.1% of surveyed catering establishments use hot water to wash food utensil.

Foods should be protected from time and temperature abuse by purchasing according to the storage space available. Keep food in rooms designated for storage to prevent spoilage of food (26). Thus, in this study result 11 of premises has storage room for perishable as well for non perishable foods. Similarly all 12 of establishments had walking type refrigerator during inspection time. In all, 12 (100%), of the premises there was no any observed sign of spoilage.

Food handlers who had a better level of formal education had a good food handling and preparation practice than those who had lower level of formal education (27). Thus all of them had taken a formal education program whether higher or lower. This result reveals that it was in a better condition than a result obtained in Bahir dar, Mekele and abroad in India Solapur, in which 8.1%, 16.2% and 22.9 % of them had not formal education respectively.

Knowledge and experience of food handlers regarding basics of food hygiene is a pillar to keep food safe and wholesome (28). Employees working in institutional establishments like in universities had the possibility of having satisfactory knowledge about food hygiene and personal hygiene. So, result of this study indicates that knowledge of food handlers regarding food borne disease was in a better condition but not about its cause and mode of transmission. Nearly all, 283(93.7%), of food handlers in this study had adequate knowledge about food borne diseases. This study is similar to a study conducted in Mekele town and Indian college of medical science in which 89.5% and 95.2% were aware about food borne disease respectively. Having adequate knowledge regarding food borne disease transmission mechanisms and ways of food contamination is essential to undertake certain basic practice to alleviate those problems (28). In this study 245 (81.1%) responded that contaminated food causes food borne disease and 214 (70.9%) were responded that dirty hand was the main cause of food contamination. However, the practice of food handlers was not in a better condition unlike to their knowledge regarding food borne disease and modes of transmission. According to the result from their overall practice score nearly half of food handlers were practicing in poor conditions (Table-9). This perhaps resulted due to negligence of food handlers to follow the right practice in their work, the shortage of time to supply food for large number of students on time, inadequate supply of basic sanitary facilities, lack of food safety emphasis on food safety management and food safety education and training condition in the establishments (28, 29).

Food handlers should have to wear gown and aprons during food preparing and serving time to prevent food contamination and also dirty clothing could also be a source of microorganisms. Food workers who inadvertently touch their dirty clothing may contaminate their hands (29). But in this study the result showed that the number of food handlers who wear gown during work time was only 210 (69.5%) indicating that lower than a similar study conducted in Mekele town which was 72.6% and also it is much lower than a study conducted in Bahir Dar (92.6%) and Awasa (86%) worn gown during inspection but it was in a better condition than a study conducted in Addis Ababa (54.2%) of them had gown. *Based on the result from an in-depth interview made for managers, the reason for this low figure may be inadequate supply of gowns and aprons periodically by the university administration. As the interviewee indicated that some food handlers claimed that they were forced to buy gowns out of own pockets and the remaining were waiting until they are given from the university.* However, half 160 (53%) of them covered

hair with restraints in which much better than similar studies conducted in Zeway (40.1%), Mekele (39%) and Awasa (11.8%). Nearly half, 179(59.5%), of them were without any finger ornaments during the time of inspection. The rate of food handlers who worn finger ornaments in Addis Ababa University were higher than that of the study conducted in Mekele town (41.5% versus 35.7%). Compared to other parts of the hand the area beneath fingernails harbor the most microorganisms and is the most difficult to clean (29). Majority, 219(72.5%), of them were trimmed their fingernails short and almost all of them, 295 (97.7%) wash hands always before they start any activity which is not sufficiently enough.

Safer food preparation and handling were reported by person who took training on food preparation and handling and on those who had a better educational rank (30, 31). A study done in costarica shows that lack of food safety training and certification and lack of knowledge and supervision were the prominent factors influencing the possibility of offering safe food. About, 197(65.2%) of food handlers took training related with safe food handling and preparation practice which is much better than study conducted in Bahir Dar (21.8%). Since education, training, and the development of food safety certification examinations are key components in the process of ensuring that food handlers are proficient in and knowledgeable about food safety and sanitation principles the result indicated that amount of training provided for food handlers in this establishment was not enough. For in-depth interview about training provision managers replied that *"there were no provision of training related with basics of food handling and preparation for food handlers. The main problem could be top managers did not consider training of food handlers as a priority issue to promote safe food handling practice. And also time constraints could be the reason to arrange a training session for food handlers"*. Besides, univariate and multivariate analysis result showed that, training status and educational status of food handlers had a clear influence on the practice score of food handlers. There fore consideration should be given by university administrators to provide training periodically and checking their training status during recruitment.

Most of the time food handlers are a sensitive group of population who are the main focus of contamination since they are in direct contact with clients and food contact surfaces specially if they are in asymptomatic stage (32). A result from physical examination showed that only 1(0.3%) had cough during the time of inspection which were much lower than a study result obtained in Awash Sebat-Kilo in which Visible skin infections were observed on two food

handlers and ear infections were also found on another couple of food handlers, raising the infection rate to about 8.2%. and also 9% of food handlers had health problem during inspection time in Mekele town. The positive actions in this university which need to be promoted were food handlers with any infectious disease could not be allowed to have any activity which had contact with food. Managers of different cafeteria responded that *"food handlers with any type of communicable diseases allowed taking rest until they become healthy in all campuses students cafeteria and they are not allowed to do any activity which has contact with food"*.

The presence of indicator organisms in a high counts in food contact surfaces, equipments and utensils have direct associations with cleaning efficiency and hygiene status of working environment (33, 34). The isolation of indicators like Staphylococcus aureus (S. Aureus), Escherichia coli (E. coli), coliforms and aerobic mesophilic bacteria (AMB) with a count of >100 colony /50cm^2 of swabbed utensils (above the acceptable level) gives a clear indication of feacal contamination with the risk of other pathogens that may be transmitted through water or food.

According to the result from swab test the cleanliness of food utensils were in a better condition than a result obtained in Mekele town in which E.Coli and S.aureus were isolated from 18.2% and 27.3% of the swabbed utensil respectively. This result perhaps indicates that the dish washing facility, water accessibility and other conditions which were available with in the university students catering establishments were satisfactory as much as a required level. Acid and gas formation in 7(19.4%) of the examined utensils would also confirm the presence of total and faecal coliform. However the isolation of Staphylococcus aureus gives the existence of poor hygiene of the food handlers who served as sources of contamination. This contamination was possibly due to human contact through air particles breathed, coughed or sneezed out during the course of work. As well as the presence of certain food handlers with certain infectious diseases could be the source of those identified S. aureus in swabbed food utensils. Additionally, according to manager's response there was shortage of supply of sanitary facilities for food handlers as required.

