ASSESSMENT OF KNOWLEDGE, ATTITUDE AND PRACTICE ON REGULATORY FOOD HYGIENE AND SAFETY REQUIREMENTS AMONG CAKE AND ICECREAM MANUFACTURERS AND WORKERS AND TRENDS OF REGULATORY MEASURES

BY:

GETACHEW ABEBE (BSC)

ADVISORS:

Dr. AYNADIS TAMENE

Mr. TEWODROS GIRMA

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

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GETACHEW ABEBE (BSC)

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This is to certify that the thesis prepared by Getachew Abebe, enttitled **"knowledge, attitude and practices on regulatory food hygiene and safety requirements among cake and ice-cream manufacturers and workers and trends of regulatory measures in Addis Ababa, Ethiopia"** and submitted in partial fulfillment of the requirements for the degree of master in food regulatory affairs complies with the regulation of the university and meets the accepted standard with respect to originality and quality.

Signed by the Examining Committee:

	Signature	Date
Advisors:		
Dr. Aynadis Tamene	_____	_____
Mr.Tewodros Girma	_____	_____
Internal examiner:		
_____	_____	_____
External Examiner:		
_____	_____	_____
Chair person, Department, Graduate Program Coordinator:		
_____	_____	_____

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LIST OF ACRONYMS AND ABBREVIATIONS

AA	Addis Ababa
AAFMHACA	Addis Ababa Food, Medicine and Health care administration and control authority
DC	Data Collector
EB	Ethiopian Birr
EC	Ethiopian Calendar
EFDA	Ethiopian Food and drug administration
EPHI	Ethiopian Public Health Institute
FAO	Food and Agricultural Organization
FHS	Food Hygiene and Safety
FMHACO	Food, Medicine and Health care administration and control Office
FMOH	Federal Ministry of Health
GMP	Good Manufacturing Practices
HACCP	Hazard analysis and critical control point
KAP	Knowledge, Attitude and Practice
LMIC	Low and Middle Income Country
NGO	Non-Governmental Organizations
PI	Principal Investigator
S-C	Sub-City
SD	Standard Deviation
SPSS	Statistical Package for Social Sciences
WHO	World Health Organization

ABSTRACT

Background: Poor knowledge, attitude and practices of hygiene can contribute to the outbreaks of food borne illness. Most foods, including cake and ice cream products, could be affected by food borne pathogens, mainly due to poor hygienic conditions and inappropriate food handling practices. Inadequate knowledge, negative attitude and poor practices on food hygiene and weak regulation practices are among the factors responsible for the occurrence of poor hygienic conditions and inappropriate food handling practices.

Objective: To assess the level of knowledge, attitude and practice on regulatory food hygiene and safety requirements among cake and ice-cream workers and trend of regulatory measures in Addis Ababa, Ethiopia.

Methods: For knowledge, attitude and practices of workers assessment, a cross-sectional survey was conducted in purposely selected 5 sub cities and 108 manufacturers. 236 workers were selected by simple random sampling technique and interviewed using structured questionnaire. For the assessment of trends of regulatory measures, data were collected from 10 inspection team leaders (9 sub cities' food medicine and health care administration office and one Addis Ababa food medicine and health care administration authority) using a structured questionnaire. Data was entered using EPI info version 7.2 and cleaning and analysis was performed by using SPSS version 25.

Result: The mean age and work experience of workers in the cake and ice-cream manufacturing companies were 30.03 and 5.72, respectively. About 46.6 % (110) of participants had no formal education. Only 2.5% of participant's field of study was related to their job.72.9 %, 37.3% and 59.3% of participants had poor knowledge, attitude and practice level about food hygiene and safety regulatory requirements, respectively. The total measure taken by the regulatory bodies on non complaints of requirements was 129 and 99 by 1^{st} and 2^{nd} half year of 2019, respectively. It was also 115 and 128 by the $1^{st}$and 2^{nd}half years of 2020, respectively. Warning, lockdown and withdrawal from work were the major regulatory measures taken by the regulatory bodies.

