ASSESSMENT OF PREREQUISITE PROGRAMS FOR IMPLEMENTATION OF HAZARD ANALYSIS AND CRITICAL CONTROL POINT AND ASSOCIATED FACTORS AMONG HOTELS AND RESTAURANTS OF DUKEM AND BISHOFTU TWONS, ETHIOPIA.

By:

Dano Yadesa (BSc)

A THESIS SUBMITTED TO ADDIS ABABA UNIVERSITY SCHOOL OF SOCIAL PHARMACY IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR MASTER DEGREE OF REGULATORY AFFAIRS IN FOOD TRACK

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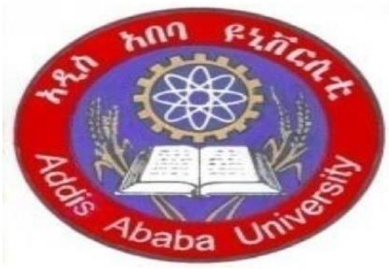

COLLEGE OF HEALTH SCIENCES SCHOOL OF PHARMACY, DEPARTMENT OF PHARMACETICS AND SOCIAL PHARMACY

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APPROVAL BY THE BOARD OF EXAMINERS

The thesis of **"**Prerequisite programs for implementation of Hazard Analysis and Critical Control point and associated factors among hotels and restaurants of Dukem and Bishoftu Towns, Ethiopia." It is accepted in its present form by the board of examiners as partial fulfillment for the requirements Master Degree of Regulatory Affairs in Food Track

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STATEMENT OF DECLARATION

By my signature below, I declare and affirm that this thesis is my original work. I have followed all ethical principles of scholarship in the preparation, data collection, data analysis, and completion of this thesis. All Scholarly matter that is included in the thesis has been given recognition through citation. I affirm that I have cited and referenced all sources used in this document. Every serious effort has been made to avoid any plagiarism in the preparation of this thesis. This thesis is submitted in partial fulfillment of the requirements for Master's Degree in Regulatory Affairs in Food Track to Addis Ababa University. I declare that this thesis has not been submitted to any other institution anywhere else for the award of any academic certificate.

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Acronyms

AAU	Addis Ababa University
CAC	Codex Alimentarius Commission
E. coli	Escherichia coli
FAO	Food and Agriculture Organization of the United Nations
FDE	Food Drinking Establishments
EFY	Ethiopian Fiscal Year
FS	Food safety
FSM	Food safety management
GAP	Good Agricultural Practices
GH	Good Hygiene
GHP	Good Hygienic Practices
GMP	Good Manufacturing Practices
HACCP	Hazard Analysis and Critical Control Point
SOP	Standard Operating Procedures
USA	United States of America
W HO	World Health Organization

Abstract

Background*:* Prerequisite programs like GHP and GMP support the basic environmental and operating conditions which are important for the production of safe and wholesome food in the food establishments. Set of procedures that designed to provide fundamental base for operating conditions necessary for the production of safe food and also considered as HACCP plan.

Objectives: This study aimed at assessing the prerequisite programs for implementation of HACCP and associated factors among hotels and restaurants in Dukem and Bishoftu Towns in Ethiopia.

Methods: A cross-sectional, quantitative study was held on 266 hotels and restaurants from June 2021 to July 2021, in Dukem and Bishoftu Towns, Ethiopia. Data were collected from the managers of hotels and restaurants using pretested and structured questionnaires, entered, cleaned, and analyzed using SPSS version 23. Bivariate and multivariable logistic regressions were computed to identify the factors associated with Pre Request programs for implementation of HACCP. A p-value of <0.05 with 95% CI was cut-off points to declare the level of statistical significance.

Results: The study showed that the prerequisite programs for implementation of HACCP was poor (13.5% (95%CI: 1.09-1.18) among the hotels & restaurants under the study. In the multivariate logistic regression analysis: The study revealed that, the odds to the implementation of prerequisite programs practices among hotels and restaurants had no documentation and record keeping (AOR= 0.334, 95%CI: 0.139, 0.804) , the odds to the implementation of prerequisite programs practices among hotels and restaurants had no finance (AOR= 0.115, 95% CI: 0.032, 0.419) ,and the odds on HACCP Practices among hotels and restaurants not know meaning of HACCP (AOR= 0.083, 95% CI: 0.008, 0.900) showed statistically significant association with HACCP implementation prerequisite programs.

Conclusions and recommendations: The prerequisite programs HACCP implementation in the evaluated hotels and restaurants was poor compared to other studies. Therefore, concerned government bodies (like health regulatory and hotel and tourism bureaus), owners of hotels, and restaurants should demonstrate their commitment so that the food provided by the establishments is safe to the consumers.

Keywords: prerequisite programs of HACCP, hotels & restaurants, Dukem, Bishoftu

1. Introduction

1.1. Background

Food safety systems are assurances that food will not cause an adverse health effect for the consumer when it is prepared or consumed in accordance with its intended use (ISO, 2018).

Food safety systems are designed to control and manage all measures necessary to ensure the safety and wholesomeness of food during preparation, processing, manufacture, storage, transportation, distribution, handling and offering for sale or supply to the consumer based on preventive principles and concepts. With this type of systems, it is intended to implement measures that ensure efficient control by identifying points or stages where the health hazards of consumers can be controlled. Hazard Analysis and Critical Control Point (HACCP) has been defined by the World Health Organization as "a scientific, rational and systematic approach for the identification, assessment and control of hazards"(Food Agriculture Organization; World Health Organization, 2003).

Originally developed to focus on food safety hazards, the HACCP system has been successfully applied to other applications and other industries. The intent of HACCP is to help prevent known hazards and to reduce the risks that they will occur at any point in a process through the execution of seven core action. HACCP methodology is currently the internationally accepted benchmark for the implementation of food safety systems (Stevens and Hood, 2019).

HACCP is based on scientific methods and ways of identifying hazards in the food processing and preparing mitigation measures to assure food safety. This method is a preventive way of assessing the chemical, biological and physical hazards in the food chain. It is a worldwide strategy to control food hazards keeping the food safe preventing the public from food-borne illness. HACCP principles are based on the Codex Alimentarius guidelines, which are related to ISO 22000:2018 (Mure *et al.*, 2020). Food safety is a global concern affecting both public health and international trade (Ayalew, Birhanu and Asrade, 2013; Wandolo *et al.*, 2018).

Both high-income and low-income countries are affected by multiple etiologies of foodborne diseases which have widespread occurrence and a concern of public health. About 90% of hazards are biological causing the major foodborne illness(Temesgen, 2015). Every year about 1/3rd of the people living in low-income countries are affected by foodborne pathogens. To overcome this problem, internationally adopted food safety management system based on HACCP principles have been expanded worldwide and widely implemented in a multitude of food establishments. This enables them to sustain food safety and facilitates good food trade practice (Singhetal, 2016).However, the enforcement of implementation of food safety management system is not similar in all regions because factors such as, income levels, the culture of eating, diets, local conditions, government facilities, organizational facilities, etc., strongly affects the level of implementation and regulation. Food safety assessments are essential during food preparation, processing, production, storage, and distribution stages (Savelli et al., 2019). Hence, for ensuring the safety of food, manufacturers, importers, regulators and the community need to work together. Specially, the government needs to ensure food safety by enforcing the implementation of guidelines and systems (Temesgen, 2015).

This study is aimed at determining prerequisite programs for implementation of HACCP and factors associated in hotels and restaurants at Dukem and Bishoftu towns. As far as to our knowledge, there was no study conducted to assess prerequisite programs for the implementation of HACCP in hotels/restaurants at Dukem and Bishoftu towns, central Ethiopia.

1.2. Statement of the problem

Issues of food safety are becoming a vital public health concern all over the world. In recent years critical outbreaks of foodborne illness are increasing. A foodborne illness affecting both high-income and low-income countries mainly puts pregnant women, children, and the elderly at a special health risk. Overall, about 70% of diarrheal illnesses in low-income countries resulted from the consumption of contaminated food items. This has been aggravated by low monthly disposable income of the service providers, lack of enough training on food safety for food sector workers and managers, poor attitude and knowledge on safe food handling practice (Food and Town, 2014).

Globally incidence of foodborne illness contributed to the death of 2.1 million people each year mainly from diarrheal cases. Worldwide 1.5 billion children are affected by contaminated food which leads to diarrheal diseases and more than three million premature deaths occur each year. 10-20% of foodborne outbreaks are due to poor practicing by food handlers in establishments(Food and Town, 2014).

Lack of adequate financial resources, inadequate infrastructure and facilities, lack of commitment from managers and owners, inadequate enforcement by regulators are some of the aggravating factors that hinders effective implementation of HACCP in low income countries(Macheka *et al.*, 2013).

Insufficient and poor planned strategies in food safety systems have also contributed a lot for the high burden of foodborne outbreaks in low income countries (Wandolo *et al.*, 2018). Lack of appropriate food safety assurance systems are problems that have become obstacles to Ethiopia's economic development and public health safety. Current and new challenges to food safety include changes in food processing, technology, lifestyle and consumer demands and others. There are significant gaps in Ethiopian on food safety system implementation in terms of legal and policy frame works, which contributes to the problem i.e. food-borne diseases are very rampant in the country (Ayalew, Birhanu and Asrade, 2013).

For instance, a study conducted in Gondar town which is one of the towns in Ethiopia with hotel establishments cater indicated that foodborne disease related to practices of

poor hygiene of food handlers has increased in past few years(Food and Town, 2014).Dukem and Bishoftu are towns in central of Ethiopia with significant numbers of hotel and restaurant175 hotels and 100 restaurants. Therefore, the main objective of this study was to determine the status of prerequisite programs for the implementation of HACCP and associated factors among hotels and restaurants in Dukem and Bishoftu Towns.

1.3 Significance of the study

The finding of this study generates information that can help Oromia regional health office and other relevant stakeholders to understand the status of the hotels on the implementation of prerequisite programs for the implementation of HACCP and associated factors in the towns.

