Addis Ababa University
School of Graduate Studies

Assessment of the Sanitary Conditions of Food Establishments in Mekelle Town

By Kinfe Zeru, B.Sc.

A Thesis submitted to the School of Graduate Studies of Addis Ababa University in Partial Fulfillment of the Requirements for the Degree of Master in Public Health

June, 2005

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Declaration

I the undersigned, declare that this thesis is my original work, has never been presented in this or any other university, and that all resources and materials used herein, have been duly acknowledge.

Name: Knife Zeru, B.Sc.

Signature _____

Place: Addis Ababa University, Ethiopia

Date of submission: June 2005

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

Name: Abera Kumie (MD, M.Sc)

Signature _____

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Lastly, but not least, I would like to extend my sincere thanks to Tigray Regional Health Bureau for funding this project and to Department of Community Health, Addis Ababa University for the opportunity I had to conduct this study.

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ABSTRACT

In Mekelle town the number of catering establishments is increasing from time to time like other towns of the country. Different efforts are undergoing to prevent and/or avoid the incidence of foodborne diseases that can arise from food service establishments. However, the sanitary condition is not known since no systematic study was carried out to assess the condition. Thus, this study was designed to determine the sanitary conditions of mass catering establishments in Mekelle town.

A cross-sectional study was conducted from November 2004 to January 2005. A census was employed to obtain the list of catering establishments. Four hundred twenty two (422) establishments were recruited for the study from the total 546 establishments by simple random selection technique. Standardized and structured questionnaire was used to gather information. Bacteriological examination of food utensils from randomly selected 88 establishments was made. Standard swab sample collection and laboratory procedures were employed. Epi Info version 6 was implemented for data management.

The findings of the study showed that 91% of the establishments have license, 65.7% were found operating their business in rented buildings and 83.8% of the managers/owners were literate. Sixty two percent of the floor and 54.4% of the walls and ceilings of the kitchens were found in good repair condition. Toilet, hand washing lavatories, proper solid waste receptacles and privately owned tap water supply were available in 96.9%, 57.1%, 39.2% and 93.6% of the

establishments, respectively. Ineffective dish washing practice, improper food stuff and food utensil storage, poor personal hygiene and food handling practices of food handlers were also the major deficiencies observed. Of all the bacteriological tested, 44.3% were found with

aerobic mesophilic bacteria above the acceptable level (>100 colonies/utensil) and 45.5% were grossly contaminated (> 50 fecal coliform/100ml). Staphylococcus aureus and Escherichia coli were also isolated from 27.3% and 18.2% of the swabbed food utensils.

In conclusion large numbers of mass catering establishments were found with poor sanitary condition and major deficiencies of the premises. The knowledge and practice of food handlers were also found unsatisfactory. In addition the laboratory results of swabbed utensils revealed the ineffectiveness of washing, sanitizing, handling and storage system. Therefore, the likelihood of food contamination is very high. Promoting and improving the standard sanitary requirements through regulatory activity, regular sanitary inspection focusing on education and motivation of owners and food handlers as well as an integrated work with other relevant sectors, is recommended.

Keywords: Sanitary condition, catering, food utensils, swab test

. Introduction

Foodborne disease takes a major toll on health. Thousands of millions of people fall ill and may die as a result of eating unsafe food (1). Food can be subjected to contamination with toxic substances and pathogenic organisms during production, transportation, preparation, storage and service. The consumption of contaminated food that contains sufficient quantities of pathogenic organisms and toxic substances will result in foodborne disease (2). Other factors in the prevalence of foodborne disease are the lack of knowledge on the part of food handlers and negligence in safe food handling. It is estimated that in developing countries up to 70% of cases of diarrheal disease may be caused by contaminated food (3). Food prepared in large quantity is liable to contamination and to the rise of foodborne diseases if the strictest principles of hygiene are not maintained (4). Unless hygienic food handling and preparation is ensured in mass catering establishments, the health of large number of consumers will be in endanger as similar type of food prepared in the same kitchen by the same food handler is eaten at a time.

In Tigray Region the number of mass-catering establishments is increasing since 1991 as a result of urbanization, and active movement of people from place to place like other Regions in our country. As Mekelle is capital town as well as the political and economic center of the Region, it is assumed that large number of mass catering establishments is located in the town though accurate data are not available. Therefore, to accommodate the development and to prevent the possible health problems that can arise from mass caterings, the Regional Government issued Hygiene and environmental Health Regulation in 1997. Hence the issuance of this regulation is believed to promote the regulatory activities managed by the Health Bureau. Guidelines and code of practices are developed and made to be in use to establish uniform and standardized regulatory

provisions. However, although these and other efforts are undergoing to improve the sanitary status of the establishments, their overall sanitary condition is not known, even there was no attempt to assess the condition systematically. So evidence based data are scarce in the Region for appropriate strategy formulation, planning and evaluation of the regulatory and hygiene education activity.

Therefore, this study will have a significant input in the formulation of appropriate strategy to; modify and facilitate the overall regulatory activity, for program planning and evaluation as well as base line information for policy makers to improve the sanitary condition of mass catering and reduce the incidence of food borne diseases.

2. Literature Review

An adequate supply of safe, wholesome and sound food is essential to the health and well being of man (5). However, there are several occasions that food affects the health of many people throughout the world due to contamination (6). Contaminants present in food may arise during food preparation and processing, from industrial pollution of the environment and from agricultural practices and food preparation. Food contamination is in no way restricted to the industrial countries-infact the problem of developing countries is severe due to difficulties in securing optimal hygienic practices (5). Despite the great advance made in modern technology, producing safe food and keeping food safe remains a worldwide public health problem (7).

With poor or non-existent reporting systems in most countries reliable statistics on foodborne diseases are not available and their magnitude is therefore difficult to estimate (3). However, estimates indicated that 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. Globally the incidence of foodborne diseases may be 300 to 350 times higher than the number of reported cases (6). In U.S.A alone, an estimated 76 million people got sick from foodborne disease in 1999, out of which 5000 of them died. Although no estimation can be made for the developing countries, it is believed that the prevalence of foodborne diseases in these regions of the world is even greater (7).

With the increase in urbanization, industrialization and tourism, mass catering establishments are becoming increasingly popular in both industrialized and developing countries. Mass catering establishment operations, by reason of their scale and complexity, have the potential to produce

even more disastrous consequences for health, if the strictest principles of hygiene are not maintained (4).

In 1969/70 there were about 737 outbreaks of foodborne disease with 52,011 cases reported to the U.S Centers for Disease Control and Prevention (CDC). Of those 33% of outbreaks occurred at restaurants, cafeterias and delicatessens (8). A summary of the results of a study of almost 1500 general and family outbreaks of foodborne disease which occurred in England and Wales between 1970 and 1982 revealed that the largest proportion (58%) of the incidents studied occurred from food prepared in restaurants, hotels, clubs and the like (9). Among foodborne disease outbreaks that occurred in Poland in 1990-92, 8.2% of the outbreaks occurred from food prepared in restaurants, bars, and café (3). Thus, situations where food is prepared in quantity for a large number of people are most likely to give rise to most food poisoning (9).

Developing countries are affected by a wide range of foodborne diseases. Cholera, compylobacteriosis, E.coli, gastroenteritis, salmonellosis, shigellosis, typhoid and paratyphoid are few examples (3).

In Ethiopia, according to the Ministry of Health annual report of 2003/04, dysentery and gastroenteritis were among the ten top diseases of outpatient visits although the report did not include all regions activity (10). The number of cases associated with foodborne diseases is highly underestimated due to poor reporting, documentation and poor health seeking behavior of patients. In Tigray Regional State, of all diseases reported from governmental health institutions in 2003/04 gastroenteritis, ameobiasis, bacillary dysentery, typhoid, helminthiasis and other intestinal parasitic infections account 18.4% or 345,959 cases (11).

Foodborne disease occurs in mass catering establishment that is not complying with sanitary and hygienic food handling and preparation. Interventions that focus on the improvement of these factors are believed to reduce the incidence of foodborne diseases (9). Unfortunately, the premises of mass catering do not have all the necessary basic sanitary amenities required for production of safe food (12). Studies conducted in Addis Ababa (1994) and Zeway (2001) 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 (13,14).

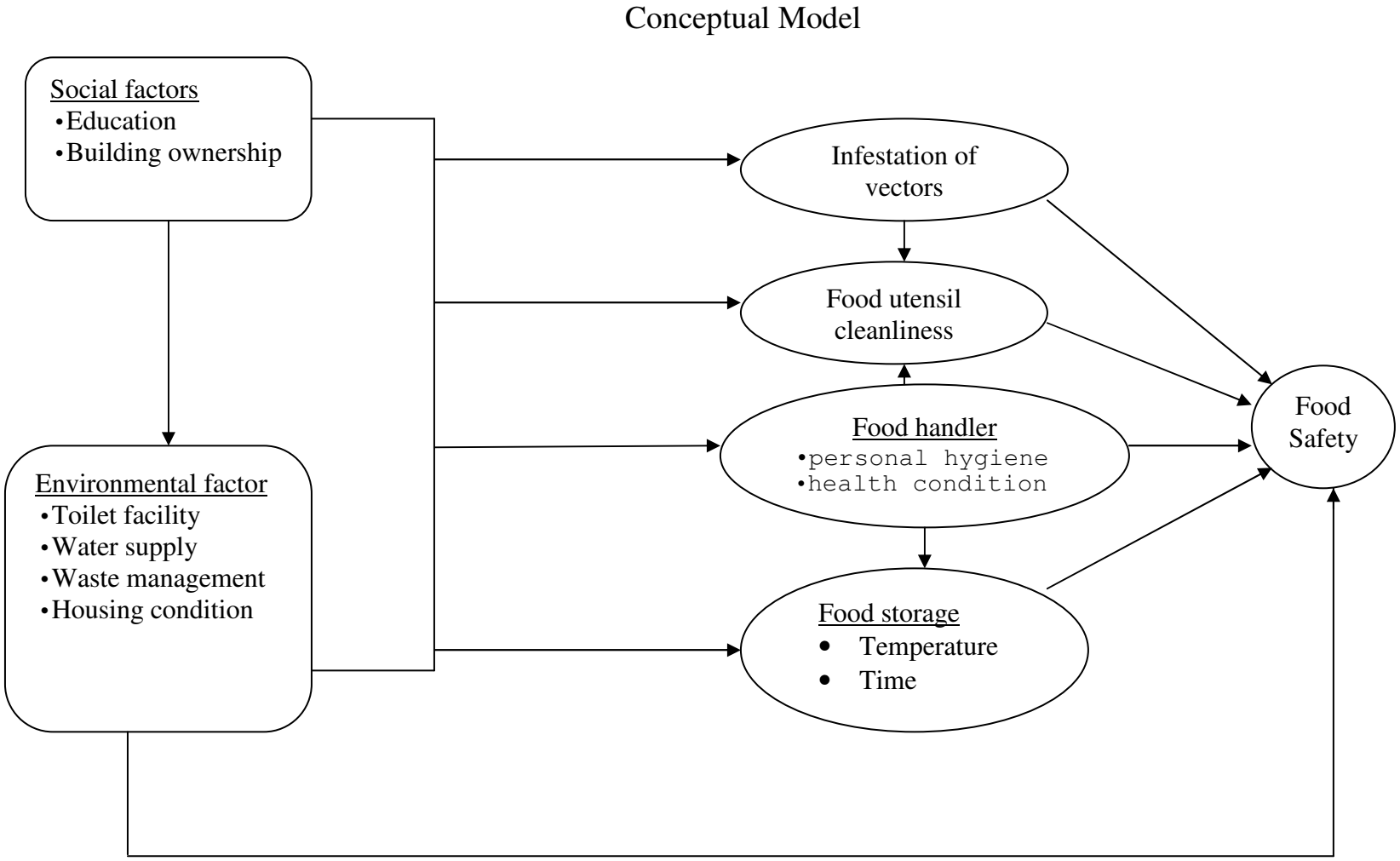
Food handlers have a basic responsibility to maintain a high degree of personal hygiene and food handling practice (9); but they have almost no knowledge about the ways and means of food contamination, and usually have low standards of personal hygiene for the tasks they are expected to perform (12). A study conducted in Addis Ababa revealed that only 50% of food handlers have had a satisfactory and 46% were found with out any kind of protective outer garment (15). Another study done in Awassa and Zeway showed that the prevalence of intestinal parasitic infection and some obvious form of active skin and respiratory infection among food handlers were 63% and 14.8% respectively (14,16).

It is well known that perishable foods should be kept at a temperature either below 4^0C or at not less than 60^0C in order to prevent the growth and multiplication of bacteria (9). However, a study conducted in Addis Ababa showed that about 60% of public catering establishments did not have refrigerators; even around 47% of those establishments that had refrigerator could not adjust the temperature properly. In fact one third of the establishments were found with spoiled perishable foodstuff (15).

Food utensils used in the preparation of food can act as a source of contamination. Unclean and/or ineffectively washed and sanitized food utensils are potential risks for food contamination (17). So the sanitary quality of food utensils requires due attention and needs regular monitoring. The effectiveness of washing and sanitizing of food utensils can be determined by visual inspection and laboratory methods. However, the standard measure is bacteriological swab test which is an effective tool for monitoring and measuring food utensil sanitation, though it will not be affordable for routine monitoring activity. A standard plate count of less than 100 colonies per utensil or less than 100 colonies per 50 cm^2 of surface swabbed and the absence of coliforms indicates a satisfactory washing and sanitizing as well as handling and storage procedures (8).