Conclusion/recommendation: Most workers do have poor knowledge and practice towards food hygiene and safety regulatory parameters. Though most of the workers knew the importance of hand washing practices, practically they were not complying. In contrast to the knowledge level, overall, more than half of the participants had good level of attitude towards food hygiene and safety regulatory requirements. The overall level of food hygiene and safety regulatory practices was poor. Though the sum total practice level was poor, the majority of them were also good at some specific requirements. The present study also pointed out that most of the regulatory measures taken by the regulation bodies on non-fulfillment were simple type of measures like warning.

1. INTRODUCTION

1.1. Background

Cakes and ice creams are categorized under sweetened bakery products. Chocolate ice cream is a frozen food that uses dairy products, cocoa powder, and chocolate chips as main ingredients, mixing them with sugar or syrup, egg products, emulsifier, stabilizer flavors, and colors, produced through a series of processing steps (Junchao Lu *et.al*. 2014). Western Europe was the largest region in the ice cream and frozen dessert manufacturing market and worth $36.6 billion in 2018, accounting for 39.7% of the global ice cream and frozen dessert manufacturing market, followed by Asia Pacific at 35.4% and North America at 10.0% respectively and also, in Taiwan also, ice cream is a huge industry that accounts for a market share of approximately in new Taiwan dollar 1688 million, representing 2115 tons of products sold for the year 2012 (Junchao Lu*et.al*. 2014).This product is well known and could serve as a good microbial growth medium because of its' nutrients (lactose, protein, carbohydrate, etc.) and neutral pH profile. Therefore, preventing microbial contamination could be crucial for its safety control (Kokkinakis EN et.al. 2008).

Likewise, in Ethiopia the production and consumption to such product is highly increasing (EPHI, 2020). Accordingly, as the consumption of such products is increasing, health problem is also a challenging issue particularly in poor countries because of the prevailing poor food handling and sanitation practices, inadequate food safety laws, weak regulatory systems, lack of financial resources to invest in safer equipment and lack of education for food-handlers or workers (FAO/WHO, 2004).

In Ethiopia, assessing prevalence of food borne illness due to gaps of knowledge, attitude and practice (KAP) of food handlers or workers towards food hygiene and safety requirements is critical. The existing studies conducted so far on different food items are indicating that most of the prevalence of food borne problems are mainly associated with KAP of the food handlers.

1.2. Statement of problems

Lack of strong regulatory measures and KAP gap of workers, food handlers and manufactures are major problems particularly in developing countries, hindering the proper implementation of hygiene and safety requirements in food production area. Due to these issues, food borne health issues specially arises from ice cream and cake manufacturing and selling practice is becoming a worldwide issue. Since an ice cream and cakes could serve as good growth medium for microbes, poor knowledge of hygiene and improper handling practices could contribute to outbreaks of food borne illness associated with it (Kokkinakis EN *et.al*. 2008).

Many countries have investigated the knowledge, attitude, and practices of various categories of food handlers to establish a baseline for the development of effective and relevant food handlers' training programs (Hislop & Shaw, 2009; Jianu & Chis, 2012; Martins, Hogg, & Otero, 2012; Van Tonder, Lues, & Theron, 2007).

Therefore, Strong food regulation, which subjects suppliers of goods and services to behavioral control and which penalize those who fail to perform in accordance with the specified standards are the dominant form of social regulation and very important (Nadvi and Waltring, 2003).

Even though, there are some studies conducted on KAP of food handlers with regard to food facilities and other products manufacturing process, still there is no or little information regarding ice cream and cake manufacturers' and workers' knowledge, attitude and practices towards safety and hygiene requirements and on trends of regulatory measures on non-complaints in Addis Ababa.