In this research, factors associated with HACCP prerequisite programs were assessed; conclusion and ways forward were set. The results from the study can be utilized to improve the safety of food management practices in hotels & restaurants by taking corrective and preventive actions in the establishments. Also, hotel owners, government bodies, and consumers can capitalize on the findings of the present study for the ultimate safe food supply system and good catering practice improvement in the two towns. The study also will support other researchers to work more into the field of this study by providing baseline data.

2. Literature Review

2.1. **Factors associated with prerequisite program of HACCP Practices**

Lack of good sanitation, good storage practice, good management activities, staff motivation of supervisors as well as lack of equipment, lack of knowledge, absence of enforcement from the concerned body, lack of resources, lack of trained manpower were identified as major barriers for implementation of HACCP in food establishments in studies (Javier and Charles, 2001)**.**

In a study conducted in Zimbabwe on practice of food safety management, the respondents' knowledge on practice of food safety management was low. Important factors identified by reports showed that management team commitment, responsible people, and expertise knowledge are basic inputs for effective practicing of HACCP in food establishments (Macheka *et al.*, 2013).

Assessing on components of HACCP program in ensuring food free from contamination, about 40% of food establishments showed that good storage practice is critical. Contamination of food is controlled by use of appropriate constant suppliers of raw food materials. Capacity building of food handlers has also been identified as a basis for controlling food hazards (Kahindi, 2016).

In African countries, challenging factors in food processing practices includes inadequate commitments, weak law enforcement, outdated food regulation, lack of capacity, poor communications and coordination among the establishment's owners and regulatory body and customers (National Food Safety Policy and Strategic Plan, 2012).

Globally, the scale-up of food safety is a key challenge for food sectors because the implementation and practices of food safety in food sectors have both negative and positive implications for the sector. Food establishments are increasing, and food product transportation is also done by guaranteeing the quality and safety of food items to be used in international trade, while local products practice food hygiene in their sectors to control foodborne illness (Temesgen, 2015).

Concerns about food safety with access to a reliable sufficient amount of food and the right to eat nutritious and safe food had been considered as a fundamental human right. However, the best method to address food safety concerns is to manage the supply chain, which begins with a farm-to-fork approach that focuses on effective cost prevention and risk-based management systems. It is preferable to follow evidence-based study results to address the issues of food safety for worldwide progress(Jacxsens ,et al 2016).

Food safety is a science-based approach. It has related procedures such as good hygiene practices, good agricultural practices, and HACCP identification of hazard analysis and critical control point systems, which are already practiced and implemented in many countries(Government Of Malaysia, 2004).

2.2. Internal and external associated factors towards prerequisite programs for implementation of HACCP in food establishments.

The main barriers to the practice of HACCP in the food sector are: lack of basic sanitation; lack of understanding of HACCP; absence of prerequisite programs; lack of time; lack of knowledge; turnover of staff; poor attitude of the employee; because of complicated terminologies; lack of personnel training; lack of equipment; lack of technical expertise; lack of recourses; lack of managerial skill. The barriers vary from region to region or from sector to sector. The conditions of the facilities in implementing, installing, monitoring, and successfully verifying systems are complex and dependent on organizational managers(Yuksel, et al, 2007).

Advantages of food safety are reduction of risk related to mortality and morbidity associated with consumption of contaminated food by microbial and other hazards. Factors that affect the safety of food in the food sectors include demography policy, education, and policy on labeling, lack of safety information (Antle, 1999).

Many studies had showed that unsafe food highly affects human health in a negative way and it is a significant public health issue. All over the world, governments are doing their best to enforce the improvement of the safety of the food supply to prevent foodborne diseases, but the issue of this remains a significant challenge for the public both in high-income and low-income countries. According to the WHO report (2015), estimates of the

global burden of foodborne diseases are increasing. Together, 31 foodborne hazards are estimated to cause 600 million cases of foodborne disease and 420,000 deaths annually(Savelli *et al.*, 2019).

Demographic change, alterations in food consumption, more processed food with increasing amounts of added chemicals, increased urbanization, and intensified food production all pose challenging issues for both high-income and low-income countries. To overcome these obstacles, the FAO re-evaluated its approaches for enhancing food safety and quality (Government Of Malaysia, 2004).

The National Aeronautics and Space Administration (NASA) established HACCP in 1960s as a pillar of food safety management and systematic methods of identifying hazards such as biological, chemical, and physical in the processing of food items and providing the support in food control methods. HACCP is supported by a combination of many activities, such as good hygiene practices, good storage practices, and a preventative maintenance program(Culler *et al.*, 2015)

The problems Food safety is also varies in nature relayed on environmental conditions during the existence of disasters. As an example, during floods, food may be contaminated by chemicals and surface water such as sewage and wastewater. Latrines and septic tanks can contaminate the food facilities. The crowding of survivors after disasters may lead to aggravating the situations due to poor sanitary conditions leading for contaminated food (WHO,1984).

Challenges to implementing this preventive method in the food sector vary by region and sector, and some may be due to internal and external factors such as food handler education and the availability of resources in food facilities. As reported from low-income countries, in the food sectors, the practices of weak regulation of food safety and control practices of HACCP systems are complemented as a challenge in the food sectors (Macheka *et al.*, 2013).

A study conducted in Turkey in the food sector identified obstacles for the implementation of HACCP practice as inadequate materials and the physical condition of the infrastructure of the facilities. A well-planned and built facility with well-designed and equipped kitchens

will safeguard raw materials and food products in a sanitary manner. The good design layout of equipment in facilities is very important to prevent hazards from the process of preparation of food and also has a vital role in the control of temperature, pressure areas and minimizes the amount of Critical Control Points for effective control of the environment. However, facilities in food premises with congested food preparation classes frequently exist, and this design affect the safety of food hygiene during preparation (Ba and Yuksel, 2007).

In a study by Macheka conducted in Zimbabwe, the major identified barriers to practice hazard analysis and critical control point in food safety management were reported as inadequate infrastructure and facilities, absence of financial resources, poor commitments of workers by top managers, ignorance by establishment owners, and absence of enforcement of regulation systems linking with the systems(Macheka *et al.*, 2013).
A study conducted in Nigeria indicates that among food facilities, implementation of food safety procedures is significantly associated with monthly income and educational level of workers. In a similar way, a study conducted in Gondar also indicates that marital status, age, monthly salary, absence or presence of training in food hygiene and safety, lack of skill, gap and knowledge were factors affecting the practices of food safety in the food and drinking establishment sectors (Admasu and Kelbessa .2018).

Many assessments showed that various factors affect the practicing of HACCP systems in food establishments. These includes seven elements: training, human resources, planning, competence, knowledge, documentation system, and the commitment of management, which is more present in all identified challenges, as well as lack of expertise, absence of legal guidelines on safety, attitudes, and financial problems(Nyamari, 2013).

Food safety issues affect both developing and developed nations. People who eat contaminated food are easily poisoned and sickened as a result of the money they spend on hotels and restaurants. Food safety concerns in Africa remain problematic(Kumar, 2018).

According to Taylor ,1999 study indicates that the main strategic plan for hazard analysis and critical control point practices is based on knowledge, the qualification of workers, the

infrastructure of the facility, assets, equipment, and knowing the procedures of the hazard analysis and critical control point in food sector facilities(By James, 2009).

As a study conducted in South Africa indicates, only about 6% of managers in the food sector know that HACCP is mandatory in the food sector, and more than 70% of managers and food workers did not get enough training on food safety (WHO, 1999).

Habeeb et al. (2018) stated that on assessment of HACCP compliance with the system in hotel standards, the concept of hazard analysis and critical control point is unknown. As a result, the researchers recommended that to sustain food safety and to control foodborne outbreaks, the implementation of HACCP is the first choice (Gesage, 2020).

Numerous studies revealed that there are numerous barriers to the implementation of hazard analysis and critical point practice, such as a lack of time for documentation, a lack of convinced staff on the benefits and increased costs, a skill gap, and an attitude of compliance, rather than true recognition of the value in the structure of food sectors. HACCP adherence has many obstacles such as facility assets, procedures, and techniques of understanding the concepts of food safety(Lateefat et al, 2004).

Food safety problems in low-income nations are often linked to issues of poor hygiene. The safety of food hygiene in hotels remains a source of concern. Food poisoning causes in public eating establishments, restaurants, and hotels as a result of poor food preparation hygiene are a common occurrences (Gesage, 2020).

In small scale food industries like hotels and restaurants, generally HACCP implementation is affected by lack of adequate funds and poor attention from the government to HACCP practice(Cheng *et al.*, 2019).

Many investigators identified factors influencing the practice of hazard analysis and critical control points in the food sector and classified them into four classes, which include knowledge, attitudes, external behaviors, and internal behaviors. A similar study in Turkey also identified a lack of skills in HACCP, including hotels and restaurants, as factors affect implementation of the HACCP principles(Rostron, 2012).

In a study conducted by Reda and Mostafa in 2016 in Egypt on food handlers' ideas on food hygiene training and experience linked with food standards and the implementation of HACCP in restaurants and star hotels, it was indicated that lack of training on food safety has significant effects on the habits and skills of food handlers(Cheng *et al.*, 2019).
A study conducted by Adesokanin 2015 indicates that training for food handlers on safe food handling practices in hotels and restaurants is excellent and untrained food handlers are poor at practicing safety of food. Most of the workers do not know the terms of HACCP and also about cross-contamination of raw food with insect hazards(Adesokan, Akinseye and Adesokan, 2015).

Restaurant employees who worked in HACCP implementation reported better handling practices for safe food handling than those working in restaurants that did not implement HACCP in their restaurants/hotels. Hotels and restaurants are likely to have more ability and resources to provide better facilities and build the capacity of their workers to practice good food safety practices in their establishments(Habiballah, 2017).

The expected gain from customers, for competition, perceived importance for external stakeholders such as government, customers, establishments, and media, commitment of top managers on HACCP, establishment size, and amount of products produced daily all have a significant impact on the implementation of hazard analysis critical control points in food establishments (Taylor, 2009).