Socio-demographic condition of owners and food handlers, environmental factors like housing condition, availability of toilet facility, liquid and solid waste management, water supply, and infestation of vectors are some of the factors that affect food safety (9, 12). Having concrete information on the status of these factors in mass catering establishment is crucial to evaluate the undergoing hygiene education and regulatory activity in the area as well as to design appropriate strategy to improve the sanitary condition so as safeguard the health of the public particularly in our set up where mass catering establishments are flourishing and less attention is given to the sanitary condition.

Figure 1: Factors that Affect Food Safety in Mass Catering Establishments



3. Objectives

General objective:

To determine the sanitary conditions of mass catering establishments in Mekelle, Tigray Region, Ethiopia

Specific objectives:

- To describe the sanitary conditions of the mass catering
- To assess the Knowledge and Practice of food handlers towards hygienic food handling
- To examine the bacteriological quality of food utensils

4. Methodology

Study design: A cross-sectional study was conducted from November 2004 to January 2005

Study area: the study area was Mekelle, the capital town of Tigray regional State which is located 780 km. away from Addis Ababa, in the northern part of the country. It covers 24.29 square kilometer and has an estimated population of 147,858. There are one hospital, three health centers and a number of nongovernmental and private clinics. The sanitation coverage of the town was estimated to be 62% according to the sample survey report of the then Mekelle zone Plan and Economy Department, 2001/02 (map see annex 4).

Source population: all mass catering establishments regardless of their legal status were the source populations

Study population: randomly selected mass catering establishments were the study subjects and food handlers from randomly selected establishments were recruited for knowledge and practice study

Exclusion criteria were:

- Local barware or *tela bet* –because the regulatory body does not address them due to limitation of capacity and there is no guideline to effect regulatory activity.
- Establishments which provide services temporarily around construction sites, market places , bus stations and the like
- Establishments that provide packed and canned foods will be excluded from the study, because they are less likely to be contaminated.

Sample size determination:

- Sample size (n) was determined based on the assumption of a 50% proportion (P) of poor sanitary conditions of the overall sanitary facility, 0.05 expected margins of error (d), and with 95 % confidence level ($Z_{\alpha/2}$) and 10% contingency was also considered for non response. Accordingly the required sample size was 422.

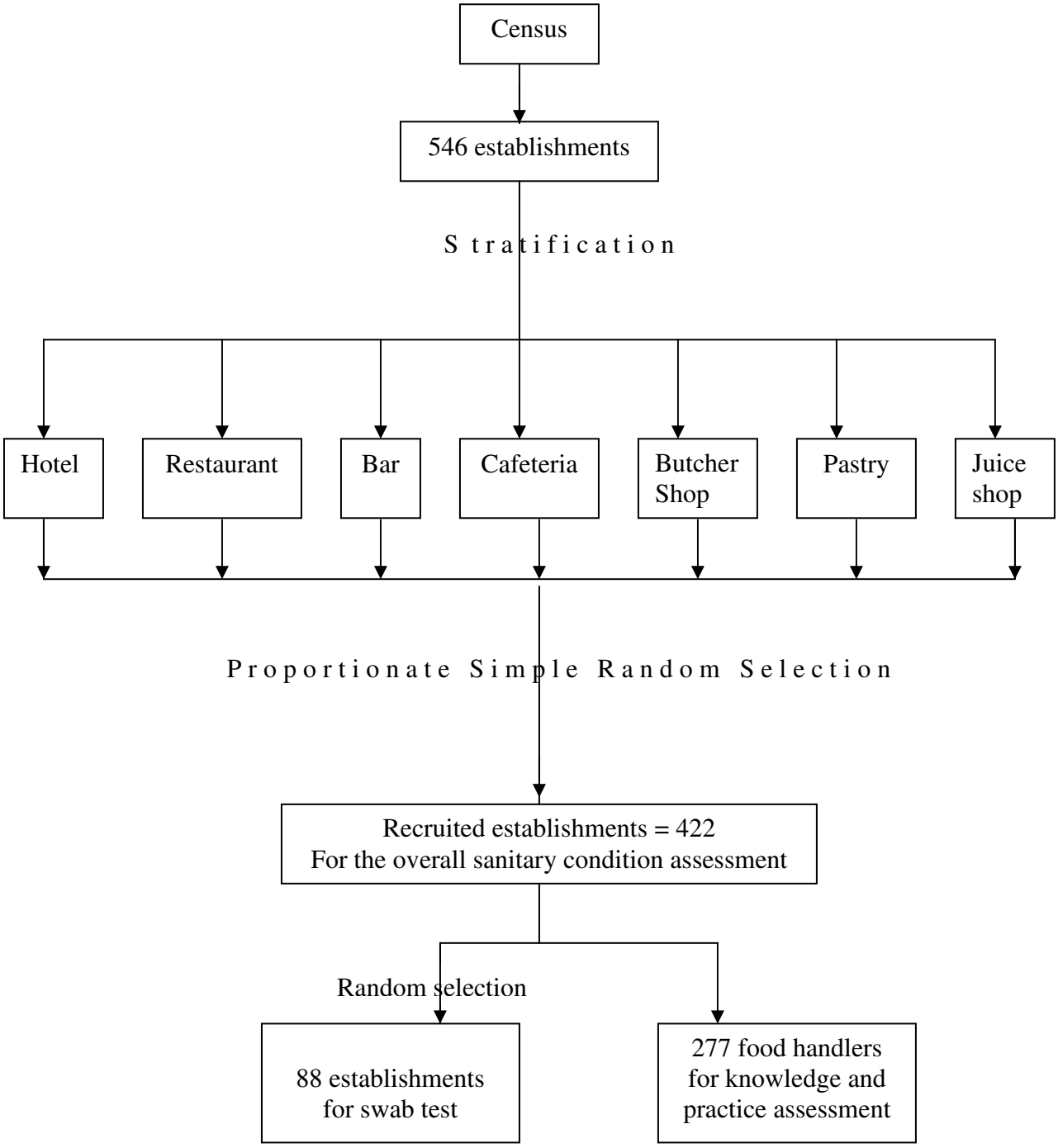
$$n = \frac{(Z_{\alpha/2})^2 * P(1-P)}{d^2} \quad , \quad n = \frac{(1.96)^2 (0.5)^2}{(0.05)^2} \quad n = 384 + 38 = 422$$

- The sample size was high when compared with the total number of existing catering establishments (546) in the town that was found after the census, but it was taken deliberately in order to maximize the precision of the study. Otherwise, the required sample size for such a study with small source population could have been 249 including 10% contingency for non response.
- Food utensils for microbiological swab test analysis were taken from 88 (21%) of the study subjects or food service establishments.
- From each recruited mass catering establishments, that provided various meals, one food handler was selected for knowledge and practice assessment; hence 277 food handlers were interviewed and physically assessed.

Sampling procedure:

- First a census was conducted in each kebeles/sub-district of the town to obtain the list of existing catering establishments (sampling frame) and as a result 546 establishments were registered. The existed establishments were stratified by the type of service they provided as hotels, restaurants cafeterias, bars, butcher shops, juice shop and pastry. Sample size was determined proportionately from each stratum and selection was performed randomly using simple random table. The main purpose of stratification was to avoid over or under representation of certain types of establishments
- One food handler was selected from each establishment, which provided meals for the knowledge and practice assessment. In the presence of more than one food handler in a single food preparation area/kitchen, selection was done by lottery method.
- Food utensils (dish plates) for bacteriological swab test examination were selected from a series of plates cleaned and shelved. The establishments for swab test were randomly selected from those already recruited for the overall sanitary condition assessment.

Figure 1: Sampling procedure



Data collection:

Standardized and structured questionnaire was 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. It was prepared originally in English and then translated into Amharic and back to English by two different sanitarians 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.

The questionnaire was designed to obtain information on socio-demographic characteristics of owners/managers and food handlers, repair condition of premises, availability of water supply, toilet facility, refuse management, food utensil washing facility, storage system of food and food utensils as well as to measure the knowledge and practice of food handlers.

Nine sanitarians and three medical laboratory professionals were recruited for data collection and microbiological analysis of food utensils respectively. Data collectors and supervisors were trained for two and a half day and they were provided with a training manual. After the training the questionnaire was pretested in establishments that were not included in the actual study to ensure the quality and validity of data. Regular supervision, spot checking and reviewing the completed questionnaire was carried out by two senior sanitarians and by the principal investigator daily to maintain data quality. The sanitarians were assigned to collect data from establishments other than their permanent work place or catchment's area in order to minimize

interviewer bias. Each data collector had completed an average of 7 questionnaires daily, and hence the actual data collection took 9 days excluding the training and pretesting time.

Operational definition: (8, 12)

- **Mass catering establishment**:- is any business enterprise, serving or vending food and drink regardless of its legal status
- **Hotel** is an establishment providing accommodation and meals for payment.
- **Restaurant** is an establishment selling ready to eat food and drinks
- **Snack bar/ Cafeteria** is an establishment rendering foods that can be served quickly and hot as well as non alcoholic drinks
- **Butcher shop** is an establishment mainly involved in raw meat sale for take home
- **Pastry/*cake bet*** is an establishment rendering hot drinks like tea, coffee and cakes any time in the day time
- **Juice shop** is an establishment that serve mainly different type of fruit juices
- **Food handler** is kitchen personnel who are involved in the preparation and handling of food in the kitchen.
- **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, 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.
    - When prepared food is stored in clean container with a tight cover and/or covered with clean cloth or plastic sheet
    - When food utensils are stored in shelf, cupboard or other area in such away that it is not exposed for dust particles deposition and insect contamination

- **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.

Variables

Dependent variable:

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

Independent variables:

- Socio-economic characteristics like educational status, marital status, building owner ship

Laboratory Procedures for the Bacteriological Examination of food Utensils

(see Annex 1, page 50)

Five plates/bowls were selected from each randomly enrolled catering establishment regardless of the scope and size of establishments as well as the number of existing plates in each establishment. Although, it is well known that the number of plates differs from establishment to establishment, a fixed number of plates/bowls that is five is selected for swab test. Concerning selection method, first the total number of clean plates/bowls were counted in each establishment and then the same type of five plates were selected by systematic selection technique from the shelves or other places where they stored. For each group of food utensils (5plates/bowls) swabbing one sterilized cotton swab on wooden applicator stick was used. By using moist cotton swab, an approximately 50 cm^2 (a path of 2.5cm by 20 cm or 5cm by 10cm or other dimension to cover an equivalent area) of the selected plates/bowls were rubbed slowly and firmly 3 times reversing the direction each time (18). The swabbed samples were transported to the laboratory

using an icebox within 2 hours. In the microbiological laboratory samples were plated/cultured within 2 hours in order to avoid bacterial multiplication. 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. Similarly swab sample was also inoculated into test tubes containing MacConkey broth and incubated for 24-48 hours at 37^0C and 44 ^{0}C to determine the growth of coliform bacilli. Biochemical tests were performed when necessary in the identification of bacteria species (19). The detail is attached in annex 1.

Data quality assurance:

The quality of data were ensured through training of data collectors, close supervision and prompt feedback, reviewing each of completed questionnaire daily and re-interviewing certain establishments randomly. Moreover a sort of brief daily activity evaluation method was established to correct problems that could face during the course of data collection. The consent for the survey and the assurance of confidentiality were delivered to improve the quality of data. Data consistency and completeness were made all the way during data collection, data entry and analysis.

Data analysis

Epi Info version 6 statistical package was used for data management. The principal investigator performed data entry and cleaning. About 20% of the questionnaire was also cross checked with the already entered data to maintain its validity. Frequency distributions and percentages as well as Odds Ratio with 95% confidence interval for selected variables were calculated as appropriate.

Description of Facilities at Sites of Performance

The study area was Mekelle, Regional Health and Research Center Laboratory equipped with qualified laboratory personnel and with standard equipment that were important for the intended investigation. Computer, duplicating machine and other materials that are important for the development of questionnaire was available in Tigray Region Health Bureau, which is located in Mekelle. Sanitarians for data collection were also available in different governmental health institutions of the town. An Internet was also accessesible in the Bureau of Health.

Ethical consideration

The ethical approval and clearance was obtained from Department of Community Health and Addis Ababa University ethical committee. Permission was also obtained from the Municipality of Mekelle and Mekelle town Health Office. The purpose of the study was explained to the owners/managers of establishments and verbal consent was obtained from them. Their privacy was also maintained. They were also informed that the information obtained from their establishment would not be disclosed to third person/body. This would also assure confidentiality. Establishment owner/managers were advised to take corrective measures when a gross sanitation and hygienic problem was observed during data collection.

Dissemination of findings

The findings of this study will be disseminated to Ministry of Health, Tigray Region Health Bureau, Tigray Trade and Industry Office, Mekelle town Municipality and Mekelle town Health Office. The findings will be also disseminated to different organizations that will have a contribution to improve the sanitary status of the establishments in the region. The findings will

be also presented in various seminars and workshops. In collaboration with Mekelle town Chamber of Commerce a Programme will be arranged to discuss with establishment's managers/owners. It is also planned to publish the paper in a peer reviewed scientific journal.

Result

General information*:* -

According to the census performed in the town 546 catering establishments were identified, of which 422(77%) were enrolled in the study. None response rate was insignificant (0.5%). A total of 420 mass catering establishments were investigated during the study, consisting 51(12.1%) hotels, 55(13.1%) restaurants, 126(30%) bars, 114(27.1%) cafeterias, 54(12.9%) butcher shops, 13(3.1%) juice shops and 7(1.7%) pastries. Among those establishments 382(91%) were licensed. Two hundred seventy six (65.7%) of the establishment owners were found operating their business in rented buildings. The majority, 410(97.6%) of the establishments were owned privately; 374(89%) of the establishments were managed by the owners themselves, and the remaining 25(6%) and 19(4.5%) were managed by relatives of the owners and hired personnel, respectively.