7. Strengths and limitations of the study

7.1 Strengths

Strengths of this study were:

- Laboratory analysis were made for detecting microbial quality of food utensils could increase the quality of data
- Use of Mixed type of study designs
- Perhaps done in university for the first time

7.2 Limitations

Limitations of this study were:

- Facility based analysis was not performed due to small sample size of premises
- Shortage of literature
- Since data collection were done mostly by interviewing good practices of food handlers could be falsely inflated

8. Conclusion and recommendations

8.1 Conclusion

- Repair and sanitary status of premises were in a better condition in inspected establishments
- Poor accessibility and cleanliness of latrine service in some cafeterias
- The overall hygiene practice of food handlers depicts that most of them had poor food handling practice
- Food handlers with better educational status and training had better practice score
- Due to presence of adequate dish washing facility the microbial quality of food utensils were in a better condition

8.2 Recommendation

1. University administrative office should give due consideration:
    a. To provide gown and aprons for food handlers frequently
    b. To construct adequate sanitary facilities which specifically designed for food handlers like shower rooms, cloth changing rooms, lavatory facilities…etc
    c. To prepare pre-placement training and in service training on personal and food hygiene for food handlers and managers
    d. Should have to hire sanitarians who could perform a continuous supervision of through all time
2. Food handlers should have to
    a. Receive periodic medical check up
    b. Report to their managers if they had any type of communicable disease
    c. Follow the right food handling practice
3. Managers of all catering establishments should
    a. Avoid food handlers from any activities which had a contact with food who are with any type of infectious disease
    b. Have to perform continuous supervision and follow-up of food handlers
4. Environmental health professionals should
    a. Perform regular sanitary inspection since it could improve adherence of food handlers to personal hygiene and food safety practices.

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Annexes

Annex I: Procedures for the Bacteriological Examination of food Utensils and/or Food equipment Surfaces (33, 34)

1. Sample source

Environmental health and medical laboratory professionals were collected the sample from student catering establishment of Addis Ababa University. All other catering establishments like student lounge, staff lounge, and patient lounge were excluded.

2. Type of utensil sampled

In each of student catering establishments the following food utensils were swabbed

- ✓ Plates
- ✓ Bowls

3. Sample period

The samples were taken from January 2, 2013- January 3, 2013. It was done with in two days and the analysis was done according to the time they were sampled. Swabbing was undertaken always before the lunch time.

4. Sample numbers

Number of swabs taken was restricted to fit within the time, financial and resource parameters of the project. As a result of this three swabs were submitted from each student catering establishments. One swab was obtained from bowls and the remaining two swabs were obtained from plates. There fore, a total of 24 swabs from plates and a total of 12 swabs from bowls were taken.

5. Equipment and materials for sampling

Different medias used (MacConkey agar, Lactose broth, blood agar, melted yeast extract agar manitole salt agar …), test tubes, Vial containing the swab, Test tube shaker, The Petri dishes, Incubator

6. Technique for swabbing /procedure for bacteriological Examination of food utensil

    a. Food utensil sample selection

Swabs from the food equipment were taken at the same time, and were collected within 1 h after cleaning and sanitizing of food utensils. Fifteen plates/bowls were selected from each student catering services systematically. Sample selection processes were undertaken before lunch time since food utensils and bowls were ready for use after being sanitized and cleaned. Through

using sterilized cotton swab on wooden stick applicator each group of plate/bowls (5 plates/bowls) were swabbed and then the sterilized swabs were placed in a screw cap test tube to avoid post contamination.

b. Swab preparation and swabbing technique

First all food utensils /cleaned and sanitized plates and bowls/ which had direct contact with food were recruited for swab test. Items which were not cleaned and sanitized were not included under the swab groups. And also information about how item was cleaned and when it was last cleaned since it could affect the result.

The swab technique was done using sterile cotton sampling swabs which were moistened in tubes containing 4 ml of sterile normal saline (diluents/dilution fluid) emptied into a series of sterilized vials with rubber stopper which were used as a transporting media as the swabbed cotton was rinsed in the content of the vials and which was used as a neutralizing buffer. In order to maintain confidentiality and to simplify the laboratory management, each vial was labeled with its own code number. This all processes were done in a laboratory prior to swabbing.

Collection of samples were followed the standard practice and all samples were properly collected, labeled, stored and transported. The sampling procedure was done according to the ISO standards. Therefore, ISO 18593:2004 was used to sample food equipments (bowls/plates). The swabbing was done with a pencil eraser-type pressure with horizontal, vertical and diagonal ways over the surface. After taking the sample, the tubes were transported in a refrigerated box to the laboratory and immediately analyzed.

First the plastic template was removed from the package using only the handle and then the template was placed on the food utensils /plates/bowls/ to be swabbed. After this the swab was removed from the peel pouch and inserted in to the tube containing the neutralizing normal saline dilution buffer. The tip of the swab was pressed against the wall of the tube to remove any excess liquid. Then the area of 50 cm2 (a path of 2.5cm by 20 cm or 5cm by 10cm or other dimension to cover an equivalent area).within the template was swabbed by rubbing the swab over the surface. The surface was swabbed in two directions at right angle to each other; E.g. horizontally and vertically. The area was swabbed for approximately 20 seconds. The swab was inserted more than half way into the neutralizing buffer of sterile normal saline (diluents/ dilution fluid) (4ml) which were poured in to a series of sterilized vials with rubber stopper. It was broken or cut aseptically so that the swab remained in the fluid. The swab container /universal

were labeled clearly with sample reference number, site, date and time. The samples were placed into a cool box maintained between 1 °C and 4 °C and transported to the laboratory within 4 hours where possible.

a. Multiple test tube method

The growth medium and conditions of incubation have been chosen to detect required species of microorganisms. Then a broad range of possible concentrations, serial dilutions, incubating several tubes at each dilution were done. One (1 ml), 0.10 ml and 0.01 ml of sample (normal saline/dilution fluid) was added to three groups of test tubes (each group consists three test tubes) containing a solid growth media of MacConkey broth, and incubated at 37^0C for 24-48 hours. And then it was checked for lactose fermentation, which was identified by acid production and gas formation. The presence of acid and gas in incubated samples indicates positive result for the growth of coliform bacilli. Then, after counting the total number of observed positive and negative presumptive results from the culture, the standard tables of most probable number was used to interpret the result. A drop of each presumptive positive results were inoculated in to another test tubes containing lauryl tryptose broth (three groups of test tubes, each containing 3 test tubes) and then re incubated at 44^OC for 24 hours to confirm the presence of fecal coliform. The confirmatory test for fecal coliform was done after checking for gas and acid formation and the standard tables of MPN were used to read the result. .

b. Direct culture

After collecting the swabs it were inoculated in laboratories with in the minimum required time that it could be valid (with in maximum of 2 hours). However, in certain conditions in which the samples could not be inoculated at the allowable time it was kept in a refrigerator to alleviate the problems of misinterpretation of results due to bacterial multiplication. Then samples were inoculated after thawing is completed but all samples were inoculated at the same day.