In restaurants and hotels, there are five basic ways to prevent the contamination of food and ensure the food safety of consumers from food-borne illnesses. For example, monitoring of temperature, time-safe food handling practices, cleaning and sanitizing techniques, and a HACCP plan. The control of temperature in the danger zone is the cornerstone of preventing the safety of food from different types of aetiologies such as trichinosis in pork, E. coli in beef, and salmonellosis in poultry(Walczak, 2000).

Poor personal hygiene of food handlers, a lack of water supply, and a lack of attitude and skill in food establishments are all factors that contribute to the practice of food safety in establishments(Abdi *et al.*, 2020).

Biological hazards come from poor personal hygiene, poor environment, low quality of raw materials, inadequate cooking, improper storage/holding temperature, improper heating and cross contamination from improper segregation of cooked foods(Pawar, 2013).

3. Objectives

3.1. General objective

The general objective of this study was to assess prerequisite programs for implementation of HACCP and associated factors among hotels and restaurants in Dukem and Bishoftu Towns, Ethiopia.

3.2. Specific objectives

The specific objectives of the study were

- To determine the status of prerequisite programs for implementation of HACCP among hotels and restaurants in Dukem and Bishoftu Towns, Ethiopia.
- To identify factors associated with implementation of HACCP among hotels and restaurants in Dukem and Bishoftu Towns, Ethiopia.

- **Conceptual framework**

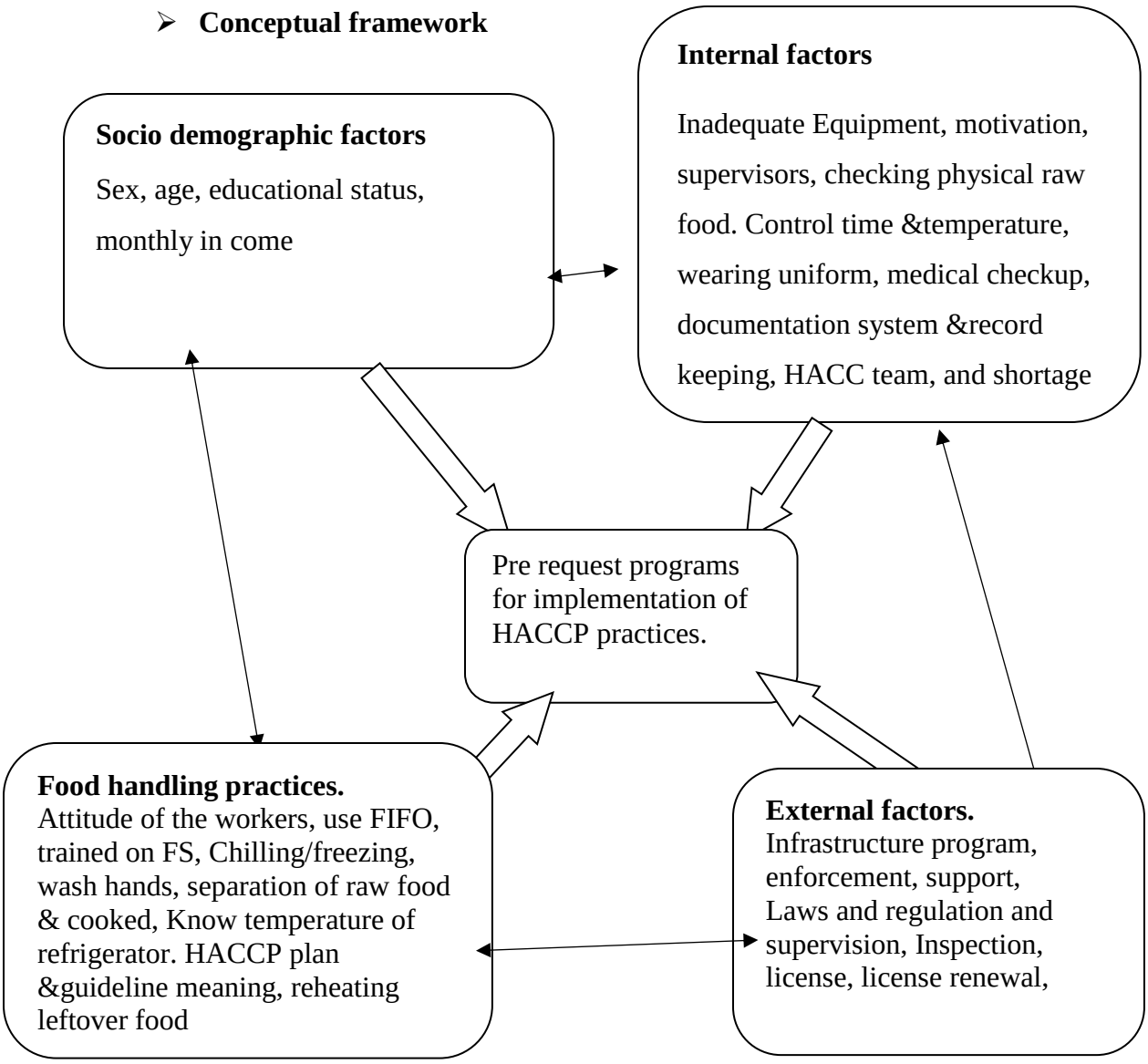

Figure 1: Conceptual framework of prerequisite program for the implementation of HACCP implementation as adopted from (Kifle *et al.*, 2020).

4. Methods

4.1. Study area and Period

The study was conducted in Dukem and Bishoftu towns, which located at East Shewa under Oromia regional, southeast of Addis Ababa, respectively. According to Dukem and Bishoftu Towns health offices in 2021, the total population in the towns was 69,571 and 227,998 respectively. According to Dukem and the Bishoftu cultural and tourism offices, there are 175 hotels and 100 restaurants licensed, and 275 managers manage the hotels and restaurants in Dukem 60 managers and 215 managers Bishoftu in both towns.

The data was collected from June 2021to July 2021, from hotels and restaurants at Dukem and Bishoftu Towns of Ethiopia.

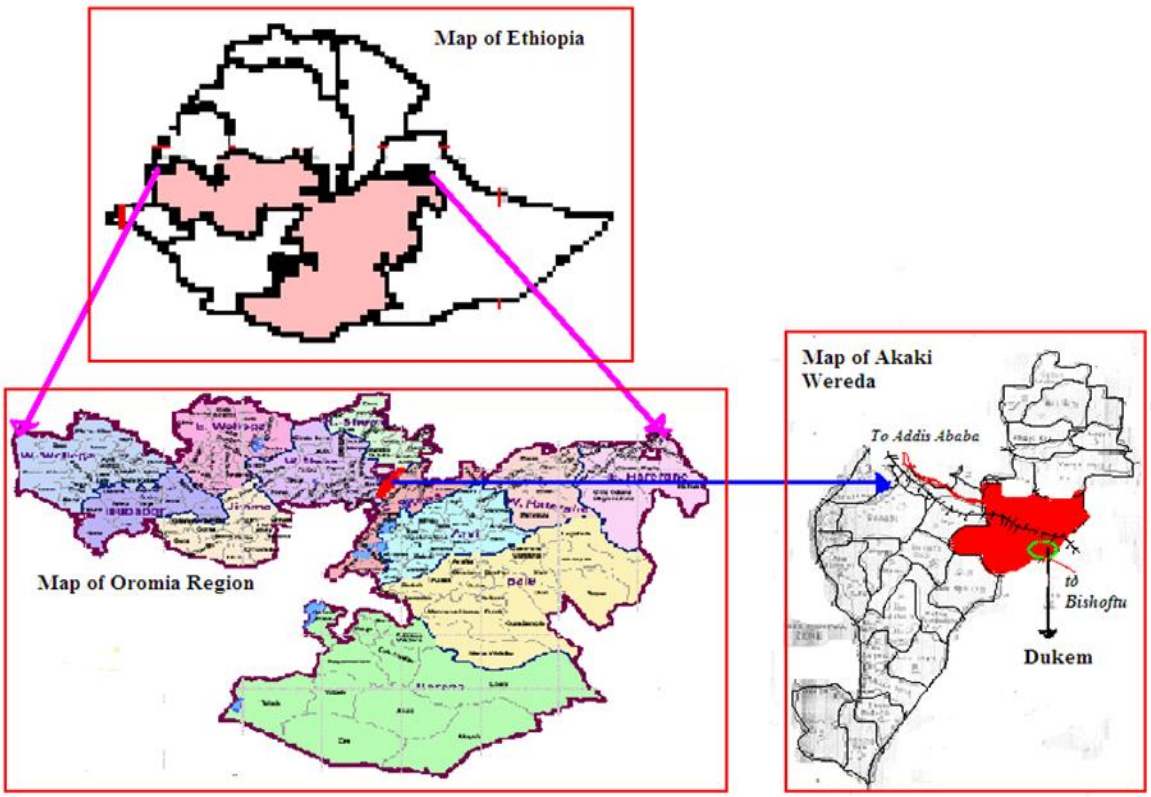

Figure 2: Administrative Map of Dukem and of Bishoftu towns(MoFED, 2020)

4.2. Study Design

A quantitative cross-sectional study was conducted in hotels and restaurants established in Dukem and Bishoftu Towns.

4.3. Source population

All hotels and restaurants providing food catering services and working during the study period in Dukem and Bishoftu Towns.

4.4. Study population

All hotel and restaurant managers working in the selected hotels and restaurants located in Dukem and Bishoftu towns.

4.5. Inclusion and exclusion criteria

Inclusion criteria

All hotels and restaurants licensed and working during the study period were included, as were those interested.

Exclusion criteria

All hotels and restaurants that are licensed but not interested in giving information for this study.

Sample size determination and sampling technique

The total list of 175 hotels and 100 restaurants licensed was obtained from the cultural and tourism offices of the towns, then all managers of hotels and restaurants were included in the study as respondents.

4.6. Study variables

Dependent variable

Pre request programs for implementation of HACCP in hotels and restaurants

Independent variables

The independent variables were: socio-demographic factors, sex, age, educational status, and monthly income, knowledge and attitude, workers' attitudes

4.7. Operational definition

A food handler is a person who handles food processing, production, packaging, and storage and also distribution in the food process (FAO, 2017).