The median service years of the establishments were two years ranging from one month to forty-eight years. Some 13,578 customers were served in those establishments daily, as reported by the owners. Two hundred seventy seven (66.0%) establishments were found to be serving various types of meals including juice, cake and bread; while the remaining 143(34%) establishments were involved only in rendering hot and cold drinks including alcohol. Sanitary inspection was done in 254(60.5%) of the catering establishments in the past six months.

Among the surveyed establishments, 322(76.7%) were found rendering services as per their work permit, 60(14.3%) were out of their license and the status of the remaining 38(9%) were not known, as they did not have license at all.

Socio-demographic characteristics

Owners/managers

The median age of owners/managers were found 35 years, ranging from 19 to 80 years. The majority, 352(83.8%) of the managers were literate. Half of the owners were found to be married. And 410 (97.6%) of the owners/managers were Christians and the remaining 10(2.4%) were Muslims (Table1).

Food handlers

There were 1271 (437 males and 834 females) food handlers working in those 277 establishments; of them 277 were recruited for knowledge and practice assessment. Two hundred eighteen (79.7%) were found literate (grade one and above). Two hundred four (73.6%) of the food handlers were females and 73 (26.4%) were males. Concerning their marital status; 188 (67.9%) were single, 68(24.5%) married, 11(4%) divorced and the other 10 (3.6%) were widowed. Their median age were found to be 22 years with a minimum age of 13 and a maximum of 62 years. The median service year of those food handlers were found to be one year, ranging from 10 months to 40 years and nearly half of them had less than one year service year.

Table 1: Socio-Demographic Characteristics of owners/managers in Mass Catering Establishment, Mekelle, Tigray, December 2004 (n=420)

Characteristics	**Frequency**	**percent**
Sex		
Male	181	43.1
Female	239	56.9
Age		
19-34	198	47.1
35-50	177	42.1
>50	45	10.8
Educational status		
Illiterate	68	16.2
Grade 1-6	121	28.8
Grade7-12	170	40.5
Grade >12	61	14.5
Marital status		
Single	168	40.0
Married	210	50.0
Divorced	22	5.2
Widowed	18	4.3
Separated	2	0.5
Establishment building ownership		
Private	144	34.3
Rented	276	65.7

Repair condition of premises: -

Sanitary assessment was done among 239(56.9%) establishments that had kitchens. The floor of kitchen in 131(54.8%) establishments were constructed of concrete, 58(24.3%) floors were tiles, 22(9.2%) were cement pointed stone and the rest 28(11.7%) of the kitchen floors were plain earth. On the other hand, of those 420 dining/service rooms assessed, 279(66.4%) had floors constructed of tiles, 115(27.4%) were concrete, 23(5.5%) were cement pointed stone and the remaining three were found to be plain earth. One hundred forty four (60%) of the establishment's kitchen and 345(82%) of the dining/service room had an open-able window (about 10% of floor area). Only 75(31.4%) of the kitchens had a dressing room for food handlers (Table 2).

Water supply and sanitation: -

The majority, 407(96.9%) of the establishments had toilet facility, of those only 35(8.6%) were found to be with separated unit for males and females (Table 3). In 374(92%) of the establishments the toilets were open for customers at the time of the study. When the latrine became full, desludging by vacuum truck was the most common practice of establishments 389(95.6%), followed by new latrine construction 10(2.5%) and connecting to the municipal storm water drainage 6(1.5%), very few establishments, two (0.5%) disposed to an excavated trench in their back yard.

Municipal pipe water was the only source of water supply for all establishments; accordingly 393(93.6%) of the establishments had access to privately owned pipe water supply. However, only 73(31.7%) of the kitchens had accessed to running tap water for food preparation and equipment washing, and 6(8.1%) of them had access to hot water supply (Table 3).

Table 2: The Physical condition of mass catering establishment, Mekelle, Tigray, December, 2004

Characteristics	Frequency	Percent
Kitchen, n=239		
Good floor repair condition	149	62.3
Good walls and ceilings repair condition	130	54.4
Clean walls and ceilings	130	54.4
Adequate ventilation	165	69.0
Adequate lighting	185	77.4
Dining room, n =420		
Good floor repair condition	367	87.4
Good walls and ceilings repair condition	357	85.0
Clean walls and ceilings	350	83.3
Adequate ventilation	358	85.2
Adequate lighting	398	94.8

Solid waste management

Onsite solid waste storage containers/receptacles were available in 408(97%) of the establishments; 191(46.8%) of the receptacles were sacks, 143(35%) were barrels, 29(7.1%) were plastic buckets, 25(6.1%) were dust bins and the other 20(4.9%) were other type of temporary use receptacles like cartons. More than one third (38.1%) of the establishments had the proper type of receptacles (durable, tight fitting cover and light to lift and transport). Municipal refuse collection containers were the most common type of solid waste collection methods employed by 372(88.6%) of the establishments (Table 3).

Lavatory facility

Lavatory facilities were available in 240(57.1%) establishments, of those 125(52.1%) were buckets and welded metal sheets, 87(36.3%) were conventional hand wash basins, while 25(10.4%) were water trough constructed of concrete and fixed with running tap water. Detergents like soap were available in 140(58.3%) of the lavatory facilities. Majority of the establishments dispose their waste water/sullage generated from hand washing lavatories and dishwashing facilities into septic tanks or latrines (Table 3).

Table 3: Sanitary Conditions of Mass Catering Establishment, Mekelle, Tigray, December 2004 (n=420)

Characteristics	Frequency	percent
Water supply		
Pipe private	393	93.6
Pipe shared	16	3.80
Pipe from neighbors	11	2.6
Latrine facility		
Flush type	321	76.4
Dry pit latrine	86	20.5
Not available	13	3.1
Latrine condition		
Properly managed	278	68.3
Improperly managed	129	31.7
Liquid waste final disposal		
Open area dumping	34	8.1
To septic tank/latrine	366	87.1
To municipal storm water drainage	17	4.1
Others	3	0.7
Solid waste storage receptacles		
Proper receptacle available	160	38.1
Improperly stored	248	59.0
Not available	12	2.9
Solid waste collection and disposal		
Municipal container	372	88.6
On site disposal	6	1.4
Privately owned carts	28	6.7
Others (open field dumping, dumping into storm water drainage)	14	3.3

The physical condition among establishments was assessed by sanitary inspection. The cleanliness of floors, walls and ceilings as well as the availability of openable window and ventilation condition in inspected establishment's kitchen was found in better condition when compared with the un-inspected establishments (Table 4).

In addition, the ventilation condition of dining/service rooms, the repair condition of solid waste receptacles, and the availability of detergent (soap) on the hand washing lavatories were found in better condition in those supervised establishments with an odd ratio and 95% C.I of 1.78 (1.00, 3.19), 1.58 (1.02, 2.46), and 2.23(1.25, 3.97), respectively. The proportion of toilet facilities kept clean were also in better position in inspected establishments than the not inspected, although the association was not significant, OR=1.20(0.77, 1.89).

Table 4: The Repair and Ventilation condition of Establishments Kitchen in relation to the Sanitary Inspection of Establishments in Mekelle, Tigray, December 2004 (n=239)

Condition	Sanitary Inspection		OR (95% C.I)
	Yes	No	
Kitchen wall and ceiling			
Clean	93	37	2.13 (1.20, 3.80)
Unclean	59	50	1.00
Kitchen floor			
Clean	98	45	1.69 (1.17, 3.56)
Unclean	54	42	1.00
Openable window			
Yes	93	51	1.11 (0.62, 1.98)
No	59	36	1.00
Kitchen ventilation			
Adequate	110	55	1.52 (0.83, 2.79)
In adequate	42	32	1.00

Dish and glass washing facility

Among those establishments, which have served various types of meals and had kitchen, 232 (97.10%) had some kind of dishwashing facilities; of them 186(80.2%) used bowls and /or buckets for dish washing, 46(19.8%) used conventional type of sink fixed with running tab water. One hundred seven (46.1%) establishments used three-compartment dish washing facility, 112 (48.3%) of establishments used two compartments and the remaining 13(5.6%) establishments used to wash their dishes in a single compartment. The majority, 226(97.4%) of the establishments were found to use some kind of detergent for dish washing while 91(39.2%) use hot water for sanitizing their dishes at least twice a week.

In addition, 390 (92.9%) of the establishments had some kind of drinking cup/glass washing facility. About three fourth (77.2%) of those establishments were equipped with a bowl and or bucket for drinking cup or glass washing, 89(22.8%) establishment used the conventional type of sink and 47(12%) were used one compartment. Nearly half (49.5%) of the establishments used two compartments for soiled cup washing and 150(38.5%) were found with three compartment washing device.

Food storage

In 141(33.6%) establishments food stuffs other than perishable ones and different type of drinks were stored separately in a store room; of those only 73(51.8%) were store their food properly in a store room which had enough space for free air circulation and in a well arranged manner.

Among all the establishments which were engaged in rendering various types of meal, juice, cake and raw meat; 250(90.3%) were found to have a refrigerator and 177(70.8%) of those

refrigerators had a thermometer, the temperature of refrigerators were found under 10^0C in 124 (70%) establishments. Foodstuff was found properly stored in 207(82.8%) of the establishments (food stuffs were arranged in such away that those moist foods like raw meat were stored at the bottom and ready-to-eat foods and other less moist foods were stored at the upper part of the fridge separately). However, in 18(7.2%) establishment's sign of spoilage (color change and bad odor) were observed in refrigerated foodstuffs.

Butcher shops: -

The floors of 27(50%) butcher shops were constructed of concrete, 22(40.7%) were tiles and the remaining 5(9.3%) were cement pointed stone. The majority, 47(87%) of the floors were found in good repair condition, 39(72.2%) of the walls and ceilings were kept clean, but more than half of the wall was not water washable and oil paint painted. Seventy four percent of the butcher shops had some kind of cupboard or box where meat was exhibited for sale, but only 24(60%) of the cupboard/boxes were insect proof. The availability of cupboard/box was related with the sanitary inspection of the butcher shops, OR=6.17 (1.01, 41.38).

Thirty one (57.4%) butcher shops used festal, 8(14.8%) and 14(25.9%) butcher shops used newspaper and used paper respectively and the remaining one use approved type of smooth paper sheet for wrapping meat.

Knowledge of **Food Handlers**:

Among the 277 food handlers who were interviewed for knowledge and practice assessment, 248 (89.5%) knew at least one type of foodborne diseases. Mass media was the most common source

of information, 125(50%) followed by health center 106(42.7%). The proportion of food handlers who believed that foodborne diseases are caused by germs was 197(79.4%). Of those who were asked about the mode of transmission of foodborne disease; 207(83.5%) answered that contaminated food is the vehicle and 138(55.6%) responded that vectors are the channels for the transmission. Eighty three percent (206) of the food handlers also knew the potential risk of dirty hands in contaminating food (Table 5).

Practices of food handlers:

In 181(65.3%) kitchens, prepared local foods like "*enjera"* and "*wet'* were kept in clean container and covered properly and in nearly half (48.7%) of the kitchens, food utensils and equipment were stored properly during the survey. Two hundred one (72.6%) of the food handlers were found wearing outer working garments, of which 67(33.3%) of the food handlers outer garment were not clean. One hundred and eight (39%) were found with covered hair, and 211(76.2%) were with trimmed fingernails and 99(35.7%) were found preparing food while they worn finger ornaments. Only 63 (22.7%) food handlers took medical check up in the past one year. Diarrhea, respiratory infection, skin lesion and nose and eye discharges were observed on 25 (9%) of the food handlers.

The monitoring and control of establishments by the responsible body seems to have a positive influence on the personal hygiene and food handling practice of food handlers. Prepared food and food utensils storage condition, kitchen wall and ceilings cleanliness and the proportion of food handlers with trimmed fingernail and wore outer working garments were found in better condition in those inspected establishment's kitchen when compared with un inspected ones (table 6).

Table 5: Knowledge of Food Handlers about Foodborne Disease, Mekelle, Tigray, December 2004 (n=277)

Knowledge	Frequency	Percent
Heard about foodborne disease	248	89.5
Did not hear about foodborne disease	29	10.5
Causes for foodborne disease		
Germs	197	79.4
Chemicals	4	1.6
Un hygienic food preparation	62	25
Anger of God	4	1.6
Mode of Foodborne disease transmission		
Contaminated food	207	83.5
Contaminated water	88	35.5
Vectors like flies and cockroaches	138	55.6
Reason for food contamination		
Dirty hands	206	83.1
Infected food handlers	46	18.5
Unclean/dirty utensils	152	61.3
Dirty working area	78	31.5
Infestation of insects and rats	56	22.6

N.B: Because of the possibility of multiple responses total number of food handlers may not be equal to 277

Table 6: Food Handler's Practice in relation to Sanitary Inspection activity, Mekelle, Tigray, December 2004 (n=277)

Characteristics	Sanitary inspection		OR (95% C.I)
	Yes	No	
Storage of food utensil			
Proper	103	32	2.36(1.35, 4.11)
Improper	82	60	1.00
Storage of ready to eat food			
Proper	131	50	2.04(1.17, 3.56)
Improper	54	42	1.00
Food Handler wear gown			
Yes	142	59	1.85(1.03, 3.32)
No	43	33	1.00
Food Handlers gown			
Clean	102	32	2.15(1.09, 4.26)
Not clean	40	27	1.00
Food handler with trimmed finger nail			
Yes	144	67	1.31(0.70, 2.44)
No	41	25	1.00

Bacteriological Examination of food Utensils

Among the 420 establishments selected for the overall sanitary condition assessment, 88 establishments were enrolled for swab test. Hence 88 swabbed plates were examined (each swab sample comprised of 5 food utensils). Of those 19(21.6%) were collected from hotels, 39(44.3%) from restaurants, 29(33%) from cafeterias and a single swab from a bar. Ninety three percent (82) of the establishments wiped their utensils using cloth or towel. Clean food utensils stored in cupboard, shelf and on simple table without cover were 15(17%), 16(18.2%) and 57(64.8%) respectively. Of all those bacteriological examined food utensils 75(85.2%) were plates and the remaining 13(14.8%) were bowls. The repair condition and cleanliness of the food utensils as absorbed by the naked eye; 56(63.6%) were new and tidy, 25(28.4%) were old and stained, and the remaining 7(8%) were found corroded and cracked.