Therefore, this study aimed to assess the KAP of ice cream and cake manufacturers and workers regarding the practices of food production safety and hygiene requirements as well as trends of regulatory measures on non-compliance of these requirements.

1.3. Significance of the study

Now a day celebrating birthday especially for children using cake and ice cream product is common. The cake and ice cream product is susceptible to microbiological hazards and end users of this product are more of children, which are among immune compromised groups. So, the study is essential to assess the level of cake and ice cream product manufacturers' practices and workers' knowledge on hygiene and safety requirements and evaluate trends of regulatory measures. Even though there were some studies conducted on related sub-sectors in Ethiopia, there was no study conducted on the same topic in Addis Ababa. So, by using the findings of this study, the regulatory body will solve the problems associated with trends of regulatory measures. The findings will also provide information to fill the gap by responsible body in Addis Ababa and contribute to improve ice cream and cake manufacturers' and workers' knowledge, attitude and practices to access safe and hygienic products. In addition, it will provide information for future research and policymakers.

1.4. Objective of the study

1.4.1. General objective

- To assess the level of knowledge, attitude and practices of cake and ice-cream manufacturers and workers on food hygiene and safety regulatory requirements, and trend of regulatory measures in Addis Ababa

1.4.2. Specific objectives

- To determine the level of knowledge on food hygiene and safety regulatory requirements among cake and ice-cream workers in Addis Ababa, Ethiopia.
- To determine the level of attitude on food hygiene and safety regulatory requirements among cake and ice-cream workers in Addis Ababa, Ethiopia.
- To assess the practice of food hygiene and safety regulatory requirements by cake and ice-cream manufacturers in Addis Ababa, Ethiopia.
- To evaluate the trend of regulatory measures on non-compliance of hygiene and safety regulatory requirements among cake and ice-cream manufacturers in Addis Ababa, Ethiopia

2. Literature review

This study examined a wide range of assets including articles, journals, reports, books and basic theoretical concepts about cake and ice cream manufacturer's hygiene and safety knowledge, attitude and practices and others various aspects of reviews and system were discussed.

The topic to assess the level of knowledge, attitude and practice on regulatory food hygiene and safety requirements, and trend of regulatory measures on noncompliance of mandatory hygiene and safety requirements among cake and ice-cream manufacturers and workers defined and noticed as follows:

2.1. Overview of regulatory food hygiene and safety requirements

Regulatory requirements are one of regulatory instruments. Globally, regulatory functions are basically founded on legal provisions, regulations, directives, guidelines and requirements which are often referred as regulatory instruments that are formulated by government agencies for proper implementation and enforcement. In parallel, there are global and regional standards formulated by institutions like WHO and ICH, which at times may not be binding but support the industry and regulatory authorities in policy formulation, training and technical capacity building. Regulatory instruments are legal, enforceable, 'command and control' type instruments aimed at reaching desired, products safety and quality targets or performance standards used to regulate the product and behavior of individuals and/or firms.

Food regulation in Ethiopia is a shared responsibility of Ministry of Health, Ministry of Agriculture, Ministry of Trade and Industry, and Quality and Standards Authority of Ethiopia. However, there is no strong coordination and cooperation among these government regulatory agencies (Melese Temesgen, 2004). Hence for the purpose of identifying the problems and challenges associated with food quality regulation in Ethiopia, international food standards guidelines and selected countries experience serve as useful instruments. EFDA introduce all types of regulatory instruments including regulatory requirements .Specially in Addis Ababa where this study will be conducted primarily designed regulatory instruments are regulations, directives and requirements. In AAFMHACA this regulatory requirement are developed for each type of organization including cake and ice cream manufacturers. Such requirements are like, workers (hygiene, health condition, washing facility), working area and equipment design, raw material legality, packaging material safety and hygiene ,waste management system, etc.(EFDA proclamation,1112/19).