A food safety management system refers to the application of good manufacturing, good hygienic practices, and critical control points in food processing (FSSAI, 2006).

Food Safety: Assurance that food will not cause the consumer any harm if consumed (FAO, 2017).

Good hygiene practice: All practices are under review to ensure food safety in all food chains (FSSAI, 2006).

The status of prerequisite programs for the implementation of HACCP in hotels and restaurants was computed by taking the summation responses of 12 questions (Table 2). The sum of these variables was calculated, and for each variable, a value of 1 for the response "Yes" and 0 for the "No response" was coded. The "Yes" response of >9 (80%) out of 12 questions was considered good prerequisite programs for HACCP, and ≤ 9 (80%) was considered poor prerequisite programs for HACCP. Based on this, establishments with a score of more than 80% were categorized as having good prerequisite programs for HACCP, whereas establishments with a score of less than or equal to 80% were considered to have poor prerequisite programs HACCP practice(Press, 2016).

4.8. Data collection

The structured questionnaire was first prepared in English and then translated to Afaan Oromo by a language expert for data collection and then re-translated back to English for data analysis to maintain the validity of the results. It contains variables on socio-demographic characteristics, prerequisite program for the implementation of HACCP, knowledge and attitude of workers on HACCP practices, and internal and external factors affecting hotel and restaurant food safety. Data were collected by four data collectors who are fluent in Amharic and Afaan Oromo and supervised by two BSc health professionals. They were closely monitored under the supervision of the principal investigator. They were

mainly first-degree holders of health professionals (BSc nurses and environmental health) and were trained by the principal investigator on the objective of the study, how to fill out the questionnaire, and how to maintain privacy and confidentiality during data collection

4.9. Data processing and analysis

The collected data was checked for completeness and entered into SPSS version 23 for analysis. Descriptive statistics, including frequencies and percentages, were used to summarize variables. To determine the association between each variable and the binary logistic regression model, Variables with a p-value of less than 0.05 were considered statistically significant.

4.10. Data quality assurance

Data collectors and supervisors were given a one-day training on how to collect, manage, and complete data, as well as on issues of confidentiality, and how to administer the questionnaire and deal with privacy concerns. Before data collection, a pre-test was conducted on 5% of the sample (n = 14) in Galan town, which has a similar set up in the study area. The collected data had been reviewed and checked for completeness, accuracy, and consistency by the principal investigator regularly to ensure that it was complete and corrective action was taken before data collection to minimize errors.

4.11. Ethical considerations

The study was ethically approved by the Health Research Review Committee of Addis Ababa University, College of Health Sciences, and School of Pharmacy and Oromia Regional Health Office Research Review Committee. A formal letter was written to Dukem and Bishoftu town administrations. Participants received information about the purpose of the study, respondent selection procedures, and the harms and benefits of the study. The respondents were informed of their right to refuse or agree to participate in the study or to discontinue their participation whenever they felt the need. Each respondent was told that their details would be kept private and used only for academic study. Privacy was assured during data collection and confidentiality of the data was also assured by coding the questionnaire.

5. Results

5.1. Socio-demographic and socio-economic characteristics of hotel and restaurant managers.

The socio-demographic and socio-economic characteristics of managers in hotels and restaurants in Bishoftu and Dukem towns are presented in Table 1. The study was conducted on 266 participants that included managers of hotels and restaurants, with a response rate of 97%. 177 (66.5%) of the respondents were female. The mean age and standard deviation of participants were 32.36± 7.083, respectively. In terms of their educational level, the majority of the respondents, 122 (45.9%), were diploma holders, and 79 (29.7%) completed their 8th grade, 31 (11.7%) completed their 10th grade, 25 (9.4%) completed their 12th grade, and 9 (3.4%) had a first degree. More than half of the study participants, 183 (68.8%), were married. 94 respondents (35.3%) got a monthly income of less than 2000 Ethiopian Birr (<2000ETB), and the majority of the workers (45.1%) earned a monthly income of 2001 -5000 ETB, and the average income of the respondents and SD was 4295.64 ETB ± 2423.78, respectively (Table 1).

Table 1: Socio-demographic and socio-economic characteristics of the managers of hotels & restaurants in Dukem and Bishoftu towns.

Variables	Categories	Frequency	Percent (%)
Sex	Male	89	33.4
	Female	177	66.6
Age	<20	3	1.1
	21-30	105	39.5
	31-40	130	48.9
	41-50	25	9.4
	51-60	3	1.1
Educational status	Grade 8 completion	79	29.7
	Grade10 complete	31	11.7
	Grade 12 completion	25	9.4
	Diploma / level IV	122	45.9
	Degree	9	3.4
Marital status	Married	183	68.80
	Single	66	24.80
	Divorced	10	3.8
	Widowed	7	2.6
Monthly Income	<2000	94	35.3
	2001-5000	120	45.1
	5001-10,000	40	15
	>10,000	12	4.5

5.2. Status of prerequisite program implementation for HACCP implementation on Hotels and Restaurants

The status of prerequisite program implementation for the implementation of HACCP in hotels and restaurants was computed by taking the summation responses of 12 questions (Table 2). The sum of these variables was calculated, and for each variable, a value of 1 for the response "Yes" and 0 for the "No response" was coded. The "Yes" response of >9 (80%) out of 12 questions was considered good HACCP practice, and ≤ 9 (80%) was considered poor HACCP practice. Based on this, establishments with a score of more than 80% were categorized as having good prerequisite program for implementation of HACCP, whereas establishments with a score of less than or equal to 80% were considered to have poor programs for implementation of HACCP. Following this procedure, the study found that 36 (13.5%) of hotels and restaurants had good pre request programs for implementation of HACCP and 230 (86.5%) were categorized as poor programs for implementation of HACCP in hotels and restaurants.

As per the study results, a majority of 256 (96.2%) of hotels and restaurants had not planned on HACCP and had no team. Supervisors were assigned to 207 (77.8%) of the hotels and restaurants to monitor sanitation, food safety, and quality, while for the 59 (22.2%) establishments, supervisors were not assigned (Table 2). The majority of staff, 182 (68.4%), wore working uniforms and masks, while 84 (31.6%) did not (Table 2).

Maintaining sanitation of materials and equipment is key in hotels and restaurants. This study findings indicated that 169 (63.5%) of hotels and restaurants installed sinks for cleaning hands and equipment in their establishments, while 97 (36.5%) did not (Table 2). 137 (51.5%) hotels and restaurants reported transporting food with suitable equipment while the counter parts did not (Table 2). Similarly, 222 (83.5%) of the hotels and restaurants had cold storage rooms (Table 2). On the other hand, the study found that the majority of hotels and restaurants, 206 (77.4%), had no control of time and temperature while cooking (Table 2).

As a good practice, it was noted that 191 (71.8%) of hotels and restaurants had checked the physical condition of food raw materials before food preparation and that 192 (72.2%) of

hotels and restaurants perform well cared practice in preventing food from contamination. Similarly, 189 (71.1%) hotels and restaurants wash vegetables and fruits before use. In contrast to this, the majority (233, or 87.6%) of hotels and restaurants did not safely label and store chemicals separately from food storage (Table 2).

Table 2: Status of prerequisite program for HACCP implementation among Hotels and Restaurants in Bishoftu and Dukem towns.

Study Variables	Answer			(N=266)
	Yes		No	
	N	%	N	%
HACCP Plan	10	3.8	256	96.2
HACCP team	10	3.8	256	96.2
Person who monitor sanitation, food safety, and quality monitoring	207	77.8	59	22.2
Personal protective cloths during working	182	68.2	84	31.6
Designated sink for cleaning hands	169	63.5	97	36.5
suitable utensils when handling ready to eat food	137	51.5	129	48.5
cold room storage	222	83.5	44	16.5
Control of temperature and time while cooking	60	22.6	206	77.4
Checking physical condition of food while receiving	191	71.8	75	28.2
Food prevented from cross contamination	192	72.2	74	27.8
chemical hazard labeled and stored separately from food storage	33	12.4	233	87.6
wash vegetables and fruits before use	189	71.1	77	28.9
Poor score of pre request program	230(86.5%)			
Good score Pre request program	36(13.5%)			

5.3. Knowledge and Food handling practices in hotels and restaurants.

The study indicated that the majority of the food handlers, 242 (91%), were not trained in food safety, and among the hotels and restaurants, 113 (42.5%) had a schedule for washing/cleaning food surfaces, while no such practice was reported by 153 (57.5%) of the respondents (Table 3).

The study also showed that the respondents, the majority of 248 (93.2%) of the hotels and restaurants, did not understand the HACCP definition. The 256 (96.2%) respondents had no experience using HACCP guidelines (Table3).

The majority of respondents (174, (65.5%) did not understand that cleaning of food equipment decreased the risk of food contamination. The other important food preparation control factor being evaluated was chilling/freezing, in which 151 (56.8%) of hotel and restaurant respondents had no concept of its effect of eliminating harmful microorganisms (Table3).

As a good practice, 136 (51.1%) of food staff knew that hand washing before handling food reduces the risk of contamination, while the other half of the respondents (130, 48.9%) had no experience of following this good conduct. 42 (15.8%) of hotels and restaurants used two knives' systems, while 36 (13.5%) and 188 (70.7%) used color coding and wash after each used method (Table3).

In the evaluation of kitchen washing practices, 157 (59%) and 109 (41%) washed the kitchen after each use and when preparing other types of food, respectively. Similarly, 150 (56.4%) of managers agreed that reheating leftover food is not necessary according to their establishments. 165 (62%) of hotels and restaurants washed fruits and vegetables with cold water, while 101 (38%) used hot water (Table3).

In the 155 (58.3%) hotels and restaurants workers with sores or wounds on their hands were not invited to prepare food (Table 3).

Table 3: Knowledge and Food safety practices in hotels and restaurants.