Aerobic Mesophilic Bacteria (viable bacteria), Escherichia Coli, Staphylococcus aureus as well as total and fecal coliforms were isolated. Aerobic mesophilic bacteria were grown in 69(78.4%) of the swabbed utensils with an average of 53 colonies per utensil, but 39(44.3%) of the swabbed utensils were found above the acceptable level of aerobic mesophilic bacteria (>100 colonies/utensil). S.aureus and E.coli were isolated from 24(27.3%) and 16(18.2%) of the swabbed utensils, respectively. Acid and gas formation in 69(78.4%) of the examined utensils would also confirm the presence of total and fecal coliforms (Table 7).

Table 7: Bacteriological Swab Test of Food Utensils in selected Establishments in Mekelle, Tigray, December 2004 (n=88)

Type of Identified Microorganisms	Frequency	Percent
Aerobic mesophilic bacteria, colony/plate		
Nil/no growth	19	21.6
1-25	15	17.0
26-50	13	14.8
51-100	2	2.3
>100	39	44.3
Fecal coliforms, MPN/100 ml		
No growth	19	21.6
1-10	10	11.4
11-50	19	21.6
51-250	20	22.7
500-1100	20	22.7
Escherichia Coli	16	18.2
Staphylococcus aureus	24	27.3

Discussion

This study revealed that a high proportion of establishments render their service having license certificate. The proportion of licensed establishments in the town were the same as that of similar study in Awassa (16), but greater than the findings of similar studies done in Addis Ababa and Zeway (13, 14). The reason for the presence of high rate of licensed establishments is due to the focus given by concerned governmental organizations and the routine monitoring and enforcement made by kebele leaders and sanitary guards on the unlicensed establishments. However, unlike the findings of similar studies in Addis Ababa and Zeway (13, 14) being licensed or not did not make a difference in the sanitary condition of the establishments. The explanation for this would be as the number of establishments without work permit was very small; the difference might have been masked.

Sanitary and repair condition of premises were significantly associated with the sanitary inspection of establishments, since it is well known fact that legislation and frequent inspection of catering establishments supplemented by education and motivation are effective mechanisms to ensure food safety (8). However the sanitary inspection was irregular and infrequent. The reason for the irregular and infrequent inspection might be multitude-the number of professionals assigned for the regulatory activity in the town is very small when compared with the number and diversity of establishments that demand supervisory activity, on top of that no health center in the town had resources to facilitate the activity. Hence it is difficult to perform frequent and regular regulatory activity through walking from one to another on foot and it requires the attention of concerned body to strengthen the regulatory activity.

To prevent food contamination due to dirty working area, cross contamination of food utensils, infestation of insects and deposition of dust and smoke particles on food and food utensils while food preparation; the repair condition and cleanliness of kitchen should be well maintained and kept clean (12). However the finding of this study revealed that, the repair condition and cleanliness of establishment's kitchen were found unsatisfactory as observed visually. Thus with these deficiencies in the kitchen, prevention of food contamination during preparation and serving hygienically maintained and safe food to customers is unthinkable and deems intervention.

The repair condition of establishments dining and/or serving room floor as well as the repair and cleanliness of walls and ceilings were found in good condition in 87.4%, 85% and 83.3% of the establishments respectively. This finding revealed that Mekelle was found in a better condition than establishments in Addis Ababa and Awassa (13, 16). Moreover, adequate lighting and ventilation were observed in better condition in this study than similar study in Zeway (14), but the proportion of establishment's dining room, which had, adequate ventilation were higher in Addis Ababa (13) than the current study area.

Although the physical repair condition of the establishments were better than previous similar studies in Addis Ababa, Awassa and Zeway, there were discrepancies in physical repair condition, adequate lighting and ventilation between kitchens and dining rooms in this study. The dining room was found in better condition than the kitchens, the main reason for such difference between kitchens and dining rooms would be; most establishments were initially designed and constructed for residential housing and then converted to catering establishments through time and hence the existing kitchens were either constructed for family purpose initially or constructed

later as an extension to obtain legal license with poor engineering design and/or cheap construction material. The other reason would be the attention given for the sanitary and repair condition of kitchens by the owners/managers was less either due to lack of awareness, economical problem and/or ignorance.

Almost all of the establishments (97%) had toilet facility which were more or less the same with the proportions of establishments that had latrine in Addis Ababa and Awassa, 86% and 95% respectively, but much higher than Zeway (59%) and yet nearly one third (31.7%) of the latrines were improperly managed. Thus poorly managed latrines create a favorable medium for the breeding and multiplication of insects that can carry microorganisms and contaminate food and food utensils and equipment and reach the mouth of a healthy individual (12).

All premises are expected to provide adequate and conveniently located lavatories with hot and cold running water, soap and approved type of towel (12). However, the findings of this study showed that only 57.1% of the establishments had lavatory facilities and most of them were found in establishments engaged in the provision of meal service. The finding is much lower than the findings in Addis Ababa (63%) and Zeway (70.1%). None of the lavatory facilities were supplied with hot water and only 58% of the establishments with lavatory facility had soap, which is lower when compared to the finding in Addis Ababa (83%). The absence of lavatory facility on those establishments that did not serve meals shows that the licensing procedure looks less stringent for those establishments concerning lavatory facility.

Garbage and refuse generated from kitchens and other work areas should be collected and stored in proper container or receptacle. The receptacles should be durable, easily lifted and transported,

have tightly fitting cover as well as easily cleanable (12, 20). Nevertheless, though the majority, 97% of the establishments had some kind of refuse receptacles, most of them did not comply with the specification that refuse receptacles should be. Nearly half of the observed receptacles were sacks and cartons that are very far below the required type and only 39% of the establishments had the appropriate type of receptacles. The collection and storage of garbage and refuse in sacks and cartons is unsanitary and worthless, because they are inconvenient, uncovered and the surrounding will be soiled as the receptacles can be damaged due to the moisture content of the garbage. As a matter of fact insects like flies will have the access to multiply and contaminate food.

One of the most widely used and accepted methods of food utensil washing method is the three compartment sink or vat system. This system is used to wash, rinse and sanitize food utensils and equipments (12, 20). The study showed that 46.1% of the establishments among those that serve meals and 38.5% of all were found using three compartments for dish washing and drinking cup or glass washing respectively. Though it was better than the washing practices in Addis Ababa and Zeway (13, 14), it requires an integrated effort of the regulatory body and owners to reach a universally used three compartment-washing device. As clean and sanitized food utensils are crucial both aesthetically for the presentation of appetizing food and to safeguard the health of customers (9).

All perishable and potentially hazardous food items must be maintained at a safe temperature that is below 10^0C or above 60^0C in order to slow down or stop the growth and multiplication of bacteria (12). Thus, high percentage of establishments (90.3%) was identified as having refrigerator when compared with the findings in Addis Ababa (40.2%), Awassa (66.3%) and

Zeway (13.9%). Proper storage system of food items in refrigerator was also found in better condition when compared with a study done in Addis Ababa (49.6%). But the proportion of refrigerators that had adjusted temperature below 10^0C was almost consistent with Addis Ababa (49.6% verses 53.4%). The percentage of catering establishments where spoiled food items were found was very low (7.2%) when compared with Addis Ababa (33.5%). In general the presence of perishable food items in those establishments that did not have refrigerators and in those establishments that did not adjust the temperature of their fridge to the required level could create a favorable medium for the multiplication of bacteria. Hence, perishable food items stored in such conditions could be the source of foodborne disease

The other area of the study was butcher shop on which meat was sold. Meat is a very delicate food item which needs special care in handling and processing, otherwise it can be a suitable medium for microbial contamination, growth and disease transmission (9, 12), and yet the findings of this study showed that a considerable number of butcher shops had series deficiencies that lead for contamination and spoilage of meat. About a quarter of the walls and ceilings of butcher shops were not kept clean and the same proportion had no cupboard or box where meat was exhibited for sale, even 40% of the existed cupboard or box were not insect and dust proof, on top of that 40.7% of the total butcher shops use newspaper and used paper to wrapped meat. Hence the risk of meat contamination by flies, dust particles and the like is obvious and infact the problem will be aggravated by the windy nature of the town.

The presence of as young as 13 and as old as 62 years old food handlers in the kitchen looked to be unlikely by a definition of employment age. But when we consider our set up and economical status of the society it is a common practice. Particularly there are several occasions that the

whole family members were involved in catering business by having a division of labor among themselves. Hence the presence of 13 and 62 years old food handlers in the kitchen might have been from those establishments that run their business by family members.

Food handlers had reasonably good knowledge towards the cause, mode of transmission of foodborne disease and the risk factors for food contamination. On the other hand their high level of knowledge is incompatible with the sanitation of the facility, particularly with the cleanliness and repair condition of kitchen, the hygienic condition of food utensils, storage system of prepared food and clean utensils. The possible explanation might be multitude; they might have been reluctant to practice what they know due to work overload, lack of attitudinal change, ignorance or lack of encouragement. They might not be equipped and/or supplied with the necessary material that enables them to maintain the sanitary quality of their premises. Some sanitary defects could be beyond their scope to intervene.

Food handlers may be the source of food contamination either as carriers of pathogen or through poor hygienic practices. All food handlers have a basic responsibility to maintain a high degree of personal cleanliness and observe hygienic and safe food handling practices. Keep hands clean, fingernails short, wear clean working garment and hair cover (hair net and cap) are some of the precautions that a food handler must maintain (8, 21). But in this study food handler's practice towards personal hygiene and sanitary food handling is found unsatisfactory. Seventy three percent of the food handlers were found wearing working outer garments which are lower than the result of similar study in Awassa (86%) but higher than the finding of Addis Ababa (54.2%); on the other hand, the proportion of clean outer garments were much lower than the case in Awassa, 74%.

The rate of food handlers who are found with trimmed finger nail in this study are relatively comparable with the findings in Awassa (76% verses 78.8%), and higher than the result found in Zeway (49.2%). Thirty nine percent of food handlers were also found with covered hair, which is consistent with that of Zeway (40.1%), but better than the results in Awassa (11.8%). The rate of food handlers who wore finger ornaments was higher in Mekelle than in Zeway (35.7% verses 28.7%). The over all practice of food handlers towards personal hygiene and food handling is not to the acceptable level. Because food handlers are expected to have a high degree of personal cleanliness and safe food handling practices.

Food handlers known or suspected to be suffering from infectious diseases like diarrhea, visible infected skin lesson (boils, cuts), respiratory infection and discharges from ear, eye and nose should be suspended from food handling and preparation until they become cured. The purpose of this measure is to prevent food contamination and thereby the spread of infectious disease through the ingestion of contaminated food (9). But in this study infected food handlers were observed while preparing food in the kitchen, though the proportion is low (9%) when compared with Zeway (14.8%). Therefore, the risk of food contamination and spread of infectious disease like foodborne disease is more likely to occur in those establishments as far as the infected food handlers continue in their daily activity.

The presence of S.aureus, coliforms, E.coli and Aerobic Mesophilic Bacteria (AMB) colony above 100 per utensil showed the existing sanitation quality of food utensils. E.Coli and S.aureus were also isolated from 18.2% and 27.3% of the swabbed utensil respectively. A study conducted in Jimma (22) showed that 9 out of 13 or 69.2% of milk utensils were positive for E.Coli that shows high rate of contamination than the current study. However, microbial survey of 200 Irish

restaurants (23) came up with the findings of 3% of cutting boards, 1% of knives and 2% of worktops were positive for E.Coli which was very low when compared with this study. In contrary, 23% of cutting boards, 13% of knives and 25% of worktops were positive for S.aureus, which was more or less comparable with the figure found in this study.

Food utensils like plats/bowls were found in gross unhygienic condition. There are different factors that might have been attributed to the gross bacterial contamination of plates/bowls. The washing technique might be ineffective as most of the establishments did not use the standard three compartments washing facility and used hot water very rarely. Clean plates might be improperly handled and stored, because more than half (64.8%) of the utensils were stored on a table without cover in a way that they were exposed to dust particle deposition and contamination. Water used for washing plates might not be changed frequently. Clothes /towels used to wipe and dry plates could contaminate clean plates, by spreading bacteria from plate to plate and this fact has been confirmed by laboratory experiments some where.

Food handlers with skin lesion, respiratory infection and nose and eye discharge might have been attributed to the presence of S.aureus in about 27.3% of the swabbed plates. As S.aureus lives and flourishes in the human nose, throat and skin, the likelihood of recontamination of plates by improper handling of infected food handlers is obvious.