The test tubes (vials) and the appropriate normal saline fluid/dilution was shacked with shaker to mix and disintegrate the content of the swab. To isolate E. coli and S. aureus 1 ml of sample (normal saline/diluents in the vial) was inoculated in to the solid growth media of MacConkey and blood agar (BA) in to the Petri dishes respectively. Then the Petri dishes were incubated aerobically at a temperature of 37^0C for 24-48 hours. Additionally, to grow aerobic mesophilic bacteria 1 ml of sample was transferred to sterilized Petri dishes which had approximately 10ml of melted yeast extract agar and mixed together and finally incubated at 37^oC for 48 hours.

Different biochemical tests were used to confirm identified S. aureus and E. coli. For isolation of S.aureus coagulase, deoxyribonuclease (DNase) and Manitole salt agar was used and sugar fermentation, urease, and citrate and indole test for E.coli identification were used as a confirmatory test.

7. Quality control and validity

For each inoculation one sterile Petri dish was incubated as a negative control to evaluate if there was contamination during inoculation process. The presence of qualified medical laboratory personnel and their rich experience together with the availability of well-equipped laboratory facility would have its own significant contribution to ensure the quality and result validity

Annex-II- English version questionnaire

Addis Ababa University
College of medicine
School of public health

Questionnaire for data collection on sanitary conditions of food service establishments and food safety knowledge and practices of food handlers in Addis Ababa University, 2012/13

Identification

Name of campus _____ Campus code No._____

Address of campus _____

Verbal consent from food handlers before conducting interview

Greeting:

Hello, my name is _____. I am student of Addis Ababa University. I would like to interview you a few questions about your knowledge and practice regarding food safety. The objective of this study is to assess sanitary conditions of food service establishments and food safety knowledge and practices of food handlers in Addis Ababa University, which is important to improve the sanitary status so as to safeguard the health of scholars from foodborne disease. Your cooperation and willingness for the interview and observation is helpful in identifying problems related to the subject matter. Your name will not be written in this form. All information that you give will be kept strictly confidential. Your participation is voluntary and you are not obliged to answer any question you do not wish to answer. If you are not still comfort with the interview please feel free to drop it any time you want. Do I have your permission to continue?

1. If yes, continue to the next page
2. If no, skip to the next participant

Interviewers' name _____ signature _____

Date of interview _____ Time started_____ Time finished____

Supervisors name _____ signature _____

General instruction

Almost all questions have pre-coded response. So it is important to follow the following instructions while you are interviewing respondents and recording their answer.

- Ask each question exactly as it is written on the questionnaire.
- Do not rely on the response of respondents only, inspect/observe the areas that need physical observation
- Do not read the pre-coded response to respondents. listen only the response of respondent
- Circle the response in the response column that best matches the answer of the respondent.

S.No.	Questions response	Response	Code
1.	Socio demographic profile of food handlers		
01	Sex of food handler	1. Male 2. Female	/__/
02	Age of food handlers(years)	_____	/__/
03	For how long you stay in this work(years)	_____	/__/
04	Educational status of food handlers	1. Illiterate 2. Grade 1-6 3. Grade 7-8 4. Grade 9-10 5. Grade 11-12 6. 12+	/__/
05	Marital status of food handlers	1. Single 2. Married 3. Divorced 4. Widowed 5. Separated	/__/
06	Average monthly income (Eth Birr)	_____	/__/
07	Average working hour per day (hour)	_____	/__/
2.	Knowledge of food handlers about FBD and hygienic practice		
2.1	Knowledge of food handlers about FBD		
08	Heard about foodborne disease	1. Yes 2. No (if 'no' skip to Q.No. 13)	/__/
09	Your source of information about FBD (circle all responses)	1. Health center 2. Sanitarian during inspection 3. Mass media 4. Others (specify)	/__/

10	Cause of food borne disease (circle all responses)	1. Germs 2. Chemicals 3. Evil eye 4. Super natural force 5. Do not know 6. Others (specify)	/__/
11	Route of transmission for food borne disease (circle all responses)	1. Contaminated food 2. Contaminated water 3. Vectors 4. Do not know 5. Others (specify)	/__/
12	Cause of food contamination (circle all responses)	1. Dirty hand 2. Infected food handlers 3. Dirty utensils 4. Vectors and rats 5. Dirty working environment 6. Do not know 7. Others (specify)	/__/
2.2 Hygienic food handling practice of food handlers			
13	Food handlers wear outer garments/gown during inspection	1. Yes 2. No (if no skip to Q.No. 15)	/__/
14	Does the gown clean	1. Yes 2. No	/__/
15	Food handlers hair covered with appropriate aprons	1. Yes 2. No	/__/
16	Food handler wear finger ornaments during food handling	1. Yes 2. No	/__/
17	Food handlers finger nail cut short	1. Yes 2. No	/__/
18	Food handlers wash hands before starting food preparation today (this morning)	1. Yes 2. No	/__/
19	Cook foods thoroughly before ready for consumptions	1. Yes 2. No	/__/
20	Check ingredients expiry date before using for food preparations	1. Yes 2. No	/__/
21	Cover mouth with tissue paper when coughing or sneezing accidentally during food preparation	1. Yes 2. No	/__/
22	Dry washed utensils before ready for use	1. Yes 2. No	/__/
23	Use separate utensils for raw and cooked foods	1. Yes 2. No	/__/
2.3 Food handlers training status			
24	Food handler take medical checkup in the past one year (see medical certificate)	1. Yes 2. No (if yes skip to Q.No.26)	/__/
25	If the answer for number 24 is no, does he/she had made medical checkup ever before	1. Yes 2. No	/__/

26	Food handler trained on food preparation and handling	1. Yes 2. No	/__/

Checklist for the assessment of establishment's condition of different campuses of Addis Ababa University