Study Variables	Categories	Frequency	%
Trained on food safety	No	242	91
	Yes	24	9
Positive attitude of Worker safety food practices	No	82	30.8
	Yes	184	69.2
Schedule of clean food surfaces	No	153	57.50
	Yes	113	42.50
Meaning of HACCP	No	248	93.20
	Yes	18	6.80
Cleaning food equipment's decreases contamination	No	174	65.4
	Yes	92	34.6
Chilling or freezing eliminates harmful germs	No	151	56.80
	Yes	115	43.20
Wash hands before touching food utensils reduces contamination	No	130	48.1
	Yes	136	51.1
Use guideline of HACCP	No	256	96.2
	Yes	10	3.8
Knives	Two system	42	15.8
	Wash	188	70.7
	Coding	36	13.5
At what time kitchen washed, rinsed, sanitized	After each use	157	59
	When prepare other food	109	41
Have a sore on back of hand, and prepare food	No	155	58.3
	Yes	111	41.7
Reheating leftover food	Not important	150	56.4
	At room temperature	116	43.6
Wash vegetables and fruits by	Hot water	101	38
	Cool water	165	62

5.4. Internal and external factors affect HACCP practices in hotels and restaurants.

The survey on the internal and external factors affecting food safety is presented in Table 4. Lack of finance and time were among the internal factors that affected the implementation of HACCP. 185 (69.6%) of the respondents pointed out financial problems as a reason for not implementing HACCP, while lack of time was pointed out as a reason by 235 (88.3%) of the respondents (Table 4).

As presented in Table 4, 210 (78.9%) of hotels and restaurants had no practice of keeping documentation systems or inspection files in their establishments. The hotels and restaurants that responded prevented cross-contamination of food by using different cutting boards. Accordingly, 123 (46.2%), 92 (34.6%), and 51 (19.2%) used cutting boards made of wood, plastic, and marble, respectively.

A significant number of the hotels and restaurants, 129 (48.5%), had no suitable utensils when handling ready-to-eat foods. In terms of external factors, all the hotels and restaurants (266, 100%) were licensed by the concerned authorities, and they renew the license on a yearly basis. Regarding inspection, 99 (37.2%), 83 (31.2%), and 76 (28.6%) were inspected in three-month, six-month, and once-a-year intervals, while 8 (3%) were never inspected. The study also indicated that 215 (80.8%) of hotels and restaurants had no HACCP plan or practice on their premises, pointing out the lack of enforcement as a reason, while 204 (76.7%) put lack of government support and as well as lack of skill as other major reasons (Table 4).

The health of food handlers is critical in order to protect the health of customers. Thus, in this study, the medical check-up trend among the hotel and restaurant staff was evaluated. The majority of 191 (71.8%) hotel and restaurant workers had a good practice of medical check-ups every three months (Table 4).

Table 4: Internal and external factors affect pre request of HACCP practice of hotels and restaurants in Dukem and Bishoftu towns.

Study variables	Categories	Frequency	Percentage (%)
Enforcement	No	215	80.8
	Yes	51	19.2
Support	No	204	76.7
	Yes	62	23.3
Lack of finance to practice HACCP	No	85	30.4
	Yes	185	69.6
Lack of time to practice HACCP	No	31	11.7
	Yes	235	88.3
Lack of skill	No	24	9
	Yes	242	91
Adequate equipment	No	132	49.6
	Yes	134	50.4
Licensed from authority body			
	Yes	266	100
Interval of inspection	at 3 month	99	37.2
	at 6 month	83	31.2
	Once year	76	28.6
	Never	8	3
Medical checkup in three months	No	75	28.2
	Yes	191	71.8
Keep documentation system	No	210	78.9
	Yes	56	21.1
Cutting board	Wood	123	46.2
	Plastic	92	34.6
	Marble	51	19.2
Suitable utensils for handling	No	129	48.5
	Yes	137	51.5

5.5. Factors associated with prerequisite program for HACCP implementation in hotels and restaurants in the towns of Dukem and Bishoftu

In the binary logistic regression analysis, 10 predictor variables were significantly associated (P<0.25 at 95%CI) with the HACCP practices, including: absence of documentation system record keeping, adequate equipment, poor practice of the First in First Out concept on raw food, lack of finance, labeling and storing chemicals separately from food storage, meaning of HACCP, personal protective clothing during work, thermometer or equivalent gauge in refrigerator, rent houses, wash hands before preparing food. However, in the multivariable analysis, only 3 variables—absence of a documentation system for record keeping, lack of finance, and not understanding the meaning of HACCP—were significantly associated (P<0.05 at 95%CI) with the HACCP practices.

This study showed that the odds of prerequisite program practices among hotels and restaurants that had no documentation and record keeping in hotels and restaurants were about 66.6% (AOR = 0.334, 95%CI 0.139, 0.804) less compared to those that had documentation and record keeping in hotels and restaurants (Table 5).

The study revealed that the odds for the implementation of prerequisite program practices among hotels and restaurants that had no finance were about 85.7% (AOR = 0.115, 95% CI 0.032, 0.419) less compared to those that had finance in hotels and restaurants (Table 5).

The study revealed that the odds of prerequisite program practices among hotels and restaurants that do not know the meaning of HACCP were about 91.7% (AOR = 0.083, 95% CI 0.008, 0.900) less practices compared to those that understood the meaning of HACCP in hotels and restaurants (Table 5).

Table 5: Binary and Multivariate analysis of Factors Associated with HACCP practice among hotels& restaurants in Dukem and Bishoftu towns, 2021.

Study variables		Prerequisite program for implementation of HACCP		COR95%CI	AOR(95%CI)
		Poor	Good		
Documentation and record keeping	Yes	40(71.4%)	16(28.6%)	Ref	
	No	190(90.5%)	20(9.5%)	0.263(0.125,0.552)	0.334(0.139,0.804)
Adequate equipment	Yes	123(91.8%)	11(8.2%)	2.613(1.228,5.559)	**
	No	107(81.1%)	25(18.9%)	Ref	
First in first out	Yes	19(63.3%)	11(36.7%)	0.205(0.087,0.479)	**
	No	211(89.4%)	25(10.6%)	Ref	
Finance for HACCP practice	Yes	156(84.3%)	29(15.7%)	0.059(.213,1.215)	0.115(0.032,0.419)
	No	74(91.4%)	7(8.6%)	Ref	
Owner of Establishment	Rent	132(85.7%)	22(14.3%)	0.500(0.239,1.048)	**
	Private	98(87.5%)	14(12.5%)	Ref	
Chemical labeling and store	Yes	19(57.6%)	14(42.4%)	0.142(0.062,0.321)	**
	No	211 (90.6%)	22(9.4%)	Ref	
Meaning of HACCP	Yes	7(38.9%)	11(61.1%)	Ref	
	No	223(89.9%)	25(10.1%)	0.071(.025,.201)	0.083(0.008,0.900)
Personal Protective cloth	Yes	149(81.9%)	33(18.1%)	0.167(0.050,0.562)	**
	No	81(96.4%)	3(3.6%)	Ref	
Thermometer /equivalent gauge	Yes	6(35.3%)	11(64.7%)	0.61(0.21,0.179)	**
	No	224(90%)	25(10%)	Ref	
Wash hands before preparing food	Yes	118(80.8%)	28(19.2%)	0.301(0.132,0.688)	**
	No	112(93.3%)	8(6.7%)	Ref	

NB ** Variables removed from the model (not significant) in multivariable analysis

6. Discussion

This study found that the status of practicing prerequisite program for the implementation of HACCP among hotels and restaurants in Dukem and Bishoftu towns was lower by 13.5% (95%CI: 1.09–1.18) compared to the study conducted among food sectors in Harare, Zimbabwe, which showed 58.3% of HACCP practice and in Tanzania, which was 26.6%. The disparities could be due to time differences, geographical infrastructure, and knowledge of HACCP practice in different study settings (Macheka *et al.*, 2013; Kahindi, 2016)**.**

The success of the food safety system (HACCP) depends on the commitment and attitude of workers. In terms of the attitude of food handlers toward HACCP practice, this study showed that 184 (69.2%) of food handlers had a positive attitude toward the practices of food safety. This result was similar to the study conducted in Jimma town that reported the positive attitude towards food safety of workers was 70 percent (Neela etal., 2016).

Health of the food handlers is essential to protect the health of customers. Thus, in this study, the medical check-up trend among the hotel and restaurant staff was evaluated. The majority of the 191 (71.8%) workers had a good practice of medical check-up every three months. This practice is higher compared with the report in the Ghanaian hospital industry, where 65.69% of the workers had the practice of checking their medical. This difference might be due to law enforcement and supervision systems and comments from authorities(Odonkor, 2020).

Well, equipment is the basis for the prevention of control hazards and food safety hazards, and equipped establishments can easily eliminate these hazards for the successful management of food safety practices. In this study, 49.6% of the hotels had inadequate equipment for HACCP/food safety systems implementation. This study was in line with Lack of equipment to implement a food safety management system was reported as a major challenge in Kenya (Wandolo *et al.*, 2018).

Establishing an internal inspection and monitoring system is also important to monitor the HACCP system. Only 28.6% of the establishments in this study had an inspection protocol

on a yearly basis. As such, a lack of law enforcement was pointed out by the majority of the respondents as a reason not to implement HACCP. With the same token, a study conducted in Ghanaian hotels pointed out the same reason for not practicing HACCP. A report in some hotels in Zimbabwe indicated in two year only 26.7% hotels inspected by authorities respectively in contrast to this study finding. This difference might be due to different policy and regulation systems (Macheka *et al.*, 2013).

Apparently, government support enhances the implementation of HACCP practices by filling gaps that the food sector might face. In this study, the majority of hotels and restaurants 76.7% did not get the government support on HACCP. As the study on Tanzania hotels also pointed out, lack of government support (25.7%) was one of the major barriers to HACCP practice. This difference might be due to different policy and regulation systems (Kahindi, 2016).