Strength of the study

- In addition to the main objective and input of the study, the list of catering establishments that was obtained through the census for the purpose of sampling frame would serve as baseline for planning and performance evaluation of the routine monitoring and control activities
- The study was supplemented by the bacteriological swab test of food utensils, which is crucial to quantify the extent of sanitary condition objectively. Thus, it will pave the way for further detail investigation in this area.

Limitation of the study

- Due to lack of standard catering establishment grading system/instrument, it was found difficult to conduct composite analysis and to rate the establishments as satisfactory or unsatisfactory based on the out come of the grading system.
- Scarcity of resources hampered the scope of bacteriological swab test of food utensils. As a result only small number of swab samples was performed, so that the sample size might not be adequate for generalizability.
- Scarcity of reference materials, particularly from developing countries would make the comparison with locally available materials only; so we could not be benefited from the experience of other less developed countries.

Conclusion

Based on the findings of this descriptive cross sectional study, the following conclusions can be drawn:

- Many catering establishments were found with poor repair and sanitary condition, that is
  - Poor repair condition of kitchens
  - Improperly managed toilet facilities
  - Inappropriate solid waste storage receptacles
  - Lack of the standard three compartment food utensil washing facility and
  - Lack of hand washing lavatory
- The knowledge and practice of Food handlers towards foodborne disease, personal hygiene and food handling were found unsatisfactory
- The bacteriological swab test of food utensil also revealed gross unhygienic condition of food utensils and/or ineffectiveness of washing and sanitizing procedures, as well as improper handling and/or storage practices.
- Therefore, from all those sanitary defects stated above, the likely hood of food contamination is very high in catering establishments of Mekelle town.

Recommendation

Based on the findings of the study, the following are recommended:

1. The regulatory body should pay due attention to promote and/or improve:
    - the universally used three compartment dishwashing system,
    - installation of appropriate hand washing lavatory facility
    - Proper type of solid waste storage receptacle
    - proper storage of perishable food items, and
    - The cleanliness of toilet facilities.
2. During work permit approval and sanitary inspection due attention should be given :
    - To the cleanliness, repair condition and overall administration/organization of the kitchen
    - On job or refresher training of food handlers on basic principles of food handling and preparation practices; because it is the kitchens' sanitary condition together with the food handler personal hygiene and food handling practices that determines the safety of food.
3. The regulatory activity should be supplemented by education, motivation and persuasion of food handlers and owners/managers; because they are the key actors for the sustainability of the sanitary condition of the establishment or not. Encouraged, motivated and persuaded food handlers and owners will take the primary responsibility for self-inspection and supervision.
4. Establish and/or strengthen integrated work with different stakeholders (municipality, health, tourism, trade and industry offices and Mekelle chamber of commerce) to promote and maintain optimum sanitary conditions of the establishment

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Annex 1: Procedures for the Bacteriological Examination of food Utensils and/or Food equipment Surfaces

1. Sample Food Utensil selection and Swabbing Technique (18)

Five plates/bowls were selected from each randomly enrolled catering establishment regardless of the scope and size of establishment as well as the number of existing plates in each establishment. Although, it is that the total number of plates differs from establishment to establishment, a fixed number of plats/bowls that is five is selected for swab test. Concerning selection method, first the total number of clean plats/bowls were counted in each establishment and then the same type of five plates were selected by systematic selection technique from the shelves or other places where they stored (18). The samples were collected during the morning shift, because often utensils are ready for lunch service from early the morning. For each group of plates/bowls (5 plates/bowls) swabbing, one sterilized cotton swab on wooden applicator stick was used. The sterilized swabs were placed in a screw cap test tube to avoid post contamination.

In the laboratory 4 ml sterile normal saline (diluents/dilution fluid) was poured into a series of sterilized vials with rubber stopper. The vials filled with sterile normal saline/dilution fluid were used as a transporting media as the swabbed cotton was rinsed in the content of the vials. In order to maintain confidentiality and to simplify the laboratory management, each vial was labeled with its own code number.

Before swabbing, a sterile swab from its container (screw cap test tube) was taken and was dipped in normal saline/diluents and squeezed it against the inside of the container so as to remove excess water, leaving the swab moist but not wet. Then after the moist swab was rubbed

slowly and firmly 3 times over approximately 50 cm^2 (a path of 2.5cm by 20 cm or 5cm by 10cm or other dimension to cover an equivalent area) of the selected 5 plates/bowls, reversing the direction each time. After swabbing each utensil the swab was returned to the normal saline/diluents, rinsed briefly in the solution and pressed out the excess solution against the inside of the vial before swabbing the next plate/bowl in the group. The same method was implemented until all utensils of the same group have been finished. After all areas of each group have been swabbed, the cotton swab was replaced in the vial media and tightens the rubber stopper on it, at the same time the vials were put in an icebox to maintain the temperature between 0-4^{0}C until they reached to the laboratory. The swabbed samples were delivered to the laboratory within 2 hours of the sample collection.

2. Laboratory procedure (19)

In the laboratory the samples were plated/inoculated with in two hours of reception, but where this could not be done (lunch time break) samples were kept properly in a refrigerator to avoid bacterial multiplication and inoculation was done after thawing is completed. But all samples were inoculated in the same day.

2.1 Direct cultures (19)

In order to disintegrate content of the swab, the vial containing the swab and normal saline/dilution fluid was shacked using a test tube shaker (vortex) and then 1 ml of sample (normal saline/diluents in the vial) was inoculated into the solid media of MacConkey and blood agar (BA) to isolate coliforms like Escherichia Coli (E.coli) and Staphylococcus auereus (S.aureus), respectively. The Petri dishes were incubated aerobically at 37^{0}C for 24-48 hours. Similarly for the growth of aerobic mesophilic bacteria (viable colony), 1 ml of sample was

transferred from the vial containing the sample to a sterilized Petri dish and approximately 10 ml of melted yeast extract agar was added to the Petri dish, mixed thoroughly and inoculated at 37^0C for 48 hours.

Their colony/cultural characters on the preliminary observation followed by confirmatory biochemical test identified S.aureus and E.coli. manitole salt agar, Coagulase and deoxyribonuclease (DNase) test was performed for the isolation of S.aureus, where as sugar fermentation, urease, citrate and indole test for E.coli identification as a confirmatory test

2.2 Multiple test tube method (19)

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 MacConkey broth, and incubated at 37^0C for 24-48 hours. After the incubation period, the test tubes were checked for lactose fermentation, which was identified by acid production and gas formation. Acid and gas producing cultures were considered presumptive positive growth of coliform bacilli. By reference to the standard tables of most probable number (MPN) in respect of the combination of positive and negative results observed, MPN was read.

A loopful/drop of each presumptive positive culture was inoculated into test tubes containing of the lauryl tryptose broth (three groups of test tubes, each containing 3 test tubes) were re-incubated at 44^0C in a water bath for 24 hours. After 24 hours the test tubes incubated at 44^0C were removed and checked for gas and acid formation, which was a confirmatory test for fecal coliforms and results were read from the standard MPN table.

2.3 Calculation and result reading (18, 19)

Calculations for aerobic mesophilic bacteria are made based on the area swabbed and the amount of normal saline/diluents contained in one vial. One vial was filled by 4 ml of normal saline or diluents. One (1 ml) of diluents was removed for laboratory testing. Therefore; the number of colonies per utensil was calculated as the total number of colonies grown in the Petri dish divided by 5 utensils swabbed, that could be expressed as colony forming unit per utensil (CFU/utensil), it could be also reported as CFU/50cm^2 surface area.

In case of multiple test tube technique for total and fecal coliforms, results were read based on the number of positive test tubes from the corresponding standard Most Probable Number (MPN) table

2.4 Quality Control and Validity

The sterility of each batch of agar media (MacConkey, manitol salt agar, blood agar, yeast extract agar and other biochemical culture Medias) were confirmed by incubating one uninoculated and another one inoculated Petri dish of each agar media. Every culture media, in the laboratory that have been used for diagnostic purpose including the media used for this study was checked weekly by standard (known) colonies.

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 2

Code No._____

English Version Questionnaire

Addis Ababa University

Faculty of Medicine

Department of Community Health

Questionnaire for Data Collection on Sanitary Conditions of Mass Catering Establishments in Mekelle Town, Tigray, 2004

Identification

Type of establishment_____Name of Establishment_____

Address of establishment_____Establishment code No._____

Verbal consent form before conducting interview

Greeting:

Hello, my name is _____. I am working in the research team of Addis Ababa University. I would like to interview you a few questions about the sanitary condition of your establishment and some of the questions require physical observation. The objective of this study is to determine the sanitary conditions of mass caterings in Mekelle town, which is important to improve the sanitary status so as to safeguard the health of consumers 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 and code _____ signature _____

Date of interview _____ Time started_____ Time finished_____

Supervisors name _____ signature _____

Code NO._____

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.

1. **Socio-demographic condition**

Sr.No.	Question	Response	Code
	1.1 Owners/managers		
101	Does the establishment have license?	1.Yes 2.No	/__/
102	Establishment ownership	1.Individual 2. Organization 3. Association 4. Other, specify	/__/
103	Manager of the establishment	1.Owner 3.Relative 2. Hired person 4. Other, specify	/__/
104	Sex of owner/manager	1. Male 2. Female	/__/
105	Age: _____years	_____Years	/__/
106	Religion of owner/manager	1.Christian 2. Moslem 3. Other, specify	/__/
107	Marital status owner/manager	1. Single 3. Divorced 2. Married 4. Widowed 5.Separated	/__/
108	Ownership of the establishment building	1. Private 2. Rented	/__/
109	Educational status owner/manager	1.Illiterate 2.Grade 1-6 3. Grade 7-12 4. Above grade 12	/__/
110	Service year of establishments in years	_____Year	/__/
	1.2 Food handler		
111	Does the Establishment Prepare food for sale?	1.Yes 2.No (If No skip to 312)	/__/

112	Total number of male food handlers	_____	/__/
113	Total number of female food handlers	_____	/__/
NOTE: **the following questions are directed only to food handlers who is involved particularly in food preparation**			
Sr.No.	**Question**	**Response**	**Code**
114	Sex of food handler	1. Male 2. Female	/__/
115	Age of food handler: _____years	_____	/__/
116	For how long you stay in this work?	_____	/__/
117	Marital status of food handler	1. Single 3. Divorced 2. Married 4. Widowed 5.Separated	/__/
118	Educational status of food handler	1. Illiterate 3. Grade 7-12 2. Grade 1-6 4. 12+	/__/

2. **Knowledge and practice of food handlers**

	2.1 Knowledge		
201	Have you ever heard about foodborne disease?	1.Yes 2.No (If no skip to 206)	/__/
202	Who is your source of information about foodborne disease? **(Circle all responses)**	1. Health center 2. Sanitarian during inspection 3. Mass media 4. Other, specify	/__/ /__/ /__/
203	What is the cause of foodborne disease? **(Circle all responses)**	1. Germs 2. Chemicals 3. Evil eye 4. Super natural force 5. Do not know 6. Other, specify	/__/ /__/ /__/
204	Foodborne disease is transmitted by **(Circle all responses)**	1. Contaminated food 2. Contaminated water 3. Vectors 4. Do not know 5. Other, specify	/__/ /__/ /__/ /__/ /__/
205	What is the reason for food contamination? **(Circle all responses)**	1. Dirty hands. 2. Infected food handlers 3. Dirty utensils 4. By insects and rats	/__/ /__/ /__/

		5. Dirty working environment 6. Do not know 7. Others, specify	
	2.2 Practice		
206	Do ready to eat foods kept in clean container and covered properly during inspection?	1. Yes 2. No	/__/
207	Do food utensils stored in well-arranged manner in shelf or cupboard during inspection?	1. Yes 2. No	/__/

Sr. No.	Question	Response	Code
208	Does the food handler wear outer garments/gown during inspection?	1. Yes 2. No (If no skip to 210)	/__/
209	Does the gown clean?	1. Yes 2. No	/__/
210	Does the food handler's hair covered?	1. Yes 2. No	/__/
211	Does the food handler wear finger ornaments?	1. Yes 2. No	/__/
212	Does the food handler's finger nail cut short?	1. Yes 2. No	/__/
213	Does the kitchen free of dust, litter or other dirt?	1. Yes 2. No	/__/
214	Does the food handler wash his/her hand before starting food preparation today (this morning)?	1. Yes 2. No	/__/
215	Does the food handler take medical check up in the past one year? (See medical certificate)	1. Yes 2. No	/__/
216	If the answer for number 215 is no, does he/she had made medical check up ever before?	1. Yes 2. No	/__/
217	Is the food handler trained on food preparation and handling?	1. Yes 2. No	/__/
2.3 Does the food handler have symptom of the following infections?			
218	Diarrhea	1. Yes 2. No	/__/
219	Respiratory infection/cough	1. Yes 2. No	/__/
220	Skin lesion (boils, cuts wounds etc)	1. Yes 2. No	/__/
221	Discharge from ear	1. Yes 2. No	/__/
222	Discharge from nose	1. Yes 2. No	/__/
3. Housing Condition			
	Does the establishment have a Kitchen?	1. Yes 2. No (If no skip to 312)	/__/
301	Kitchen floor is constructed of:	1. Concrete 2. Tile 3.Plastered stone 4. Earthen material 5. Wood	/__/
302	Have the kitchen floor big cracks, and detached areas?	1. Yes 2. No	/__/
303	Is the wall and ceiling free of dust, spider web and smoke particles?	1. Yes 2. No	/__/
304	Is the kitchen wall and ceiling has big cracks, detached areas and holes?	1. Yes 2. No	/__/