2.1.1. Terms definition of KAP

Food hygiene practice: Activities carried out by food workers to protect food from contamination and ensure a safe supply of food for consumers. (AAFMHACA Directive, 2016)

Food safety knowledge: The level of awareness of food workers concerning food safety issues (Marcia Thelwell-Reid,2014 et al., 2014).

Attitude: The way of food workers thinking and feeling about regulatory food safety and hygiene requirements. (Rubin *et.al*, 2014)

2.1.2. Cake and Ice cream workers KAP about the regulatory hygiene and safety requirements

Even though, there are some studies conducted on KAP of food handlers or workers with regard to food facilities and other products manufacturing process there is lack of study conducted specifically on ice cream and cake manufacturers and workers Knowledge, attitude and practices (KAP) gap on food safety and hygiene requirements in Addis Ababa.

2.1.3. Magnitude of food hygiene and safety requirement practice

Globally food borne health problems specially arises from ice cream and cake manufacturing and selling practice is critical problem. The study in Taiwan stated that microbiological quality of ice cream and cakes can be low, as it is a good growth medium for microbes because of its nutrients (lactose, proteins, etc.) and to its almost neutral pH of 6-7*).* Therefore, Poor knowledge of hygiene, attitude and practices can contribute to outbreaks of food borne illness (ckhsino, cheng *et.al*, 2011). According to the WHO (2010) food handlers play a significant role in ensuring food is safe throughout the chain of production and storage, therefore it is important that the food handling personnel are educated on hygiene and also follow hygiene practices such as thorough washing of hands before handling food using soap, wearing clean uniform on duty, washing hands after using toilet.

The study that was conducted in Hanoi Vietnam showed that a lack of food hygiene and safety knowledge and practices among respondents across three domains, including standard requirements for food facilities (18%), food processing procedures (29%), and food poisoning prevention (11%). Only 25.9 and 38.1% of participants used caps and masks, respectively, and 12.8% of food processors reported direct hand contact with food (Xuan T.*et al*., 2018.).

The study conducted in Africa trupati stated that Poor personal hygiene frequently contributes to food borne illnesses which indicates that food workers' knowledge and handling practices needs to be improved (W. Claeys, J.F. Schmit, 2010). Other study also showed that 21.1% of the food handlers say that washing removes contamination (JOANNE MJOKA and MOSA SELEPE, 2018).

In Ethiopia, prevalence of food born problems due to gaps of knowledge, attitude and practice of food handlers or workers towards food hygiene and safety requirements is very high. The study

conducted in Ethiopian Asosa town shows that the level of knowledge among food handlers was 75.8% and the overall practices of food handlers was 67.8% (Admasu and Kelbessa, 2018).

The guarantee to the safety and hygiene of chocolate ice cream production is working on knowledge, attitude and practice of manufacturers and workers to implement standards and requirements like, HACCP principles and other (Junchao Lu *et.al, 2014).*

2.2. Overview of food regulatory measures

Inspection is a systematic and independent examination to determine whether quality activities and related results comply with the planned arrangement and whether these arrangements are implemented effectively and are suitable to achieve the objectives. To inspect is to look closely at something, especially to check that everything is in good order and ensure that it meets certain prescribed or known standards and specifications

The Food and Drug Administration (FDA) is articulating its enforcement strategy in order to ensure strategic alignment within the Agency and express why enforcement is critical to protecting public health. FDA is a science-based regulatory agency with responsibility and authority to safeguard the public health and ensure compliance with the laws and regulations it administers pertaining to foods, drugs, medical devices, biologics, and tobacco products. Therefore, the main concept on regulatory enforcement is a measure followed by not comply with standards, requirements etc (EFMHACA, 2018).

2.2.1. Regulatory measures on noncompliant

The Food and Drug Administration (FDA) is articulating its enforcement strategy in order to ensure strategic alignment within the Agency and express why enforcement is critical to protecting public health. FDA is a science-based regulatory agency with responsibility and authority to safeguard the public health and ensure compliance with the laws and regulations it administers pertaining to foods, drugs, medical devices, biologics, and tobacco products. The scope of FDA's regulatory authority is determined by the Federal Food, Drug, and Cosmetic Act and other statutes. To more effectively implement these provisions, FDA often promulgates regulations which carry the full force and effect of law. The laws and regulations spell out criteria regulated entities must meet to ensure their products are safe and hygienic based on requirements.