The methods and use of a standard operating procedure (guideline) are vital in HACCP implementation systems for improving the quality of services in sectors. In this study finding, 3.8% of hotel and restaurant respondents were using a manual for cleaning and disinfecting equipment and facilities. This result was lower than according to a study conducted in Tanzania, where 36% of facilities used written manual standards for cleaning and disinfecting equipment. On the contrary, a study in the UK food business reported that prerequisite activities scored well enough without consideration of cleaning and disinfection in the food sector. These differences might be due to geographical location, time, study setting, prerequisite programs, policy, and regulation systems(BA and Yüksel, 2007; Kahindi, 2016).

According to the study result indicated that the majority 185(69.6%) hotels and restaurants faced lack of finance for practices of prerequisite program for HACCP implementation. In similar fashion, in Zimbabwe, findings showed that a lower proportion of hotels (23.7%) faced such challenges (Macheka *et al.*, 2013).

The 7th step of the HACCP principles is a system of documentation and record keeping at the work place. HACCP is a document-based system and documentation includes all

documents and materials such as guidelines, checklists, feedback, and comments of inspection. Without documentation, there is no evidence in the catering facility's food safety management systems.

This study revealed that the documentation system for keeping the results of inspection files in hotels and restaurants were 56 (21.1%), and similarly, the study conducted in Turkey was also (21.7%). In contrast to this, the study conducted in Jamaica indicated that 43.8% of hotels keep the results of audits in their hotels, and study findings in Ghana showed that (92.2%) of hotels in food services did not keep records of audits in their sectors. The difference might be due to policy regulation systems on food safety management (Ba and Yüksel, 2007; By James, 2009; Gyebi *et al.*, 2020).

As a result of this study result, the majority of the 248 (93.2%) of the respondents did not understand the meaning of the Hazard Analysis Critical Control Point terminology. And this study result was similar to a study conducted 94% in South Africa did not understand this meaning and also similar to the study conducted in Kumasi, Ghana was 83.3% of food staff did not know the HACCP principles' meaning. This might be due to a lack of strong policy and legislation enforcement in the regions(Conradie, 2007; Agyei-baffour, Sekyere and Addy, 2013).

7. Strength and Limitation of the Study

7.1. Strength of the Study

To our knowledge, this is the first that attempts to the assessment of practicing prerequisite program for the implementation of HACCP and associated factors among hotels and restaurants in Dukem and Bishoftu towns, Ethiopia.

The study explored in detail information regarding practices of prerequisite program for the implementation of HACCP in hotels and restaurants, which may be used as input for establishments as well as for authorities to make improvements in the future.

7.2. Limitation of the Study

The research attempted to assess factors associated prerequisite program implementation with hazards analysis and critical control points in hotels and restaurants, but it is not that this study was exhaustive, and all other factors that might exist that this study was not able to uncover.

Since this was the first study to address the current topic in those localities, there was a scarcity of published literature to make a detailed comparative explanation of the current study findings with the previous study findings.

The current COVID-19 outbreak has hampered free contact with participants during data collection.

The cross-sectional study design quantitative method may not be strong enough to show variables of the effect of interest and their associated factors.

8. Conclusion

Based on the findings of this study, the magnitude prerequisite programs for implementation of HACCP in the study area was poor compared to other studies. The results of the study showed that the absence of a documentation system and keeping records, lack of finance, and not understanding the meaning of HACCP were those factors

significantly associated with the practices of the program in hotels and restaurants' food safety systems. Therefore, the concerned body and stakeholders officially develop a program and strategy for the enhancement of the programs for future HACCP implementation in Hotels and Restaurants in Dukem and Bishoftu towns. An assessment on the prerequisite programs of HACCP has identified several challenge gaps: lack of enforcement, support system, lack of finance, lack of a HACCP plan, inability to understand the meaning of HACCP in food safety, lack of time, inadequate equipment. Results from this study underline the importance and the need for the full practice of the HACCP system for proper food handling and food safety was lower.

9. **Recommendations**

9.1. To Regulatory Offices and Concerned Government bodies

Regulatory offices (Health regulatory bodies and Hotel and tourism bureaus) of the towns and concerned government offices should facilitate more to fulfil the programs to implement HACCP practices in food establishments through capacity building in software and hardware.

All levels of authority bodies need to improve awareness creation, stakeholder participation, and programs for the implementation of HACCP principles through strengthening the prerequisite program and good food handling practices in all food and drinking establishments.

It should not be limited to only hotels and restaurants, but also to enhance small scale food factories to improve the programs for HACCP practice to save the public health.

9.2. To Hotels and Restaurant Owners

Owners of the food sectors should participate in investment on programs of HACCP implementation and good food handling practices to provide safe and quality food to their customers, encourage their neighbors and friends to participate in practice and should be involved in decision -making to increase HACCP practices in food establishments.

Owners of the food sectors should be aware the prerequisite program for practicing HACCP principles as good methods of controlling hazards from food before it exposed for contamination, also a way of decrees percentage of risk and to maximize the profit they should be encouraging the implementation of HACCP in their organizations.

9.3. For Researchers, Policy makers

It is better in future Researchers focus on assessment of prerequisite programs for implementation of HACCP and associated factors and how to overcome those challenges should need more research that affects safety of food establishments and Policy makers should work on strengthening programs for HACCP implementation.

10. Reference

Abdi, A. M. *et al.* (2020) .Food hygiene practices and associated factors among food handlers working in food establishments in the bole sub city, addis ababa, ethiopia. *Risk Management and Healthcare Policy*, 13, pp. 1861–1868. doi: 10.2147/RMHP.S266342.

Adesokan, H. K., Akinseye, V. O. and Adesokan, G. A. (2015). Food Safety Training Is Associated with Improved Knowledge and Behaviours among Foodservice Establishments .Workers, *International Journal of Food Scienceournal of Food Science*, 2015, p. 8. Available at: http://dx.doi.org/10.1155/2015/328761.

Antle, J. M. (1999) .Benefits and costs of food safety regulation, *Food Policy*, 24(6), pp. 605–623. doi: 10.1016/S0306-9192(99)00068-8.

Ayalew, H., Birhanu, A. and Asrade, B. (2013) .Review on food safety system : Ethiopian perspective *African Journal of Food Science Review*, 7(December), pp. 431–440. doi: 10.5897/AJFS2013.1064.

Ba, M. and Yüksel, M. (2007) .Di Y culties and barriers for the implementing of HACCP and food safety systems in food businesses in Turkey, *Food Control*, 18, pp. 124–130. doi: 10.1016/j.foodcont.2005.09.002.

By James (2009) .Description of the Food Safety System in Hotels and How It Compares With HACCP Standards, *J Travel Med*, 16(1), pp. 35–41. doi: 10.1111/j.1708-8305.2008.00271.x.

Cheng, W. *et al.* (2019). Barriers of HACCP Implementation in the Hospitality Industry in Taiwan, *Journal of Quality*, 22(December 2015). doi: 10.6220/joq.2015.22(4).03.

Culler, R. *et al.* (2015) .Food Safety Systems Prerequisite Programs and Validation, *Food and Nutrition Paper*.

FAO (2004) .Final Assessment of HACCP Compliance in Hotels Targeted Under the National HACCP Strategy September, *Assesment*, 1(September), pp. 1–9.

Food Agriculture Organization; World Health Organization (2003) .Food and Agriculture Organization Assuring Food Safety and Quality, *Food and Nutrition Paper*. Available at: ftp://ftp.fao.org/docrep/fao/006/y8705e/y8705e00.pdf.

Food, S. and Town, G. (2014a) .Food Safety Practice and Associated Factors of Food Handlers Working in International Journal of Food Science , Nutrition and Dietetics (

IJFS) ISSN 2326-3350 Food Safety Practice and Associated Factors of Food Handlers Working in Substandard Food Establ', (February 2016). doi: 10.19070/2326-3350-1400027.

Food, S. and Town, G. (2014b) .Food Safety Practice and Associated Factors of Food Handlers Working in International Journal of Food Science , Nutrition and Dietetics (IJFS) ISSN 2326-3350 Food Safety Practice and Associated Factors of Food Handlers Working in Substandard Food Establ'. doi: 10.19070/2326-3350-1400027.

Gesage, P. (2020). Effects of Employee Behavioral Factors on HACCP System Practices in Four and Five Star Rated Hotels in Nairobi County , 48, pp. 38–45. doi: 10.7176/JTHS/48-05.

Government Of Malaysia (2004) .FAO / WHO Regional Conference on Food Safety for Asia and the Pacific., *Foodborne disease monitoring and surveillance systerm*, p. 11.

Gyebi, B. E. A. *et al.* (2020).Knowledge, attitude, and practices (KAP) of foodservice providers, and microbial quality on food served in Kumasi, *Journal of Foodservice Business Research*. doi: 10.1080/15378020.2020.1859972.

Habiballah, etal (2017) .Restaurant Employees Food Handling Practices in Irbid City , Jordan, *Journal of Tourism and Hospitality Management*, 5(1), pp. 81–89. doi: 10.15640/jthm.v5n1a9.

ISO (2018) 'ISO 22000:2018(en). Food safety management systems — Requirements for any organization in the food chain', *Iso*, 2018(2).

Javier, P. and Charles, P. (2001). Technical barriers to Hazard Analysis Critical Control Point (HACCP), *Article*, 12, pp. 165–173.

Kahindi, B. B. (2016). Food Safety Management Practices of Small and Medium Sized Food Industry Enterprizes in Tanzania, *Article*.

Kifle, G. *et al.* (2020) .Drivers for the implementation of market-based food safety management systems : Evidence from Lebanon, *Article*, (October 2019), pp. 1082–1092. doi: 10.1002/fsn3.1394.

Kumar, A. (2018). 'HACCP in Hotel Industry - A study on its Application in Food Production (Published in International Journal of Hospitality and Tourism Systems , Vol2 , HACCP in Hotel Industry - a study on its Application in Food Production', 2(1).

Macheka, L. *et al.* (2013) .Barriers , bene fi ts and motivation factors for the implementation of food safety management system in the food sector in Harare Province , Zimbabwe, *Food Control*. Zimbabuwe: Elsevier Ltd, pp. 126–131. doi: 10.1016/j.foodcont.2013.04.019.