Sr. No.	Question	Response	Code
305	Does the kitchen have open able window? (About 10% of floor area)	1. Yes 2. No	/__/
306	Does the kitchen have adequate light in which a health person can easily identify objects in the room with out eyestrain?	1. Yes 2. No	/__/
307	Does the kitchen room have adequate ventilation in which the kitchen is reasonably free of disagreeable odor?	1. Yes 2. No	/__/
308	Have the food handlers separate dressing room?	1. Yes 2. No	/__/
309	Is there an infestation of flies?	1. Yes 2. No	/__/
310	Is there an infestation of cockroaches?	1. Yes 2. No	/__/
311	Is there an infestation of rats?	1. Yes 2. No	/__/
312	Dining room floor is constructed of:	1. Concrete 2. Tile 3.Plastered stone 4. Earthen material 5. Wood	/__/
313	Have the dining room floor big cracks, detached areas and holes?	1. Yes 2. No	/__/
314	Is the wall and ceiling free of dust, spider web and smoke particles?	1. Yes 2. No	/__/
315	Is the dining room wall and ceiling have big cracks, detached areas and holes?	1. Yes 2. No	/__/
316	Does the dining room have open able window? (About 10% of floor area)	1. Yes 2. No	/__/
317	Does the dining room have adequate light in which a health person can easily identify objects in the room with out eyestrain?	1. Yes 2. No	/__/
318	Does the dining room have adequate ventilation in which it is reasonably free of disagreeable odor?	1. Yes 2. No	/__/
319	Is there an infestation of flies?	1. Yes 2. No	/__/
320	Is there an infestation of cockroaches?	1. Yes 2. No	/__/
321	Is there an infestation of rats?	1. Yes 2. No	/__/
4. **Water Supply and Sanitation**			
4.1 toilet facility			
401	Toilet facility available	1. Yes 2. No (If no skip to 409)	/__/
402	If yes, separate room for male and female:	1. Yes 2. No	/__/
403	Number of seats of toilet facility: _____	_____	/__/
404	Is there a urinal?	1. Yes 2. No	/__/

Sr. No.	Question	Response	Code

405	Type of toilet facility:	1. Flush type 2. Dry pit latrine 3. Others, specify	/__/
406	Do the latrine free of litter, tissue papers and other dirt's like faces/urine seen around	1. Yes 2. No	/__/
407	Does the toilet facility open to give service for clients at time of inspection? (Observe)	1 Yes 2. No	/__/
408	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	/__/
	4.2 Lavatory Facility		
409	Is there lavatory facility available?	1. Yes 2. No (if No skip to 414)	/__/
410	If yes, separate for clients and workers:	1. Yes 2. No	/__/
411	What type of lavatory is it?	1. Fixed wash basin 2. Fixed water trough 3. Manual/bucket 4. Other (specify)	/__/
412	Is the lavatory functional during inspection?	1. Yes 2. No	/__/
413	Is there any type of detergent available in the lavatory facility during inspection?	1. Yes 2. No	/__/
	4.3 Liquid waste management		
414	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	/__/
415	Is there any insects breeding around the liquid waste disposal facility?	1. Yes 2. No	/__/
	4.4 Solid waste management		/__/
416	Is there a container for solid waste storage?	1. Yes 2. No (If no skip to 420)	/__/
417	If yes, the type of solid waste storage container is:	1. Dust bin 2. barrel 3.Sack 4. Others, specify	/__/
418	Does the solid waste storage container, durable, have tight fitting, and light to carry and transport?	1. Yes 2. No	/__/
419	Does the solid waste container placed at appropriate site?	1. Yes 2. No	/__/

Sr. No.	Question	Response	Code
420	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	/__/
421	Source of water supply	1. Private Pipe 2. Pipe shared 3. pipe from neighbor 4. Pipe from public stand post 5. Others, specify	/__/
422	If private pipe available is running water accessible in kitchen room for preparation and utensil washing?	1. Yes 2. No	/__/
423	If the answer for question number 421 is yes, does hot running water available?	1. Yes 2. No	/__/
5. **Food Utensil and Equipment**			
	5.1 Condition of food utensil		
501	Are the food utensils easy to clean, have no open seams and not corrodible?	1. Yes 2. No	/__/
502	Are the food utensils free of dust particles, finger paint and other marks?	1. Yes 2. No	/__/
503	Are the chopping boards smooth, free of cracks and hole during inspection?	1. Yes 2. No	/__/
	5.2 Dish washing facility		
	Is the establishment engaged in food preparation?	1. Yes 2. No (If no skip to 508)	
504	Where do soiled dishwashing undertake?	1.one compartment 2.two compartment 3. Thee compartment	/__/
505	The above compartment is	1. Fixed type with a water tap 2. Dish bowls/bucket 3. Both	/__/
506	Do they use detergent for washing dishes?	1. Yes 2. No	/__/
507	Do they use hot water for washing dishes?	1. Yes 2. No	/__/
	5.3 Drinking glass/cup washing facility		
508	Where do soiled drinking glass washing undertake?	1.One compartment 2.Two compartment 3.Thee compartment	/__/

Sr. No.	Question	Response	Code
509	The above compartment is	1. Fixed type with a water tap 2. Dish bowls/bucket 3. Both	/__/
510	Do they use detergent for washing glasses?	1. Yes 2. No	/__/
511	Do they use hot water for washing glasses?	1. Yes 2. No	/__/
512	Are clean and sanitized utensils covered by clean cloth (plastic sheet) and stored in shelf or cupboard?	1. Yes 2. No	/__/
6. **Store Room and Refrigerator**			
601	Is there a storeroom for non-perishable foodstuffs?	1. Yes 2. No (If No skip to 603)	/__/
602	If yes, does it have free space, not over crowded and properly arranged for free air circulation?	1. Yes 2. No	/__/
603	Is a refrigerator available?	1. Yes 2. No (If No skip to 607)	/__/
604	If the answer for 603 is yes, does it have a fixed thermometer available?	1. Yes 2. No	/__/
605	If thermometer is available, are readily perishable foodstuffs kept under 10^{o}C?	1. Yes 2. No	/__/
606	Is the foodstuff stored in refrigerator arranged properly?	1. Yes 2. No	/__/
607	Is there any sign of spoilage of stored food observed?	1. Yes 2. No	/__/
7. Butcher shop			
701	Butcher shop floor is constructed of:	1. Concrete 2. Tile 3.Plastered stone 4. Earthen material 5. Wood	/__/
702	Is the floor of butcher shop free of big cracks, and detached areas?	1. Yes 2. No	/__/
703	Does the Butcher shop have A ceiling?	1. Yes 2. No	/__/
704	Is the wall and ceiling free of dust, spider web and smoke particles?	1. Yes 2. No	/__/
705	Is the wall of butcher shop painted white color paint?	1. Yes 2. No	/__/
706	Is there a cupboard or shelf for meat display?	1. Yes 2. No (If No skip to 709)	/__/
707	If the answer for 707 is yes, Is it insect proof?	1. Yes 2. No	/__/

Sr. No.	Question	Response	Code
708	Is refrigerator available?	1. Yes 2. No	/__/
709	Chopping board is made up of	1. Wooden material 2. Concrete 3. Marble 4.Plastic 22.other, specify _____	/__/
710	Is the Chopping board smooth, free of crack & easily washable?	1. Yes 2. No	/__/
711	Is the meat hanger clean and made up of non-corrodible material?	1. Yes 2. No	/__/
712	Are the knives, file and others relevant equipments handled in a sanitary condition?	1. Yes 2. No	/__/
713	What is used to wrap meat?	1. Appropriate type of Paper 2. Plastic festal 3. News paper 4. Used paper 22.Other, specify ____	/__/
8. Miscellaneous			
801	Estimated average daily consumers in the establishment: ____	_____	/__/
802	Was the establishment inspected by a sanitarian in the past six months?	1. Yes 2. No	/__/
803	If yes, did the inspection activity advice and education oriented and helpful to improve the sanitary condition?	1. Yes 2. No	/__/
804	Does the establishment provide service according to the license?	1. Yes 2. No	/__/

Remark_____
_____
_____
_____

Thank you!

Code No._____

Annex 3:

Amharic Version Questionnaire

በ አዲስ አበባ ዩኒቨርስቲ

ህክምና ፋኩሊቲ

የህብረተሰብ ጤና ትምህርት ክፍል

በትግራይ ክልል በመቀሌ ከተማ የሚገኙ የምግብና መጠጥ ድርጅቶች የጤናና የሳንቴሽን ሁኔታ ለማጥናት የተዘጋጀ ቃለ መጠይቅ *1997* ዓ.ም

<u>መለያ</u>

የድርጅቱ ዓይነት _____የድርጅቱ ስም/መጥሪያ _____
የድርጅቱ ኣድራሻ_____የድርጅቱ መለያ ቁጥር_____

<u>ቃለ መጠይቁን ከመደረጉ በፊት የተሳታፊዎች ፍቃደኝነት መጠየቅያ ቅፅ</u>

ሰላምታ፡ እንደምን አሉ? እኔ አቶ/ወ.ሮ/ወ.ሪት _____ እባላሎህ ። እዚህ የመጣሁት ይህንን ጥናት የሚያከሂድ የአዲስ አበባ ዩኒቨርስቲ ቡድን አባል ሁኜ ነው። በዚህ መሰረት የድርጅትዎን የጤናና የሳንቴሽን ሁኔታ በሚመለከት ጥያቄዎችን ለመጠየቅና ድርጅትዎን ለመጎብኘት ነው የመጣሁት። ይህ መጠይቅ የተዘጋጀበት ዋና ዓላማ በመቀሌ ከተማ ውሰጥ ያሉ የምግብና መጠጥ ድርጅቶች የጤናና ሳንቴሽን ሁኔታ (sanitary condition) **ለማወቅ እንዲያስችል ነው።ይክም ማለት የጥናቱ ውጤት የድርጅቶችን የሳንቴሽን ሁኔታ የሚሻሻልበት መንገድ ለመፈለግና በንፅህና ጉድለት በተመጋቢዎች ላይ ሊከሰቱ የሚችሉ ምግብ ወለድ በሽታዎች ለመከላከልና ለመቀነስ ነው።ስለዚህ እርስዎ የጥናቱን ዓላማ ተገንዝበው ድርጅትዎን በሚመለከት ለሚነሱ ጥያቄዎች ተክክለኛ መልስ በመስጠትና ድርጅትዎን በማስጎብኘት ቀና ትብብር ያደርጉልን ዘንድ እንጠይቃለን። ድርጅትዎን በሚመለከት የምናገኘው ማንኛውም መረጃ ለማንኛውም አካል የማንሰጥና በምስጢር የምንይዘው መሆናችንን ልንገልፅልዎ እንወዳለን።ለሚጠየቁት ጥያቄ መልስ ያለመስጠት መብትዎም እናከብራለን።**

በዚህ መሰረት እርስዎ ለሚቀርብልትዎ ጥያቄ ለመመለስና ድርጅትዎን ለማስጎብኘት ፈቃደኛ ነዎት ?

1. **አዎ ከሆነ መልሳቸው ወደሚቀጥለው ገፅ ይሂዱ**
2. **መልሳቸው የለም ከሆነ ወደሚቀጥለው ድርጅት ይሂዱ**

መጠይቅ ያደረገው ሰው ስምና መለያ ቁጥር_____ ፊርማ_____
መጠይቁ የተደረገበት ቀን_____ መጠይቁ የተጀመረበት ሰዓት_____
መጠይቁ ያለቀበት ሰዓት_____የሱፐርቫይዘር ስም _____
ፊርማ_____

Code No._____

የመጠይቁ አሞላል መምርያ

ለአብዛኘቹ መጠይቆች መልስ ሊሆኑ ይችላሉ ተብሎ የታመነባቸው አመራጮች በዝርዝር ተቀምጠዋል። ስለዚህ መጠይቆቹን በምትሞላበት ጊዜ የሚከተሉትን መመሪያዎች ተከትላቹህ መጠየቅና መልሱ ማስፈር አስፈላጊ ነው።

- **እያንዳንዱ ጥያቄ መጠይቁ ላይ እንደሰፈረው በትክክል መጠየቅ አለበት**
- **መጠይቅ የሚደረግላቸው ሰዎች መልስ ብቻ በቂ አይደለም። መታየት ወይም መፈተሽ ያለባቸው ቦታዎች በሙሉ መታየት አለባቸው።**
- **ለእያንዳንዱ ጥያቄ መልስ ይሆናሉ ተብለው የተዓፉ አመራጭ መልሶች መጠይቅ ለሚደረግላቸው ሰዎች መግለፅ አስፈላጊ አይደለም።**
- **ተጠያቂዎች የሚሰጡት መልስ በትክክል ማዳመጥና ለተሰጡት መልሶች ከተቀመጡት አመራጮች በበለጠ የሚመሳሰለውን በመምረጥ የክብ ምልክት መደረግ አለበት።**