2.2.2. Type of measures that are conducting

According to Ethiopian Food and Drug Administration and Addis Ababa Food, Medicine and Healthcare Administration and Control Authority recently conducting enforcement/measurement tools are as follows:

Enforcement Tools for: On Industries and establishment of inspections

For new plants

No manufacturing licence/GMP certificate until compliance

For licence/certificate holders

Warnings, fines, Suspension/withdrawal of marketing authorization for product(s), Suspension/withdrawal of manufacturing licence/GMP certificate and Access to appeal

2.2.3. M**agnitude and trend of food regulatory body measure on noncompliant**

There are no studies on this topic before. So this study will contribute for responsible body by evaluating different experiences and problems including important recommendation.

Conceptual framework of the study

Conceptual framework was developed after different literature reviewed. Literature review deals that gender, age, training: licensed, regulatory measures, educational level, Hygiene and safety requirements, experience and field of specialization such as food related and others are factors that affecting KAP among food handlers (Mulugeta Admasu and Wogari Kelbessa, 2018).

As shown below knowledge, attitude and practice of food handlers or workers towards food hygiene and safety requirements and regulatory masseurs can be associated directly with duration of employment, age, sex, marital status, education and specialization of workers and. Masseur type is also associated with trend of regulatory masseurs.

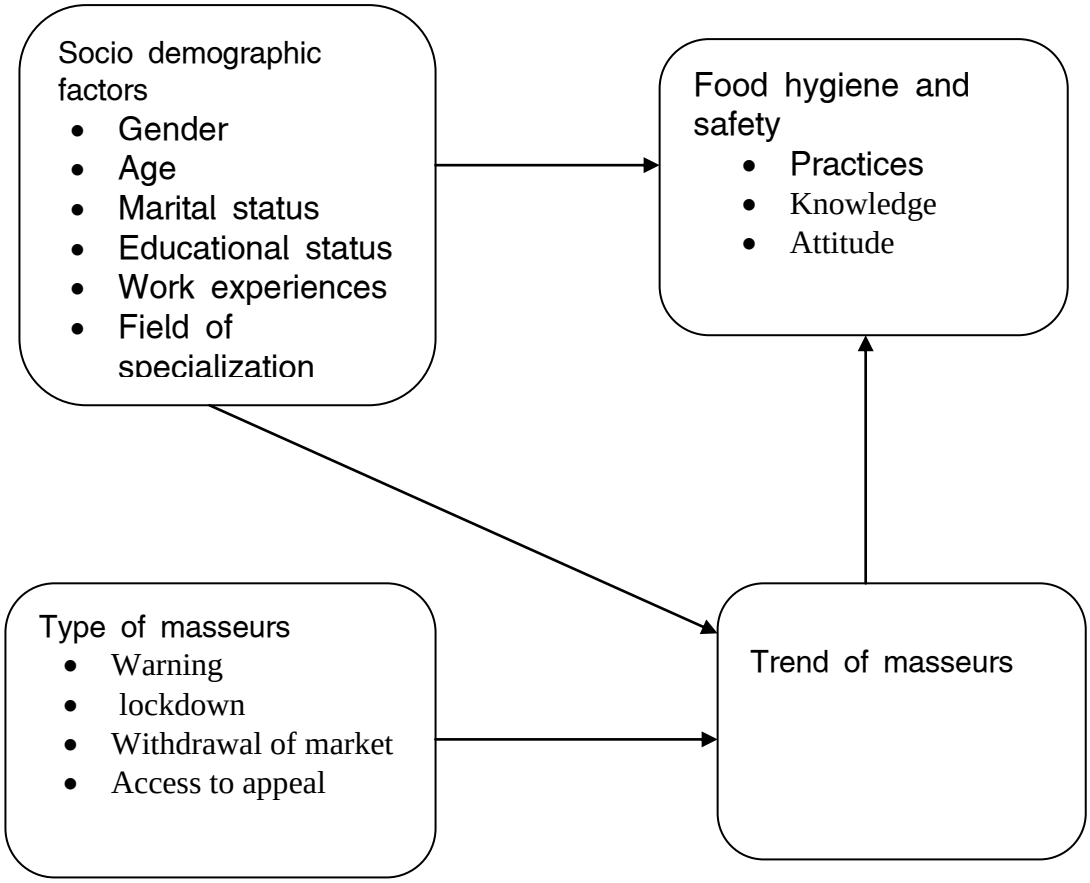

Figure 1Conceptual framework of the study

3. RESEARCH MATERIALS AND METHODS

3.1. Study design and period

A cross-sectional survey was conducted in a 5 purposely selected sub cities of cake and ice-cream manufacturers/workers to assess the level of KAP on food hygiene and safety regulatory requirements. Out of the 11 sub cities of Addis Ababa city administration, only five of them were selected with denser of manufactures (EPHI, 2020). The study also covered relevant regulatory bodies mandated for such operations to assess trends of regulatory measures from May 2021 -June 2021.

3.2. Study area

The study was conducted in Addis Ababa city administration, the capital city of Ethiopia. It has 11 sub cities and 121 woredas. This study was conducted in purposefully selected licensed cake and ice-cream manufacturers. Addis Ababa food, medicine and health care administration and control authority licensed 138 cake and ice-cream manufacturers, under these manufacturers 465 cake and ice-cream workers are expected to work (AAFMHACA, 2020).