MoFED (2020). Dukem and Bishoftu Town Year 2020, *Organization*, 1(3), p. 3.

Mure, C. C. *et al.* (2020) .Food Safety System (HACCP) as Quality Checkpoints in a Spin-O ff Small-Scale Yogurt Processing Plant.

National Food Safety Policy and Strategic Plan (2012). *National Food Safety Policy and Strategic Plan*.pp.145-155.

Neela etal., 2016 (2016). Food Safety Knowledge, Practice and Attitude of Food Handlers in Traditional Hotels of Jimma Town, Southern Ethiopia, *Annals. Food Science and Technology*, 17(2), pp. 507–517.

Nyamari, J. (2013) .'Evaluation Of Compliance To Food Safety Standards Amongst Food Handlers In Selected Hospitals In Kenya', *Article*, pp 25-30

Odonkor, S. T. (2020) .An Assessment of Food Safety Knowledge and Practices in the Ghanaian Hospitality Industry, 2020.

Pal, M., Gebregabiher, W. and Singh, R. K. (2016) .The role of Hazard Analysis Critical Control Point in food safety.

Pawar, P. A. (2013).Haccp in Retail and Food Service Operation, 2(10), pp. 50–66.

Press, D. (2016) 'Food safety knowledge , attitude , and practice toward compliance with abattoir laws among the abattoir workers in Malaysia', pp. 79–87.

Rostron, K. I. (2012) .Strategies Challenges and Outcomes in the Development and Implementation of Food Control Systems : An International Perspective from Policy Makers.

Savelli, C. J. *et al.* (2019).The FAO/WHO International Food Safety Authorities Network in Review, 2004-2018: Learning from the Past and Looking to the Future, *Foodborne Pathogens and Disease*, 16(7), pp. 480–488. doi: 10.1089/fpd.2018.2582.

Stevens, K. and Hood, S. (2019). *Food safety management systems*, *Food Microbiology: Fundamentals and Frontiers*. doi: 10.1128/9781555819972.ch40.

Taylor, E. (2009) .Factors influencing food safety management system adoption in Thai food-manufacturing firms. doi: 10.1108/00070700910951506.

Temesgen, M. (2015) .*Food Standards, Food Law and Regulation System in Ethiopia: A Review*. Available at: www.iiste.org.

Town, A. (2018) .SM Gr up Food Safety Knowledge , Handling SM Journal of Public Health and Practice and Associated Factors among Food Handlers of Hotels / Restaurants in Epidemiology, 4(2).

Uyttendaele, M., Boeck, E. De and Jacxsens, L. (2016) .Challenges in food safety as part of food security : lessons learnt on food safety in a globalized world', *Italian Oral Surgery*, 6(Icsusl 2015), pp. 16–22. doi: 10.1016/j.profoo.2016.02.003.

Walczak, D. (2000) .Overcoming barriers to restaurant food safety, *Hospitality Review*, 18(2), p. 8.

Wandolo, M. A. *et al.* (2018) .Barriers to the Implementation of Food Safety and Hygiene Principles (HACCP) in TVET and University Hospitality Schools in Kenya, *International Journal of Scientific Research and Management*, 06(07), pp. 544–556. doi: 10.18535/ijsrm/v6i7.em05.

WHO (1999) .Strategies for Implementing HACCP in Small and/or Less Developed Businesses: Report of a WHO Consultation, WHO/SDE/PH(June), pp. 1–33. Available at: http://www.who.int/fsf%0Ahttp://whqlibdc.who.int/hq/1999/WHO_SDE_PHE_FOS_99.7.pdf.

11. Annexes

English Version Questionnaires

Addis Ababa University School of Pharmacy Department of Regulatory Science. Questionnaire an assessment of pre request programs of Hazard Analysis and Critical Control Point (HACCP) practices & associated factors among hotels and restaurants in Dukem and Bishoftu Towns, Ethiopia. Hello, my name is _____. I am MSc student in Department of Regulatory Science, School of Pharmacy, and Addis Ababa University. The purpose of this study is to assess the practicing of prerequisite program for the implementation of Hazard Analysis and Critical Control Point (HACCP) practices and associated factors among hotels/restaurants in Dukem and Bishoftu Towns, Ethiopia. The outcome of the study will definitely play vital role in improving the food management system of food service in hotels /restaurants. So far, as to our knowledge, there is no study assess the practicing of prerequisite program for Hazard Analysis and Critical Control Point (HACCP) practices and associated factors among hotels/restaurants in Dukem and Bishoftu Towns, Ethiopia. If you agree to participate in the study as interviewee, I will continue my interviewee. Your participation is completely voluntary Also, you can refuse to answer any questions and you have full command to withdraw from the interview.

Benefits .There is no direct benefit to you but the result may be used as input to your establishments. This is help for design better improvement for the establishments

Risks/Discomforts. Some of the study questions may make you uncomfortable. You are free to decline to answer any question you don't wish to answer.

Confidentiality. All your responses will remain strictly confidential, your name will not be recorded on the questionnaire paper, and your responses will not link to your identity at any time. The results of study will be presented collectively not individually.

Part I .Questions on socio demographic information of hotel/restaurant managers. Instructions: Circle the responses for questions with alternatives and write for open ended questions on space provided.

1. Age of Respondent in years------

2. Type of food service your organization provide 1. Hotel 2.Restaurant

3. Gender, 1 Male. 2. Female

4 .Marital status1.Married 2.Single 3.Divorced 4.Widowed

5. Monthly income in birr1. 1.≤2000 .2. 2.2001-5000.3. 3.5001-10000.4, 4.>10000.

6. Current position in the establishments' 1. Managers

7. What is level of your education? 1. Degree2. Diploma/level4 3. 12^{th} grade complete 4.10th grade complete. 5.8th grade.

8. Work experience in your current position in this establishments in months/in years. 1, Less than one year.2, Less than 2 year.3, Less than 3 year .4 Less than 4 year.

9. Condition of the hotel/restaurant 1 Rent 2. Private.

10. How many food handlers have? 1.5, 2.10, 3.20, 4.30, 5.35, 6.More 35.

11 How many customers visited per week? 1.Over 20 but less than 100.2,Over 200 but less than 300.3.Over 300 but less than 400 .4.Over 400 but less than 500 .5.Over 500 but less than 1000 6.Over 1000 but less than 2000.7. Over2000.

12. Who measure action in compliance with food safety? 1. Health office.2.Trade office.3.Turisim office 4. Not practiced.

Part II. Questions for prerequisite programs for implementation of HACCP in hotels and restaurants.

2.1. Do the hotel have HACCP plan? 0, No 1, Yes

2.2 .Do the hotel have HACCP team? 0, No 1, Yes

2.3 Is the person assigned who monitor sanitation, food safety and quality of hotels/restaurants? 0, No 1, Yes. 2.4 .Do the workers have and use personal protective cloth and mask? 0, No 1, Yes

2.5. Is designated sink for cleaning hands and equipment in hotel/restaurant? 0, No 1, Yes

2.6 .Is the hotel/restaurant have suitable utensils for transport ready food? 0, No 1, Yes

2.7 Do the hotel/restaurant have cold room storage? 0, No 1, Yes

2.8 Do the hotel/restaurant Control of temperature and time while cooking do you the food 0, No 1, Yes?

2.9. In Hotels /Restaurant is chemical hazard labeled and stored separately from food storage? 0, No 1, Yes

2.10 .In hotels/restaurants while receiving raw food check the physical condition of food? 0, No 1, Yes.

2.11 In hotel /restaurant Does Food prevented from cross contamination by separation raw& cooked food? 0, No 1, Yes

2.12 In hotels/restaurants do you wash vegetables and fruits before use? 0, No 1, Yes?

Part III. Knowledge and a practices in hotels and restaurants.

3 .0 Do the workers Trained on food safety? 0, No 1, Yes

3.1 Do Worker have positive attitude on safety food practices? 0, No 1, Yes

3.2 Do the hotel/restaurant have schedule time of clean food surfaces? 0, No 1, Yes

3.3 Do you know the meaning of HACCP? 0, No 1, Yes

3.4 Does cleaning food equipment's decreases contamination? 0, No 1, Yes

3.5. Does the Chilling or freezing eliminates harmful germs? 0, No 1, Yes

3.6 Does wash hands before touch food utensils decrease food contamination? 0, No 1, Yes

3.7 Do the hotels use HACCP guidelines? 0, No 1, Yes

3.8 How the hotels use knives? 1, two system, 2 wash 3, coding

3.9 At what time kitchen washed? 1. After each use 2.When prepare other food

3.10 If the workers have a sore on back of hand, do prepare food? 0, No 1, Yes

3.11 How the hotels/restaurants reheated left over food? 1, not important 2.atroom temperature

3.12 How the hotels/restaurants wash vegetables and fruits by what? 1, Hotwater2.Coolwater

3.13 Do the personal protective cloth minimize contamination? 0, No 1, Yes

3.14 do separation of cook and raw food minimize contamination? 0, No 1, Yes

3.15 do control of temperature use for prevent contamination? 0, No 1, Yes

Part 4 Questions to collect Internal and external factors HACCP practice of hotels and restaurants in Dukem and Bishoftu towns.

4.1Do the hotel/restaurant licensed from authority body? 0. No, 1, yes. In what interval renewed? 1 annual 2, Never

4.2Do inspection done from authority 0. No 1, Yes. Interval of inspection 1,3 month,2, 6month,3, once a year, 4 Never.