1. ማህበራዊ ሁኔታ

ተራ ቁጥር	ጥያቄ	የተሰጠ መልስ	ኮድ
	1.1 የድርጅቱን አስተዳዳሪ/ ባለቤት በሚመለከት		
101	ድርጅቱ የንግድ ፍቃድ አለው?	1. አዎ 2. የለውም	/__/
102	የድርጅቱ ባለቤትነት በሚመለከት (የንግድ ፍቃድ በሚመለከት)	1. የግል 3. የማሕበር 2. የድርጅቱ 22. ሌላ (ይገለፅ)	/__/
103	ድርጅቱን የሚያስተዳድረው ማን ነው ?	1. ባለቤቱ 3. ዘመድ 2. ቅጥር ሰው 22. ሌላ (ይገለፅ) _____	/__/
104	የድርጅቱ አስተዳዳሪ ፆታ	1. ወንድ 2. ሴት	/__/
105	የድርጅቱ አስተዳዳሪ እድሜ ስንት ነው?	_____ዓመት	/__/
106	የድርጅቱ አስተዳዳሪ የምን እምነት/ ሃይማኖት ተከታይ ነው?	1. ክርስትያን 2. እስላም 22. ሌላ (ይገለፅ) _____	/__/
107	የድርጅቱ አስተዳዳሪ የጋብቻ ሁኔታ	1. ያላገባ/ች 2. ያገባ/ች 3. ፈት 4. ባል/ሚስት የሞተባት/ በት 5. የተለያዩ	/__/
108	የድርጅቱ ህንፃ ይዞታ	1. በግል 2. በክራይ	/__/
109	የድርጅቱ አስተዳዳሪ የትምህርት ደረጃ	1. ያልተማረ 3. 7-12 ክፍል 2. 1-6 ክፍል 4. ከ 12ኛ ክፍል በላይ	/__/
110	ድርጅቱ ስንት አመት አገልግሎት ሰጠ?	_____ዓመት	/__/
	1.2 የምግብ ቤት ሰራተኞች		
	ድርጅቱ የምግብ አገልግሎት ይሰጣል?	1. አዎ 2.አይሰጥም ((መልሱ አይሰጥም ከሆነ ወደ 312)	/__/
111	ጠቅላላ ወንድ የምግብ ሰራተኞች ብዛት	_____	/__/
112	ጠቅላላ ሴት የምግብ ሰራተኞች ብዛት	_____	/__/
ማስታወሻ፡- ከዚህ በታች (113-116) ያሉት ጥያቄዎች በቀጥታ ከምግብ ጋር ንክኪ ያላቸው ሰራተኞች ወይም ምግብ አዘጋጆች የሚቀርብ ነው።			

ተራ ቁጥር	ጥያቄ	የተሰጠ መልስ	ኮድ
113	የምግብ ቤት ሰራተኛው/ዋ ፆታ	1. ወንድ 2. ሴት	/__/
114	የምግብ ቤት ሰራተኛው/ዋ ዕድሜ	_____ዓመት	/__/
115	የምግብ ቤት ሰራተኛው/ዋ ለስንት ግዜ ነው በዚህ ስራ የቆዩት?	_____ዓመት	/__/
116	የምግብ ቤት ሰራተኛው/ዋ የጋብቻ ሁኔታ	1. ያላገባ/ች 2. ያገባ/ች 3. ፈት 4. ባል/ሚስት የሞተባት/በት 5. የተለያዩ	/__/
117	የምግብ ቤት ሰራተኛው/ዋ የትምህርት ደረጃ	1. ያልተማረ 3. 7-12 ክፍል 2. 1-6 ክፍል 4. ከ12ኛ ክፍል በላይ	/__/
2. የምግብ ቤት ሰራተኞች አጠቃላይ እውቀትና ልምድ			
	2.1 እውቀት		
201	ስለ ምግብ ወለድ በሽታ ሰምተው ያውቃሉ?	1.አዎ 2. አይደለም (መልሱ አይደለም ከሆነ ወደ 206)	/__/
202	ስለ በሽታው የመረጃ ምንጭዎ ማን ነው? **(የተሰጡ መልሶች በሙሉ አክብባቸው)**	1. ጤና ጣብያ 2. ጤና ተቆጣጣሪ 3. መገናኛ ብዙሃን 22. ሌላ (ይገለፅ) _____	/__/ /__/ /__/
203	የምግብ ወለድ በሽታ መነሻው ምንድ ነው? **(የተሰጡ መልሶች በሙሉ አክብባቸው)**	1. ጆርሞች 3. ቡዳ 2. ኬሚካሎች 4. ሌላ መንፈስ 11. አላውቅም 22. ሌላ (ይገለፅ) _____	/__/ /__/ /__/ /__/
204	የምግብ ወለድ በሽታ መተላለፍያ መንገድ ምንድ ነው? **(የተሰጡ መልሶች በሙሉ አክብባቸው)**	1. የተበከለ ምግብ 2. የተበከለ ውሃ 3.እንደ ዝንብ የመሳሰሉት ነብሳት 11. አላውቅም 22. ሌላ (ይገለፅ) _____	/__/ /__/ /__/ /__/ /__/
205	ምግብ በምን መንገድ ሊበከል ይችላል? **(የተሰጡ መልሶች በሙሉ አክብባቸው)**	1. በቆሸሹ እጆች 2. በታመሙ የምግብ ቤት ሰራተኞች 3. በቆሸሹ የምግብ እቃዎች 4. በነፍሳት 5. ንፅህናው ባልተጠበቀ የምግብ ማዘጋጃ ክፍል 11. አላውቅም 22. ሌላ (ይገለፅ) _____	/__/ /__/ /__/ /__/
	2.2 ልምድ		
206	ጉብኝት በምታደርግበት ወቅት ለመብል የተዘጋጀ ምግብ በንፅህ እቃ ሆኖና ተሸፍኖ ተቀምጠዋል?	1. አዎ 2.አልተቀመጠም	/__/
207	ጉብኝት በምታደርግበት ወቅት የመመገብያ እቃዎች በተገቢው መንገድ በሽልፍ (ቁምሳጥን) ተደርድረው ተቀምጠዋል?	1. አዎ 2.አልተቀመጠም	/__/

ተራ ቁጥር	ጥያቄ	የተሰጠ መልስ	ኮድ
208	የምግብ ሰራተኛው/ዋ የስራ ልብስ ለብሰዋል?	1. አዎ 2.አይደለም (መልሱ አይደለም ከሆነ ወደ 210 ሂድ)	/__/
209	የምግብ ሰራተኛው/ዋ የለበሰው የስራ ልብስ ንፅህናው የተጠበቀ ነው?	1. አዎ 2.አይደለም	/__/
210	የምግብ ሰራተኛው የራስ ፀጉሩ ተሸፍነዋል (ቆብ አድርገዋል)?	1. አዎ 2.አላደረገም	/__/
211	የምግብ ሰራተኛው የእጅ ጣት ጌጣጌጥ አድርገዋል?	1. አዎ 2.አላደረገም	/__/
212	የምግብ ሰራተኛው የእጅ ጣት ጥፍሩ በአጭሩ የተቆረጠ ነው?	1. አዎ 2.አይደለም	/__/
213	የምግብ ማዘጋጃ ክፍል/መአድ ቤት ከአቧራ፣ ከምግብ ትርፍራፊና የመሳሰሉት ቆሻሻ ነገሮች የፀዳ ነው?	1. አዎ 2.አይደለም	/__/
214	የምግብ ሰራተኛው/ዋ ዛሬ ጥዋት የምግብ ዝግጅት ስራ ከመጀመሩ በፊት እጃቸውን ታጥበዋል?	1. አዎ 2.አልታጠበም	/__/
215	ባለፈው አንድ ዓመት የምግብ ሰራተኛው የህክምና ምርመራ አድርገዋል ? (የህክምና ሰርቲፊኬት ተመልከት)	1. አዎ 2.አላደረገም	/__/
216	የተራ ቁጥር 215 መልስ አይደለም ከሆነ፡ ከስራው ጋር በተየያዘ የህክምና ምርመራ አድርጎ ያውቃል?	1. አዎ 2.አያውቅም	/__/
217	የምግብ ሰራተኛው የምግብ አያያዝና አዘገጃጀት ስልጠና ወስደዋል?	1. አዎ 2.አልወሰደም	/__/
2.3 የምግብ ሰራተኛው የሚከተሉት የበሽታ ምልክቶች ይታዩበታልን ? (አካላዊ ምርመራ በሚመለከት)			
218	ተቅማጥ	1. አዎ 2. አይታዩበትም	/__/
219	የመተንፈሻ አካል ህመም/ ጉንፋን	1. አዎ 2. አይታዩበትም	/__/
220	የቆዳ ቁስል	1. አዎ 2. አይታዩበትም	/__/
221	ከጆሮ የሚወጣ ፈሳሽ	1. አዎ 2. አይታዩበትም	/__/
222	ከአፍንጫ የሚወጣ ፈሳሽ	1. አዎ 2. አይታዩበትም	/__/
3. የድርጅቱ ህንፃ/ቤት በተመለከተ			
	የምግብ ማዘጋጃ ክፍል/የኩችና	1. አለው 2.የለውም (መልሱ የለውም ከሆነ ወደ 312 ሂድ)	
301	የምግብ ማዘጋጃ ክፍል/የኩችና/መአድ ቤት ቤቱ ወለል የተሰራው ከምንድ ነው?	1. ኮንኩሪት 2. ማትኔላ 3. የድንጋይ ንጣፍ 4. አፈር 5. ጣውላ	/__/
302	የምግብ ማዘጋጃ ክፍል/ኩችና ቤቱ/ መአድ ቤት ወለል ስንጥቅ ፣ የተቆፋፈረና ክፍተት አለው?	1. አዎ 2.የለውም	/__/

ተራ ቁጥር	ጥያቄ	የተሰጠ መልስ	ኮድ
303	የምግብ ማዘጋጃ ክፍል/ኩችና ቤቱ ግድግዳና ኮርኒስ ከአቧራ ፣ ከሸረሪት ድርና ከጥላሸት የፀዳ ነው?	1. አዎ 2.አይደለም	/__/
304	የምግብ ማዘጋጃ ክፍል/ኩችና ቤቱ ግድግዳና ኮርኒስ ስንጥቅና ክፍተት አለው?	1. አዎ 2.የለውም	/__/
305	የምግብ ማዘጋጃ ክፍል/ኩችና ቤቱ የወለሉ 10% ስፋት የሚሆን ተከፋች መስኮት አለው?	1. አዎ 2.የለውም	/__/
306	የምግብ ማዘጋጃ ክፍል/ኩችና ቤቱ ውስጥ አንድ ጤነኛ ሰው ያለ ምንም ችግር በቀላሉ የሉት እቃዎች ለመለየት የሚያስችል በቂ ብርሃን አለው?	1. አዎ 2.የለውም	/__/
307	ኩችና ቤቱ መጥፎ ጠረን የሌለውና በቂ የአየር ዝውውር ያለበት ነው?	1. አዎ 2.አይደለም	/__/
308	ለምግብ ሰራተኞች ቅያሪ ልብስ ማስቀመጫ የተለየ ክፍል አለ?	1. አዎ 2.የለም	/__/
309	ኩችና ቤቱ ውስጥ ዝንቦች ያስቸግራሉ?	1. አዎ 2.አይደለም	/__/
310	ኩችና ቤት ውስጥ የበረሮ ችግር አለ?	1. አዎ 2.የለም	/__/
311	ኩችና ቤት ውስጥ የአይጥ ችግር አለ?	1. አዎ 2.የለም	
312	የምግብ አዳራሽ ወለሉ የተሰራው ከምንድ ነው?	1. ኮንኩሪት 2. ማትኔላ 3. የድንጋይ ንጣፍ 4. አፈር 5. ጣውላ	/__/
313	የመመገቢያ አዳራሽ ወለል ስንጥቅ የተቆፋፈረና ክፍተት ያለው ነውን?	1. አዎ 2.አይደለም	/__/
314	የመመገቢያ አዳራሽ ግድግዳና ኮርኒስ ከአቧራ ፣ ከሸረሪት ድርና ከጥላሸት የፀዳ ነው?	1. አዎ 2. አይደለም	/__/
315	የምግብ አዳራሽ ግድግዳና ኮርኒስ ስንጥቅና ክፍተት አለው?	1. አዎ 2. የለም	/__/
316	የምግብ አዳራሹ የወለሉ 10% ስፋት የሚሆን ተከፋች የሆነ መስኮት አለው?	1. አዎ 2. የለውም	/__/
317	የምግብ አዳራሽ ውስጥ አንድ ጤነኛ ሰው ያለ ምንም ችግር በቀላሉ ያሉት እቃዎች ለመለየት የሚያስችል በቂ ብርሃን አለው?	1. አዎ 2.የለውም	/__/
318	የምግብ አዳራሽ ውስጥ መጥፎ ጠረን የሌለውና በቂ የአየር ዝውውር ያለው ነው?	1. አዎ 2.አይደለም	/__/
319	የምግብ አዳራሽ ውስጥ ዝንቦች ይታያሉ?	1. አዎ 2.አይታዩም	/__/
320	የምግብ አዳራሽ ውስጥ የበረሮ ችግር አለ?	1. አዎ 2.የለም	/__/
321	የምግብ አዳራሽ ውስጥ የአይጥ ችግር አለ?	1. አዎ 2.የለም	/__/