/managers			
S.No.	**Question**	**Question Response**	**Code**
01	Estimated average daily consumers in the establishment: ____	_____	/__/
02	Was the establishment inspected by a sanitarian in the past six months?	1. Yes 2. No (if the answer is "NO" skip to Q 04)	/__/
03	If the answer is yes was the inspection with education and beneficial for your organization?	1. Yes 2. No	
04	Sex of manager	1. Male 2. Female	/__/
05	Age: _____years	_____Years	/__/
06	Educational status manager	1. Illiterate 2. grade 1-6 3. grade 7-8 4. grade 9-10 5. grade 11-12 6. 12+	/__/
3. Housing conditions/ premise condition			
	3.1 kitchen		/__/
07	Have the kitchen floor big cracks, and detached areas?	1. Yes 2. No	/__/
08	Is the wall and ceiling free of dust, spider web and smoke particles?	1. Yes 2. No	/__/
09	Is the kitchen wall and ceiling has big cracks, detached areas and holes?	1. Yes 2. No	/__/
10	Does the kitchen have open able window? (About 10% of floor area)	1. Yes 2. No	/__/
11	Does the kitchen have adequate light in which a health person can easily identify objects in the room without eyestrain?	1. Yes 2. No	/__/
12	Does the kitchen room have adequate ventilation in which the kitchen is reasonably free of disagreeable odor?	1. Yes 2. No	/__/
13	Have the food handlers separate dressing room?	1. Yes 2. No	/__/
14	Is there an infestation of flies, cockroaches and/or rats?	1. Yes 2. No	/__/
	3.2. Dining room		/__/
15	Have the dining room floor big cracks, detached areas and holes	1. Yes 2. No	/__/
16	Is the wall and ceiling free of dust, spider	1. Yes 2. No	/__/

	web and smoke particles?		
17	Is the dining room wall and ceiling have big cracks, detached areas and holes?	1. Yes 2. No	/__/
18	Does the dining room have open able window? (About 10% of floor area)	1. Yes 2. No	/__/
19	Does the dining room have adequate light in which a health person can easily identify objects in the room without eyestrain?	1. Yes 2. No	/__/
20	Does the dining room have adequate Ventilation in which it is reasonably free of disagreeable odor?	1. Yes 2. No	/__/
21	Is there an infestation of flies, cockroaches and/or rats?	1. Yes 2. No	/__/
	2.3 Storage room		/__/
22	Is there a store room for non-perishable foodstuffs?	1. Yes 2. No (if the answer is NO skip to Q 24)	/__/
23	If yes, does it have free space, not overcrowded and properly arranged for free air circulation?	1. Yes 2. No	/__/
24	Is a refrigerator available?	1. Yes 2. No (if the answer is NO skip to Q 27)	/__/
25	If the answer for 24 is yes, does it have a fixed thermometer available?	1. Yes 2. No	/__/
26	If thermometer is available, are readily perishable foodstuffs kept under 10oC?	1. Yes 2. No	/__/
27	Is the foodstuff stored in refrigerator arranged properly?	1. Yes 2. No	/__/
28	Is there any sign of spoilage of stored food observed?	1. Yes 2. No	/__/
Part IV: Water supply and sanitation			
29	Toilet facility available	1. Yes 2. No (if the answer is NO skip to Q 34)	/__/
30	Type of toilet facility:	1. Flush type 2. Dry pit latrine 3. Others, specify	/__/
31	Do the latrine free of litter, tissue papers and other dirt's like faces/urine seen around	1. Yes 2. No	/__/
32	Does the toilet facility open to give service for clients at time of inspection? (Observe)	1. Yes 2. No	/__/
33	What is done when the latrine is full?	1. Desludge by vacuum truck 2. Construction of new latrine 3. Connecting to storm water drainage 4.Others, specify	/__/
34	Is there a urinal?	1. Yes 2. No	/__/
35	Is there lavatory facility available?	1. Yes 2. No (if No skip to 40)	/__/
36	If yes, separate for clients and workers:	1. Yes 2. No	/__/

37	Is there any type of detergent available in the lavatory facility during inspection?	1. Yes 2. No	/__/
38	What type of lavatory is it?	1. Fixed wash basin 2. Fixed water trough 3. Manual/bucket 4. Other (specify)	/__/
39	Is the lavatory functional during inspection?	1. Yes 2. No	/__/
40	Where does waste water from hand and dish washing facilities disposed off?	1. Open space 2. Septic tank/toilet 3. Latrine 4. Storm water drainage 5. Others, specify	/__/
41	Is there a container for solid waste storage	1. Yes 2. No (If no skip to 45)	/__/
42	If yes, the type of solid waste storage container is:	1. Dust bin 2. barrel 3.Sack 4. Others, specify	/__/
43	Does the solid waste storage container, durable, have tight fitting, and light to carry and transport?	1. Yes 2. No	/__/
44	Does the solid waste container placed at appropriate site?	1. Yes 2. No	/__/
45	Where is the final disposal of solid waste? **(Circle all possible answers)**	1. Municipal container 2. Municipal tractor or lorry 3. Open field dumping 4. On site burning 5. On site burial 6. Others, specify	/__/
46	Is running water accessible in kitchen room for preparation and utensil washing?	1. Yes 2. No (if NO skip to Q48)	/__/
47	If the answer for question number 77 is yes, does hot running water available?	1. Yes 2. No	
Part V : Food utensils and equipment			
48	Are the food utensils easy to clean, have no open seams and not corrodible?	1. Yes 2. No	/__/
49	Are the food utensils free of dust particles, finger paint and other marks?	1. Yes 2. No	/__/
50	How do soiled dishwashing undertake?	1. With machine 2. . Manually (if with machine skip to Q54)	/__/
51	If it is manually does is it compartmentalized	1. Yes 2. No	/__/
52	Do they use hot water for washing dishes?	1. Yes 2. No	/__/
53	Do they use detergent for washing dishes?	1. Yes 2. No	/__/
54	Are clean and sanitized utensils covered by clean cloth (plastic sheet) and stored in shelf or cupboard?	1. Yes 2. No	/__/

Annex-III - Amharic version

Code No _____

በአዲስ አበባ ዩኒቨርሲቲ

በጤና ሳይንስ ኮሌጅ

የህብረተሰብ ጤና ትምህርት ክፍል

በአዲስ አበባ ዩኒቨርሲቲ በተለያዩ ካምፓሶች የምግብ አቅርቦት አገልግሎት የሚሰጡ ድርጅቶች የጤናና ሳኒቴሽን ሁኔታ ለማጥናት የተዘጋጀ ቃለ መጠይቅ 2005 ዓ.ም