4.3 Do the hotels/restaurants have Documentation system? 0 No 1, Yes

4.4Is there Enforcement from government To HACCP? 0, No, 1, Yes

4.5 Do the Government support on HACCP? 0, No, 1 Yes

4.6 Do you have finance to practice HACCP? 0, No 1, Yes

4.7 Do the hotel/restaurant have of skill HACCP? 0. No, 1 Yes

4.8 Do the hotel/restaurant have adequate equipment? 0. No 1, Yes

4.9 Do the hotel/restaurant have time to practice HACCP? 0, No, 1, Yes

4.10 Do the workers under go Medical checkup in three months0, No 1, Yes

4.11 What types of cut board of the hotels/restaurants use made? 1, Wood 2, Plastic, 3, Marble

.4.13 .Do the workers have motivation of HACCP/food safety management practice? 0 No, 1, Yes

4.14 Do the workers have experience on of HACCP/food safety management practice? 0 No, 1, Yes.

4.15. Do the workers use checklist to prevent food hazard? 0 No, 1, Yes

4.16 Do the hotel/restaurant control biological hazards? 0 No, 1, Yes

4.17 Do the hotels/restaurants use First in first out methods on raw food? 0 No, 1, Yes

4.18. Do the hotels/restaurants clean refrigerator? 0. No 1. Yes

4.19 Do the hotels/restaurant use thermometer in refrigerator? 0. No 1. Yes

4.20 Do the hotels/restaurant have sanitary facilities? 0. No 1.Yes

4.21 Do the hotels/restaurant have water supply? 0. No 1.Yes.

4.22 DO the hotel/restaurant control physical hazards? 0. No 1.Yes.

4.23 Do the hotel/restaurant prevent cross contamination of food? 0 .No 1. Yes

4.24. Do the workers wash hands before prepare food? 0 .No 1.Yes

4.25 Do workers trained on HACCP? 0. No 1.Yes

AFAAN OROMOO VERSION

Kan fillano qabu itti marii , kan bakka duwwa qabu irrattii baressii.

Kutaa 1 Af gaffii dhimma Hawasummaa Gegessaa dhabataa hotelaafi mana nyaataa .

____1 Umurii waggadhaa

2. Gosa dhabataa 1. Hootela2.mananyaataa

3. Saala 1 dhiraa 2,. Dhalaa

4 . Halaa fudhaa. 1kan fudhee. 2 .qofa.3 kan hikee. 4 kan hiktee.

5. Galii ji'aa argatuu. 1.2000 gadi .2.2001-5000.3. 3.5001-10000.4, 4.10000 olidha

6. Gahee hojii_____

7.Sadarkaa barumsaa.1digirii.2 dipilomaa.3.kuta12 xumure.4kuta10nxumure.5kuta 8xumure.

8. Yeroo turtiidhabatichaa 1waggaa1 gadii.2waggaa 2 gadii.3.waggaa 3 gadii. 4. wagga 4 gadii.

9. Hala mana hojii 1.kiraa 2.dhunfaa.

10. Bayinaa hojetaa jiru? 1.5, 2.10, 3.20, 4.30, 5.35, 6.> 35

11 bayinaa fayyadamtoota torbaniiti dhufaani? 1 20 oli fi 100 gadi.2.200 olifi 300 gadi.3.300 oli fi400 gadi .4.> 400 < 500 .5. 500 olifi 1000 gadi 6.1000 oli fi 2000 gadi.7 .2000 oli

12. rakkoon kan argamuu yoo tahe enyuutu dhabata kana adabaa?1. wajjiraa Fayyaa.2.wajiraa daldalaa.3wajjiraa Adaafi turizimi. 4. Hin beekanme.

Kutaa 2. Gaffii waa'ee shaakalaa sakkatahinsa balaa nyaatafi tuqaa to'annoo isa nagenyaa nyaata irratti.

2.1. Karooraa sakkatahinsaa balaa nyaata adda basuun karoorii jira? 0. Miti 1. Eyyee

2.2 . Gareen sakkatahinsa balaa nyaata adda basuu ni jira? 0. Miti 1. Eyyee

2.3. To'aataan qulqulinaa nyaata fi dhabatichaa hordofuu jira? 0. Miti 1. Eyyee

2.4 . Hojettoni huccuu hojiifi maskii ni fayyadamuu? 0. Miti 1. Eyyee

2.5. Bakkii harkaafi meshaalee itti dhiqatamuu qophahee jiraa? 0. Miti 1. Eyyee

2.6 Nyaata qophahee kan ittiin dhiyesaan meshaale gahan jira? 0. Miti 1. Eyyee

2.7 Kutaan dillala'aan nyaati kufamuu jiraa? 0. Miti 1. Eyyee

2.8 Nyaatni yeroo qophefamuu ho'inaanafi yeroon ni to'ataamaa?0. Miti 1. Eyyee

2.9. Kemikaala fayyadamtaan adda basaani galmessuun qofati ni kufama? 0. Miti 1. Eyyee

2.10 Nyaata dheedhii yeroo bitamuu fayyaan isaa ni ilalamaa? 0. Miti 1. Eyyee

2.11 Falamaa nyaata hirrisuuf nyaata dhedhiifi bilchataa addaan ni bafamaa? 0. Miti 1. Eyye

2.12 Kuduraafi fuduraa osoo hin fayyadamin duraa ni dhiqamaa? 0. Miti 1. Eyyee

Kutaa 3: Gaffii shakalaa sirnaa qabiinsaa nyaata hooteelaa fi nyaata

3 .0 Hojetonnii nageenyaa nyaata irraattii leenjii qabu? 0. Miti 1. Eyye

3.1Ilaalchi hojetotaa nageenyaa nyaata eguu irraatti gariidha? 0. Miti 1. Eyyee

*3.2*Sagantaan dhabataan ittii dhabatichaa qulqulesaaan jira? 0. Miti 1. Eyyee

3.3 Hiikaa sakkatanisaa balaa nyaata adda basuun to'achuu kan jedhuu ni bektuu? 0. Miti 1. Eyye

3.4 Meshaalee nyaata qulqullessuun falamaa nyaata ni hirrisaa? 0. Miti 1. Eyyee

3.5. Dillaalessuun jaarmii nyaata kessaa ni dhabamsisaa? 0. Miti 1. Eyyee

3.6 Dursaani harkaa dhiqaachuun falaamaa nyaata ni xiqqessaa? 0. Miti 1. Eyyee

3.7 Qajelfamaa sakkatahinsa balaa nyaata to'achuu ni qabduu? 0. Miti 1. Eyye

3.8 Billaa akkamitiin fayyadamtuu?1 gosa lama 2.dhiqun. 3 hallu dibun

3.9 Bakkii nyaata tolchaan yeroo akkamii qulqqulefamaa? 1. Akka itti fayadanme booda2.yeroo nyaata biraa tolchinu

3.10, Hojetaan harkaa isa irratti madaa qabu hojii ni hojetaa? 0. Miti 1. Eyyee

3.11 Nyaata hafee akkamittii ho'istuu?1 barbachisa miti 2.tempirecheraa dareetti

3.12 Kuduraafi fuduraa bishaan akkamiin michituu? 1.bishaan ho'a2.bishaa dilalaa

3.13 Huccuu hojii fayyadamuun falaamaa ni xiqqessaa? 0. Miti 1. Eyye

3.14 Nyaata dheedhiifi bilchata addan basuun falamaa ni xiqqessaa? 0. Miti 1. Eyye

3.15 .Ho'insaa nyaata to'aachuun falamaa ni ittisaa? 0. Miti 1. Eyye

kutaa 4ffaa Gaffii kessoo fi ala dhabataa hala shakalaa sakkatahinsa fi tuqa to'annoo sirna nyaata

4.1.Hayamaa hojii qabduu?0. miti.1 eyyee. Yeroo akkamii harefamaa?1waggadhan 2.gonkuma

4.2. To'annoon gegefamee ni bekaa? 0. miti.1 eyyee Yeroo hangamiin gegefamee1.ji'a 3n2.ji'a 6n.3.waggadhan.4.gegefame hin beeku

4.3 Dhabatni kun dokimeentiin sirnaan to'annoo balaa falama itti to'aatan qaba ni qabataa? 0.miti 1.eyye.

4.4 Karaa motumaa dirqamsissuun ni jira?0.miti 1.eyye.

4.5 Degersii karaa motummaa to'anoo balaa nyaatairrati qabdu? 0.miti 1.eyye

4.6 Mallaqaa ittin balaa to'annoo falama nyaataf qabdu? 0.miti 1.eyye.

4.7 Dandeettii ittiin balaa sirna nyaata to'aatan ni qabdu? 0.miti 1.eyye

4.8 Meshaale gaha dhabatichii ni qaba? 0.miti 1.eyye.

4.9 Yeroo gaha qabduu balaa falamaa nyaata to'achuuf? 0.miti 1.eyye.

4.10 Hojettonii fayyumaa isanii niji'a sadiin qoratamaa? 0.miti 1.eyye.

4.11 Gabateen nyaata irraatii kutaan malii irra tolfamee dha?1.muka.2.pilatika.3 marbili

4.13 Hojetonnii sirna nagenyaa nyaata eguuf kakahumsa qabu? 0.miti 1.eyye

4.14 Hojetonni sirna nagenyaa nyaata hojii irra olchuuf muxanno qabu? 0.miti 1.eyye.

4.15. Gucaa ittin balaa falamaa nyaata to'attan qabdu? 0.miti 1.eyye.

4.16 wantoota lubbuu qabanii nyaata irra ni to'atamuu? 0.miti 1.eyye.

4.17 Nyaata dhedhii akkataa dursee galii taheen fayyadamuun jira? 0.miti 1.eyye.

4.18. Dilaalessaan ni qulqullefamaa? 0.miti 1.eyye

4.19 Dilaalessaa kessaattii termoometiraa ni fayyadamtuu? 0. miti 1.eyye.

4.20 Manni tajajilaa qulqulinaaf oluu jira? 0. miti 1.eyye.

4.21 Bishaani ni jiraa? 0. miti 1.eyye.

4.22 Wantootaa ijaan muldhaatan nyaata irraa ni to'atamuu0.miti 1eyyee.

4.23 to'annoon falamaa nyaata ni gegefamaa?0. miti.1 eyyee.

4.24 hojetonni harkaa nyaata qophessuun dura ni dhiqatuu? 0 miti. 1 eyyee

4.25. hojetonni leenjii balaa to'annoo nyaata adda basuu irraatti argatani?.0 miti.1 eyye