ተራ ቁጥር	ጥያቄ	የተሰጠ መልስ	ኮድ
4. የውሃና የመፀዳጃ ቤት ሁኔታ በተመለከተ			
	4.1 መፀዳጃ ቤት በተመለከተ		
401	ድርጅቱ የመፀዳጃ ቤት አለው?	**1.** አዎ **2.** የለውም (መልሱ የለውም ከሆነ ወደ 409 ሂድ)	/__/
402	መልሱ አዎ ከሆነ ለወንድና ለሴት የተለያየ ክፍል አለ?	**1.** አዎ **2.** የለውም	/__/
403	የመፀዳጃ በቱ ስንት መቀመጫ አለው?	_____ (በቁጥር)	/__/
404	የውሃ ሽንት ገንዳ (ዩሪናል) አለ?	**1.** አዎ **2.**የለም	/__/
405	የመፀዳጃ በቱ ምን ዓይነት ነው?	**1.** ዘመናዊ በውሃ የሚሰራ **2.** ባህላዊ የጉድጓድ ሽንት ቤት **22.** ሌላ (ይገለፅ)	/__/
406	መፀዳጃ በቱ ከወዳደቁ የሽንት ቤት ወረቀት ቱ ዓይነ ምድርነ ሽንትና የመሳሰሉት ቆሻሻ ነገሮች የፀዳ ነው?	**1.** አዎ **2.**አይደለም	/__/
407	በጉብኝቱ ወቅት መፀዳጃ ቤቱ ለደንበኞች ክፍት ነው?	**1.** አዎ **2.**አይደለም	/__/
408	መፀዳጃ ቤቱ ሲሞላ ምን ያደርጋሉ?	**1.**በመጣጭ መኪና ማስመጠጥ **2.**ሌላ መፀዳጃ ቤት ማስቆፈር **3.** ከዝናብ መውረጃ ቦይ ማገናኘት **22.** ሌላ (ይገለፅ)	/__/
	4.2 የእጅ መታጠቢያ በተመለከተ		
409	የእጅ መታጠቢያ ገንዳ/ሳህን አለ?	**1.** አዎ **2.**የለም (መልሱ የለውም ከሆነ ወደ 414 ሂድ)	/__/
410	መልሱ አዎን ከሆነ፡ ለተመጋቢዎችና ለምግብ ዝግጅት ሰራተኞች ተብሎ የተለየ ነው?	**1.** አዎ **2.**አይደለም	/__/
411	ምን ዓይነት የእጅ መታጠቢያ ገንዳ/ሳህን ነው ያለው?	**1.** ደረጃውን የጠበቀ የእጅ መታጠቢያሳህን **2.** ከሰሚንቶ የተሰራ መታጠቢያ ገንዳ **3.** በውሃ የተሞላ ባልዲ/ቆርቆሮ **22.** ሌላ(ይገለፅ) _____	/__/
412	በጉብኝቱ ወቅት የእጅ መታጠቢያው አገልግሎት ይሰጥ ነበር?	**1.** አዎ **2.**አይሰጥም	/__/
413	በጉብኝቱ ወቅት ለእጅ መታጠቢያ የሚያገለግል አሞ/ሳሙና በገንዳው ነበር?	**1.** አዎ **2.**የለም	/__/
	4.3 ፍሳሽ ቆሻሻ አያያዝና አወጋገድ		
414	ከእጅ መታጠቢያና ከምግብ እቃ ማጠቢያ የሚወጣ ቆሻሻ ውሃ የት ነው የሚወገደው?	**1.** የትም ቦታ **3.** መፀዳጃ ቤት **2.** ሴፕቲክ ታንክ **4.** የዝናብ ውሃ መሄጃ ቦይ **22.** ሌላ (ይገለፅ)_____	/__/

ተራ ቁጥር	ጥያቄ	የተሰጠ መልስ	ኮድ
415	በቆሻሻ ውሃ ማስወገጃ አከባቢ ነፍሳት ይራባሉ?	1. አዎ 2.አይራቡም	/__/
	4.4 ደረቅ ቆሻሻ አያያዝና አወጋገድ		
416	የደረቅ ቆሻሻ ማጠራቀሚያ/መያዣ እቃ አለ?	1. አዎ 2.የለም	/__/
417	መልሱ አዎ ከሆነ፡ ምን ዓይነት እቃ ነው የሚጠቀሙት?	1. ቅርጫት 2. በርሚል/ቆርቆሮ 3. ጆንያ 22. ሌላ (ይገለፅ) _____	/__/
418	የደረቅ ቆሻሻ ማጠራቀሚያ/መያዣ እቃ ጠንከራ፣የሚገጥም ክዳን ያለውና ለመሸከምና ለማማንገዝ ምቹ ነው ?	1. አዎ 2.አይደለም	/__/
419	የደረቅ ቆሻሻ ማጠራቀሚያ/መያዣ እቃ በሚያመች ቦታ ተቀምጠዋል ?	1. አዎ 2.አልተቀመጠም	/__/
420	የደረቅ ቆሻሻ ለመጨረሻ ግዜ የሚወገደው የት ነው ?	1. የማዘጋጃ ቤት ገንዳ 2. የማዘጋጃ ቤት ትራክተር/መኪና 3. በየቦታው ዝም ብሎ ይጣላል 4. ግቢ ውስጥ በማቃጠል 5. ግቢ ውስጥ በመቅበር 22. ሌላ (ይገለፅ)_____	/__/
	4.5 የውሃ አገልግሎት		
421	ለድርጅቱ ልዩ ልዩ አገልግሎት የሚውል ውሃ ከየት ነው የሚያገኙት ?	1. ከግላቸው ቧንቧ 2. ከጋራ ቧንቧ 3. ከጎረቤት ቧንቧ 4. ከበኖ ውሃ 22. ሌላ(ይገለፅ) _____	/__/
422	ከግላቸው ቧንቧ ውሃ የሚጠቀሙ ከሆነ ፡ በምግበ ማዘጋጃ ክፍል(ኩችና ቤት) ውስጥ የቧንቧ ውሃ መስመር አለ ?	1. አዎ 2.የለም	/__/
423	የተራ ቁጥር 422 መልስ አዎ ከሆነ ፡ ሙቅ ውሃ አለ ?	1. አዎ 2.የለም	/__/
5. የምግብ እቃ በሚመለከት			
	5.1 መመገብያ እቃዎች		
501	የመመገብያ እቃዎች ለማጠብ ምቹ፣ ስንጥቅ የሌለውና ለዝገት የማይጋለጡ ናቸው?	1. አዎ 2.አይደሉም	/__/
502	የምግብ እቃው ከአቧራ፣ ቆሻሻና ሌላ የቆሻሻ ምልክት የፀዳ ነው?	1. አዎ 2.አይደለም	/__/
503	የስጋ መቁረጫና መክተፍያ ጣውላ/ጠረጴዛ ልሙጥ፣ ስንጥቅና ቀዳዳ የሌለው ነው?	1. አዎ 2.አይደለም	/__/
	5.2 የምግብ ሳህን አጠባ		
504	የቆሸሹ የምግብ እቃዎች የት ነው የሚታጠቡት?	1. በባለ አንድ ክፍል ገንዳ 2. በባለ ሁለት ክፍል ገንዳ 3. በባለ ሦስት ክፍል ገንዳ	/__/

ተራ ቁጥር	ጥያቄ	የተሰጠ መልስ	ኮድ
505	ላይ የተገለፀው የምግብ ሳህን ማጠብያ ገንዳ ምን ዓይነት ነው?	1. የቧንቧ ውሃ በቀጥታ የተገጠመለት 2. ጎድጓዳ ሳህን/ገንዳ	/__/
506	ለእቃ ማጠብያ አሞ ወይም ሳሙና ይጠቀማሉ?	1. አዎ 2.አይጠቀሙም	/__/
507	ለእቃ ማጠብያ ሙቅ ውሃ ይጠቀማሉ?	1. አዎ 2.አይጠቀሙም	/__/
	5.3 የውሃና የመጠጥ ኩባያ አጠባ		
508	የቆሸሹ የውሃና የመጠጥ ኩባያዎች የት ነው የሚታጠቡት?	1. በባለ አንድ ክፍል ገንዳ 2. በባለ ሁለት ክፍል ገንዳ 3. በባለ ሦስት ክፍል ገንዳ	/__/
509	ላይ የተገለፀው የእቃ ማጠብያ ገንዳ ምን ዓይነት ነው?	1. የቧንቧ ውሃ በቀጥታ የተገጠመለት 2. ጎድጓዳ ሳህን/ገንዳ	/__/
510	ለውሃና የመጠጥ ኩባያዎች ማጠብያ አሞ ወይም ሳሙና ይጠቀማሉ?	1. አዎ 2.አይጠቀሙም	/__/
511	ለውሃና የመጠጥ ኩባያዎች ማጠብያ ሙቅ ውሃ ይጠቀማሉ?	1. አዎ 2.አይጠቀሙም	/__/
512	የታጠቡና የፀዱ የምግብ እቃዎች በተገቢው መንገድ በንፁህ ጨርቅ(ፕላስቲክ) ታሽፍነው በሽልፍ (ቁምሳጥን) ተቀምጠዋል?	1. አዎ 2.አልተቀመጡም	/__/
6. የምግብ መጋዘንና ማቀዝቀዣ የሚመለከት			
601	በቀላሉ ለማይበላሹ የምግብ ዓይነቶች ማስቀመጫ መጋዘን አለ?	1. አዎ 2.የለም	/__/
602	መልሱ አዎን ከሆነ፡ በቂ ቦታ ያለው ፣ ያልተጣበበና ለአየር ዝውውር እንዲያመች ሆኖ የተደራጀ ነው?	1. አዎ 2.አይደለም	/__/
603	ድርጅቱ ማቀዝቀዣ አለው?	1. አዎ 2.የለውም	/__/
604	ለተራ ቁጥር 603 መልስ አዎ ከሆነ ማቀዝቀዣው ይሰራል? (ማቀዝቀዣው ተርሞሜትር የሚሰራ መሆኑ ያረጋግጡ)	1. አዎ 2.አይሰራም (መልሱ አይሰራም ከሆነ ወደ ተራ ቁጥር 606 ሂድ)	/__/
605	በማቀዝቀዣው ውስጥ የተቀመጠ ምግብ የሙቀት መጠን ከ 10 °C በታች የተጠበቀ ነው?	1. አዎ 2.አይደለም	/__/
606	በማቀዝቀዣው ውስጥ የተቀመጠ ምግብ በተገቢው መንገድ የተደረደረ ነው?	1. አዎ 2.አይደለም	/__/
607	በማቀዝቀዣው ውስጥ የተቀመጠ ምግብ የመበላሸት ምልክት ያሳያል?	1. አዎ 2.አያሳይም	/__/
7. ልኳንዳ ቤት በሚመለከት			
701	የልኳንዳ ቤቱ ወለል የተሰራው ከምንድ ነው?	1. ኮንክሪት 2. ማትኤላ 3. የድንጋይ ንጣፍ 4. አፈር 5. ጣውላ	/__/
702	የልኳንዳ ቤቱ ወለል ስንጥቅ፣ የተቆፋፈረና ክፍተት ያለው ነውን?	1. አዎ 2.አይደለም	/__/
703	የልኳንዳ ቤቱ ኮርኒስ አለው	1. አዎ 2.አይደለም	/__/

ተራ ቁጥር	ጥያቄ	የተሰጠ መልስ	ኮድ
704	**የልኳንዳ ቤቱ ግድግዳና ኮርኒስ ከአቧራ ፣ ከሸረሪት ድርና ከጥላሸት የፀዳ ነው?**	**1. አዎ 2. አይደለም**	/__/
705	**የልኳንዳ ቤቱ ግድግዳ ነጭ ቀለም የተቀባቀለም በውሃ የሚታጠብ ነው?**	**1. አዎ 2. አይደለም**	/__/
706	**ለስጋ ማስቀመጫ የሚሆን ቁምሳጥን አለ ?**	**1. አዎ 2. አይደለም**	/__/
707	**መልሱ አዎ ንሆነ ቁምሳጥኑ የተለያዩ ነፍሳት እንደማያስገባ ሆኖ የተሰራ ነው ?**	**1. አዎ 2. አይደለም**	/__/
708	**ለገበያ የቀረበ ስጋ እስንሚሸጥ የሚቀመጥበት ማቀዝቀዣ ፍርጅ አለ?**	**1. አዎ 2. አይደለም**	/__/
709	**የስጋ መክተፍያ (መቁረጫ) ንምን የተሰራ ነው?**	1. ከጣውላ 3.ከኮንክሪት 2. ከእምነበረድ 4.ፕላስቲክ	/__/
710	**የስጋ መክተፍያ (መቁረጫ) ልሙጥ፣ ስንጥቅ የሌለውና ለማጠብ የሚመች ነው?**	**1. አዎ 2. አይደለም**	/__/
711	**የስጋ መስቀያ በፅዳት የተያዘና ከማይዝግ ነገር የተሰራ ነው?**	**1. አዎ 2. አይደለም**	/__/
712	**ቢላዋ ፣መሮድና የመሳለሉት መሳርያዎች በንፅህና የተያዙ ናቸው?**	**1. አዎ 2. አይደለም**	/__/
713	**ለስጋ መጠቅለያ ምን ይጠቀማሉ?**	**1. ልሙጥ ወረቐት** 2. ፌስታል 3. ጋዜጣ 4. ያገለገለ ወረቀት **22.ሌላ(ይገለፅ)_____**	/__/
8. ሌላ ያልተገለፀ			
801	**በየቀኑ የሚመገቡ ተመጋቢዎች ብዛት በግምት ስንት ይሆናል?**	_____	/__/
802	**ድርጅቱ ባለፉት ስድስት ወራት ውስጥ በጤና ተቆጣጣሪዎች ተጎብኝተዋል?**	**1. አዎ 2.አልተጎበኙም**	/__/
803	**መልሱ አዎ ከሆነ፡ ጉብኝቱ ምክርና ትምህርት መሰረት ያደረገና ለድርጅቱ ጠቃሚ ነው?**	**1. አዎ 2.አይደለም**	/__/
804	**ድርጅቱ አገልግሎት የሚሰጠው በተሰጠው ንግድ ፍቃድ መሰረት ነው?**	**1. አዎ 2.አይደለም**	/__/

ተጨማሪ አስተያየት

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አ መ ሰ ግ ና ለ ሁ

Annex 4: Map of the study area