የካምፓሱ ስም ---------- የካምፓሱ መለያ ቁጥር----------

የካምፓሱ አድራሻ----------

<u>ቃለ መጠይቁ ከመደረጉ በፊት የተሳታፊዎች ፍቃደኝነት መጠየቅያ ቅጽ</u>

ሰላምታ:- እንደምን አሉ? እኔ አቶ/ወ/ሮ/ወ/ሪት----------እባላለሁ:: እኔ የአዲስ አበባ ዩኒቨርስቲ ተማሪ ነኝ::እዚህ የመጣውት የመመረቅያ ጥናቴን ለማካሄድ:: በዚህም መሰረት የድርጅትዎን የጤናና ሳኒቴሽን ሁኔታ በሚመለከት ጥያቄዎችን ለመጠየቅ እና ድርጅትዎን ለመጎብኘት ነው የመጣሁት:: ይህ መጠይቅ የተዘጋጀበት ዋና አላማ በአዲስ አበባ ዩኒቨርስቲ ዉስጥ በሚገኙ ሁሉም ካምፓሶች ያሉ የምግብ አገልግሎት የሚሰጡ ድርጅቶች የጤናና ሳኒቴሽን ሁኔታ ለማወቅ ያስችል ዘንዳ ነው:: የዚህም ጥናት ጠቀሜታ ውጤቱን መሰረት በማድረግ የሁሉንም የምግብ አቅራቢ ድርጅቶች ሳኒቴሽን ለማሻሻል እንዲሁም በአብዛኛው ተጠቃሚ የሆኑትን የነባ አገር ተረካቢ ምሁራኖችን ከምግብ ወለድ በሽታ መከላከልና መቀነስ ይሆናል:: የርስዎም ለመጠይቁ ፍቃደኛ መሆንና አስፈላጊውን ትብብር ማድረግ ለጥናቱ ትልቁን ድርሻ እንደምይዝ ይታመናል:: ስለዚህ እርስዎ የጥናቱን አላማ ተገንዝበው ደርጅትዎን በሚመለከት ለሚነሱ ጥያቄዎች ትክክኛውን መለስ በመስጠትና ድርጅትዎን በማስጎብኘት ቀና ትብብር ያደርጉልን ዘንድ እንጠይቃለን:: የሚሰጡንም መረጃ በሙሉ ለማንኛውም አካል የማንሰጥና በሚስጥር የምንየዝ መሆናችንን ልንገልፅልዎ እንወዳለን:: ለሚጠየቁ ጥያቄዎች መልስ ያለመስጠት መብትዎንም እናከብራለን::

ከላይ የተዘረዘሩትን ሐሳቦች ከግምት በማስገባት እርስዎ ለሚቀርብልዎት ጥያቄና ድርጅትዎን ለማስጎብኘት ፍቃደኛ ነዎት ?

1. **መልሳቸው አዎ ከሆነ ወደሚቀጠለው ገፅ ሂድ**
2. **መልሳቸው የለም ከሆነ ወደሚቀጥለው ተጠያቂ አምራ**

መጠይቅ ያደረገው ሰው ስም----------

ፊርማ_____

መጠይቁ የተደረገበት ቀን_____

የሱፐርቫይዘር ስም----------

ፊርማ----------

አጠቃላይ የመጠይቀ አሞላል መምርያ

ለአብዛኞቹ መጠይቆች መልስ ሊሆኑ ይችላሉ ተብለው የታመነባቸው ቸማራጮች በዝርዝር ተቀምጠዋል:: ስለዚህ መጠይቆቹን በመትሞላበት ወቅት የሚከተሉትን መመርያዎች ተከትለህ መጠየቅና መልሱን ማስፈር አስፈላጊ ነው::

- **እያንዳንዱ ጥያቄ መጠይቁ ላይ እንደሰፈረው ብቻ በትክክል መጠየቅ አለበት::**
- **መጠይቅ ከሚደረግላቸው ሰዎች ብቻ የሚገኘው መልስ በቂ ባለመሆኑ መታየት ወይም መፈተሽ ያለባቸውን ቦታዎችና ክንውኖች በሙሉ በተገቢው መመልከትና መፈተሽ ተገቢ ነው::**
- **ለእያንዳንዱ ጥያቄ በመልስነት እንደ አማራችነት የቀረቡትን ለተጠያቂዎች ማሳወቅ አስፈላጊ አይደለም:: መልሳቸውን ብቻ መስማት በቂ ነው::**
- **ተጠያቂዎች የሚሰጡትን መልስ በጥሞና በማዳመጥ ለተሰጡት መልሶች ከተዘረዘሩት አማራጮች በተሻለ የሚመስለውን በመምረጥ ማክበብ አስፈላጊ ነው::**

ክፍል አንድ የምግብ ቤት ሰራተኞችን የተመለከተ መጠይቅ

ተ·ቁ	ጥያቄ	የተሰጠ መልስ	ኮድ
01	የምግብ ቤት ሰራተኛ ፆታ	1· ወንድ 2· ሴት	/----/
02	የምግብ ቤት ሰራተኛ እድሜ	----------አመት	/----/
03	የምግብ ቤት ሰራተኛው/ዋ ለምን ያህል ጊዜ ነው በዚህ ስራ የቆዩት	----------አመት	/----/
04	የምግብ ቤት ሰራተኛው/ዋ የትምህርት ሁኔታ	1· ያልተማረ 2· 1-5 3· 6-8 4· 9-10 5· 11-12 6· ከ12ኛ ክፍል በላይ	/----/
05	የምግብ ቤት ሰራተኛው/ዋ የጋብቻ ሁኔታ	1· ያላገባ/ች 2· ያገባ/ች 3· ፈት 4· አግብቶ/ታ የሞተበት/ባት 5· የተለያዩ----------	/----/
06	ወራዊ ገቢህ ምን ያህል ነው?	----------ብር/	/----/
07	በቀን ለምን ያሕል ሰአት ነው በስራ ላይ የሚሆኑት	----------ሰአት	/----/
2· የምግብ ቤት ሰራተኞች ስለ ጤናማ የምግብ አያያዝ ያላቸው እውቀትና ልምድ			
	2·1 እውቀታቸውን የሚመለከቱ መጠይቆች		
08	ስለምግብ ወለድ በሽታ ሰምተው ያውቃሉ·	1· አዎ 2· አይደለም /መልሱ አይደለም ከሆነ ወደ ክፍል 2·2 ይሂዱ/	/----/
09	ስለ በሽታው የመረጃ ምንጭዎ ምንድ ነው/ የተባልከውን ሁሉንም ክበብ/	1· ጤና ጣብያ 2·የአካባቢ ጤና ተቆጣጣሪ 3·መገናኛ ብዙሀን /የኤሌክትሮኒክስና የወረቀትን ማለት ነው/ 27· ሌላ/ይገለፅ/----------	/----/
10	የምግብ ወለድ በሽታ መንስኤው ምንድ ነው/የተባልከውን ሁሉንም ክበብ/	1· ጀርሞች 2· ኬሚካሎች 3· ቡዳ 4· የተለያዩ መንፈሶች 19· አላውቅም 27· ሌላ /ይገለፅ/----------	/----/

11	የምግብ ወለድ በሽታ መተላለፍያ መንገድ ምንድ ነው /የተባልከውን ሁሉንም ክበብ/	1· የተበከለ ምግብ 2· የተበከለ ውሀ 3· የተለያዩ ጥቃቅን በራሪ ነፍሳት / ለምሳሌ እንደ ዝንብ ያሉ/ 19· አላውቅም 27· ሌላ /ይገለፅ/---------- --	/----/
12	የምግብ መበከል መንስኤው ምንድነው /የተባልከውን ሁሉንም ክበብ/	1· ቆሻሻ እጆች 2· በተዛማች በሽታ በታመሙ የምግብ ቤት ሰራኞች 3· በቆሸሸ የምግብ ቤት መገልገያ እቃዎች 4· በበራሪ ነፍሳትና እንደ አይጥ ባሉ እንስሳቶች 5· ንፅህናው ባልተጠበቀ የምግብ ቤት ማዘጋጃ ክፍል 6· ተገቢ ባልሆነ የበሰለ ምግብ አቀራረብ 19· አላውቅም 27· ሌላ /ይገለፅ/----------	/----/
	2·2 ከምግብ አያያዝ ጋር በተያያዘ ያላቸው ልምድ		
13	የምግብ ቤት ሰራተኛው/ዋ የስራ ልብስ ለብሰዋል	1· አዎ 2· አለበሰም/ችም /መልሱ አይደለም ከሆነ ወደ ጥያቄ 210 ሂድ/	/----/
14	የምግብ ቤት ሰራተኛው/ዋ የስራ ልብስ ንፅህናውን የጠበቀ ነው	1· አዎ 2· አይደለም	/----/
15	የምግብ ቤት ሰራተኛው/ዋ ፀጉተሸፍኑዋል ወይ /ቆብ አድርጉዋል/	1· አዎ 2· አይደለም	/----/
16	የምግብ ቤት ሰራተኛው/ዋ የእጅ ጌጣጌጥ አድርጉዋል	1· አዎ 2· አላደረገም	/----/
17	የምግብ ሰራተኛው/ዋ የእጅ ጣት ጥፍሩ በእጭሩ የተቆረጠ ነው	1· አዎ 2· አይደለም	/----/
18	የምግብ ቤት ሰራተኛው/ዋ ዛሬ ጥዋት የመግብ ስራቸውን ከመጀመራቸው አስቀድመው እጃቸውን ታጥበዋል	1· አዎ 2· አልታጠቡም	/----/
19	ለመመገብ ከመቅረቡ በፊት ምግቦችን በተገቢው ሁኔታ ታብስለዋለህ/ለሽ	1· አዎ 2· አይደለም	/----/
20	ማንኛውንም ምግብ ከማዘጋጀትህ/ሽ አስቀድሞ ምግቡ ጊዜው ያለፈ መሆኑንና አለመሆኑን ታረጋግጠዋለህ/ለሽ	1· አዎ 2· አላረጋግጥም	/----/
21	ምግብ በምታዘጋጅበት ወቅት አጋጣሚ ካስነጠሰህ ወይም ካሳለህ አፍህን በመሀረብ ወይም በሌላ ነገር ትሸፍነዋለህ	1· አዎ 2· አልሸፍነውም	/----/
22	የታጠቡ እቃዎችን ለአገልግሎት	1. አዎ 2.. አላደርቅም	/----/

	ከመብቃታቸው በፊት ታደርቃቸዋለህ/ሽ		
23	ለብስልና ለጥሬ ምግብ የተለይዩ እቃዎችን ትጠቀማለህ/ሽ	1. አዎ 2.. አልጠቀምም	/----/
	2·3 የምግብ ቤት ሰራተኛው/ዋ የጤንነት ሁኔታና የምግብ አያያዝ ስልጠናን የተመለከተ		
24	ባለፈው አንድ አመት የምግብ ቤት ሰራተኛው/ዋ የህክምና ምርመራ አድርገዋል /የህክምና ሰርተፍኬቱን ተመልከት/	1· አዎ 2· አላደረገም	/----/
25	የተራ ቁጥር 221 መልስ አላደረገም ከሆነ ከዚህ በፊት በማንኛውም አጋጣሚ ከስራው ጋር በተያያዘ ተመርምሮ ያውቃል	1· አዎ 2· አያውቅም	/----/
26	የምግብ ቤት ሰራተኛው/ዋ መሰረታዊ የምግብ አያያዝና አዘገጃጀት ስልጠና ወስደዋል	1·አዎ 2·አልወሰደም/ችም	/----/

ክፍል ሁለት

አጠቃላይ የምግብ አገልግሎት መስጫ ድርጅቶችን የሳኒቴሽን ሁኔታን የተመለከተ መጠይቅ /ለአንድ ድርጅት አንድ መጠይቅ ብቻ ይበቃል/

ተ·ቁ	ጥያቄ	የተሰጠ መልስ	ኮድ
01	በየቀኑ የሚመጡ ተመጋቢዎች ብዛት ስንት ይሆናል	----------	/___/
02	ካፍቴርያችሁ ባለፉት ስድስት ወራቶች በአካባቢ ጤና ተቆጣጣሪዎች ተጎብኝቱዋል	1· አዎ 2· አልተጎበኘም	/___/
03	መልሱ አዎ ከሆነ ጉብኝቱ ምክርና ትምህርት አዘል የነበረና ድርጅታችሁን የጠቀመ ነበር	1· አዎ 2· አይደለም	/___/
04	የድርጅቱ አስተዳዳሪ ፆታ	1.ሴት 2. ወንድ	/___/
05	የድርጅቱ አስተዳዳሪ እድሜ	----------	/___/
06	የድርጅቱ አስተዳዳሪ የትምህርት ሁኔታ	1· ያልተማረ 2· 1-5 3· 6-8 4· 9-10 5· 11-12 6· ከ12ኛ ክፍል በላይ	/___/
	3 የድርጅቱ ህንጻ/ቤት በተመለከተ		
	3.1 የምግብ ማዘጋጃ ክፍል/ ኩሽና		
07	የምግብ ማዘጋጃ ክፍል/ ኩሽና/ ወለል ስንጥቅ የተቆፋፈረና ክፍተት አለው	1· አዎ 2· የለውም	/___/

08	የምግብ ማዘጋጃው ክፍል/ ኩሽና/ ግድግዳውና ኮርኒሱ ከአቡዋራ ከሸረሪት ድርና ከጥላሸት የፀዳ ነው	1· አዎ 2· አይደለም	/___/
09	የምግብ ማዘጋጃ ክፍል/ ኩሽና/ ግድግዳና ኮርኒስ ስንጥቅና ክፍተት አለው	1· አዎ 2· የለውም	/___/
10	የምግብ ማዘጋጃ ክፍል/ ኩሽና/ የወለሉን 10% ስፋት የሚሆን ተከፋች መስኮት አለው	1· አዎ 2· የለውም	/___/
11	የምግብ መዘጋጃ ክፍል/ኩሽና/ ውስጥ እንድ ጤነኛ ሰው ያለምንም ችግር በቀላሉ ያሉትን እቃዎች ለመለየት የምያስችል በቂ ብርሀን አለው	1· አዎ 2· የለውም	/___/
12	ኩሽናው ቤቱ መጥፎ ጠረን የሌለውና በቂ የአየር ዝውውር ያለበት ነው	1· አዎ 2· የለውም	/___/
13	ለምግብ ቤት ሰራተኞች ልብስ መቀየርያና ማስቀመጫ የተለየ ክፍል አለ	1· አዎ 2· የለውም	/___/
14	ኩሽና ውስጥ ዝንቦች ፡ አይጦች ና በረሮዎች ያስቸግራሉ	1· አዎ 2· አያስቸግሩም	/___/
		3·2 የመመገብያ አዳራሽ	
15	የመመገብያ አዳራሹ ወለል ስንጥቅ የተቆፋፈረና ክፍተት አለው	1· አዎ 2· የለውም	/___/
16	የመመገብያ አዳራሹ·ግድግዳውና ኮርኒሱ ከአቡዋራ ከሸረሪት ድርና ከጥላሸት የፀዳ ነው		/___/
17	የመመገብያ አዳራሹ·ግድግዳና ኮርኒስ ስንጥቅና ክፍተት አለው	1· አዎ 2· የለውም	/___/
18	የመመገብያ አዳራሹ· የወለሉን 10% ስፋት የሚሆን ተከፋች መስኮት አለው	1· አዎ 2· የለውም	/___/
19	የመመገብያ አዳራሹ·ውስጥ እንድ ጤነኛ ሰው ያለምንም ችግር በቀላሉ ያሉትን እቃዎች ለመለየት የምያስችል በቂ ብርሀን አለው	1· አዎ 2· የለውም	/___/
20	የመመገብያ አዳራሹ·መጥፎ ጠረን የሌለውና በቂ የአየር ዝውውር ያለበት ነው	1· አዎ 2· የለውም	/___/
21	የመመገብያ አዳራሹ· ውስጥ ዝንቦች ፡ አይጦች ና በረሮዎች ያስቸግራሉ	1· አዎ 2· አያስቸግሩም	/___/
		3·3 የምግብ መጋዘንንና ማቀዝቀዣ	
22	በቀላሉ ለሚበላሹ· የምግብ አይነቶች ማስቀመጫ የተዘጋጀ የተለየ መጋዘን አለ	1· አዎ 2· የለም	/___/
23	መልሱ አዎ ከሆነ በቂ ቦታ ያለው ያለተጣበበና ለአየር ዝውውር እንድያመች ሆኖ የተደራጀ ነው	1· አዎ 2· አይደለም	/___/

24	ማቀዝቀዘያ አለ	1· አዎ 2· የለም	/___/
25	ለተራ ቁጥር 334 መልስ አዎ ከሆነ ማቀዝቀዣያው ይሰራል/የማቀዝቀዣያው ቴርሞሜትር የሚሰራ መሆኑን አረጋግጥ/	1· አዎ 2· አይሰራም	/___/
26	በማቀዝቀዣው ውስጥ የተቀመጠ ምግብ የሙቀት መጠን ከ10°c በታች የተጠበቀ ነው	1· አዎ 2· አይደለም	/___/
27	በማቀዝቀዣው ውስጥ የተቀመጠ ምግብ በተገቢው መንገድ የተደረደረ ነው	1· አዎ 2· አይደለም	/___/
28	በማቀዝቀጃው ውስጥ የተቀመጠ ምግብ የመበላሸት ምልክት ያሳያል	1· አዎ 2· አያሳይም	/___/
		4· የውሀና የመፀዳጃ ቤት ሁኔታ	
29	መፀዳጃያ ቤት አለ/ለሰራተኞች ብቻ/	1· አዎ 2· የለም /መልሱ የለውም ከሆነ ወደ ሚቀጥለው ክፍል ሂድ/	/___/
30	የመፀዳጃው ቤት ምን አይነት ነው	1· ዘመናዊ በውሃ የሚሰራ 2· ባህላዊ የጉድጉዋድ ሽንት ቤት 27· ሌላ /ይገለፅ/	/___/
31	መፀዳጃ ቤቱ ከወዳደቁ የሽንት ቤት ወረቀት አይነ ምድርና የመሳሰሉ ቆሻሻ ነገሮች የፀዳ ነው	1· አዎ 2· አይደለም	/___/
32	በጉብኝት ወቅት መፀዳጃ ቤቱ ክፍት ነው	1· አዎ 2· አይደለም	/___/
33	መፀዳጃ ቤቱ ሲሞላ ምን አይነት እርምጃ ነው የሚወሰደው	1· በመጣጭ መኪና ማስመጠጥ 2· ሌላ መፀዳጃ ቤት ማስቆፈር 3· ከዝናብ መውረጃ ቦይ ማገናኘት 27· ሌላ /ይገለፅ/	/___/
	የውሀ ሽንት ገንዳ/ዩሪናል/ አለ	1· አዎ 2· የለም	/___/
34	የእጅ መታጠብያ ገንዳ/ሳህን አለ	1· አዎ 2· የለም /መልሱ የለውም ከሆነ ወደ ሚቀጥለው ክፍል ሂድ/	/___/
35	መልሱ አዎ ከሆነ ለተመጋቢዎችና ለምግብ ዝግጅት ሰራተኞች የተለያየ ነው	1· አዎ 2· አይደለም	/___/
36	በጉብኝቱ ወቅት ለእጅ መታጠብያ የሚያገለግል ኦሞ/ ሳሙና ነበር	1· አዎ 2· የለም	/___/
37	ምን አይነት የእጅ መታጠብያ ገንዳ/ሳህን ነው ያለው	1· ደረጃውን የጠበቀ የእጅ መታጠብያ ሳህን 2· ከሲሚንቶ የተሰራ መታጠብያ ገንዳ 3· በውሀ የተሞላ ባልዲ/ ቆርቆሮ 27· ሌላ /ይገለፅ/	/___/
38	በጉብኝቱ ወቅት የእጅ መታጠብያው አገልግሎት ይሰጥ ነበር	1· አዎ 2· አየሰጥም	/___/
39	ከእጅ መታጠብያና እቃ ማጠብያ	1· የትም ቦታ	/___/

	የሚወጡ ቆሻሻ ውሀ የት ነው የሚወገደው	2· ሴፕቲክ ታንክ 3· መፀዳጃ ቤት 4· የዝናብ ውሀ መሄጃ ቦይ 27· ሌላ /ይገለፅ/	
40	የደረቅ ቆሻሻ ማጠራቀምያ እቃ አለ	1· አዎ 2· የለም	/___/
41	መልሱ አዎ ከሆነ ምን አይነት እቃ ነው የሚጠቀሙት	1· ቅርጫት 2· በርሜል/ቆርቆሮ 3· ጆንያ 27· ሌላ /ይገለፅ/	/___/
42	የደረቅ ቆሻሻ ማጠራቀምያው እቃ ጠንካራ የሚገጥም ክዳን ያለውና ለመሸከምና ለማጋጋዝ ምቹ ነው	1· አዎ 2· አይደለም	/___/
43	የደረቅ ቆሻሻ ማጠራቀምያ እቃው በሚያመች ቦታ ተቀምጥዋል	1· አዎ 2· አልተቀመጠም	/___/
44	የደረቅ ቆሻሻው ለመጨረሻ ጊዜ የሚወገደው የት ቦታ ነው	1· የማዘጋጃ ቤት ገንዳ 2· የማዘጋጃ ቤት ትራክተር/መኪና 3· በየቦታ ዝም ብሎ ይጣላል 4· ግቢ ውስጥ ይቃጠላል 5· ግቢ ውስጥ ይቀበራል 27· ሌላ /ይገለፅ/	/___/
45	የደረቅ ቆሻሻው ለመጨረሻ ጊዜ የሚወገደው የት ቦታ ነው	1· የማዘጋጃ ቤት ገንዳ 2· የማዘጋጃ ቤት ትራክተር/መኪና 3· በየቦታ ዝም ብሎ ይጣላል 4· ግቢ ውስጥ ይቃጠላል 5· ግቢ ውስጥ ይቀበራል 27· ሌላ /ይገለፅ/	/___/
46	በምግብ ማብሰያ ቤት ውስት የቧንብዋ ውሀ በበቂ ሁኔታ አለ	1· አዎ 2· የለም	/___/
47	ለጥያቄ ቁጥር 421 መልስዎ አዎ ከሆነ ሙቅ ውሃ አለ	1· አዎ 2· የለም	/___/
	5· የምግብ ቤት መገልገያ እቃዎችን በተመለከተ		
48	የመመገብያ እቃዎች ለማጠብ ምቹ ስንጥቅ የሌላቸውና ለዝገት የማይጋለጡ ናቸው	1· አዎ 2· አይደለም	/___/
49	የመመገብያ እቃዎች ከአብዋራ ቆሻሻና ሌላ የቆሻሻ ምልክቶች የፀዱ ናቸው	1· አዎ 2· አይደለም	/___/
50	የቆሸሹ እና የተገለገሉ የምግብ ቤቱ እቃዎች በምንድነው ነው የሚታጠቡት	1. በማሽን 2. በእጅ	/___/
51	በእጅ ከሆነ ገንዳው ክፈል አለው	1· አዎ 2· የለም	/___/
52	ሙቅና ቀዝቃዛ ውሃ አለው	1· አዎ 2· የለም	/___/
53	ለእቃ ማጠብያ ሳሙናና ኦሞ ይጠቀማሉ ወይ	1. አዎ 2. አይጠቀሙም	/___/
54	የታጠቡና የፀዱ እቃዎችን በተገቢው መንገድ በመሸፈኛ ተሸፍነው ማስቀመጫው /ሽልፉ/ ላይ ተቀምጠዋል	1· አዎ 2· አልተቀመጡም	/___/

Annex IV: - Checklist for qualitative assessment of student's cafeteria managers

1. Does your organization check food handler's health status and whether they have took any training related with basic sanitary food handling practice before hiring them?
2. Is there a routine supervision program to assess personal hygiene of food handlers and a habit of posting certain instructions which is important to follow the right food handling practices for to be followed by food handlers?
3. Does your organization supply shower room, a room to change clothes separately for male and female, toilet facility, lavatory services, periodic supply of gown and hair cover specifically targeted food handlers?
4. What do you do if any food handler report you as he is sick with any communicable diseases like skin disease, respiratory disease, intestinal infectious disease e.g. diarrhea?
5. Does the organization provide training for food handlers periodically? If not what is the reason behind this?
6. Was there any problem related with the overall sanitation condition of the premise? If there what was your measure and outcome?
7. Was there any occurrence of food borne outbreak in this campus or other campus that you can remember? If yes was food borne outbreak investigation done during that time and what was the main factor behind the outbreak identified?

DECLARATION

I, the undersigned, declared that this is my original work, and has not been presented for a degree in this or any other university. All sources of materials used for this thesis have been dully acknowledged.

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This thesis has been submitted for examination with my approval as a university Advisor.

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Date: _____

Addis Ababa University

College Of Health Science

School Of Public Health

Assessment of the Sanitary Conditions of Catering Establishments and Food Safety Knowledge and Practices of Food Handlers in Addis Ababa University Students' Cafeteria

By

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Advisor Signature

Examiners

1._____ _____
(External examiner) Signature

2._____ _____
(Internal examiner) Signature