3.3. Population

3.3.1. Source of population

All ice cream and cake manufacturing companies and workers located in Addis Ababa and personnel working at Addis Ababa food and health-related institutions regulatory body were considered as population sources.

3.3.2. Study population

Ice cream and cake workers who were engaged in licensed ice cream and cake manufacture and food institutions inspection team leaders working at Addis Ababa food and health-related institutions regulatory body.

3.4. Eligibility criteria

3.4.1. Inclusion criteria

All workers who were working in licensed ice cream and cake manufacturers at a time of data collection and inspection team leaders working in AAFMHCA in Addis Ababa were included in this study.

3.4.2. Exclusion criteria

The survey excluded workers who were aged below 18, manufacturers who are not licensed, and had no worker at the time of data collection.

3.5. Sample size determination

To evaluate the trend of regulatory measures, the sample size was limited to 11 sub-cities FMHACO and 1 AAFMHACA inspection department director, a total sample size of 12. Since there is no manufacturer in one of the sub-cities and also no documented information in the newly established sub-city during the study period, the data was collected only from 10 team leaders (9 sub-cities FMHACO and one AAFMHACA). To assess cake and ice-cream manufacturers' and workers' KAP on food hygiene and safety requirements, the sample size was determined using Yamane's formula with a total population (N) 465 and marginal error (e) of 5% were considered(Anokye M. Adam,2020).

Required sample size $n = N / [1+ N (e^2)] =215$

Adding 10% contingency, the final sample size will be 236

3.6. Sampling procedure

There were 11 sub-cities and 138 cakes and ice cream manufacturers in Addis Ababa and sampling was conducted at 5 purposely selected sub-cities to which high numbers of manufacturing activities were observed and from each sub-cities, all cake and ice cream manufacturers/workers were considered and participated in the study. The study participant of 236 cake and ice cream workers from the 5 selected sub-cities were taken proportional to the number of manufacturers located in each sub-cities. For the trend of regulatory measures, 9 sub-cities FMHCACO and 1 regional FMHCACA inspection director totally 10 participants were interviewed based on last year's performance report.

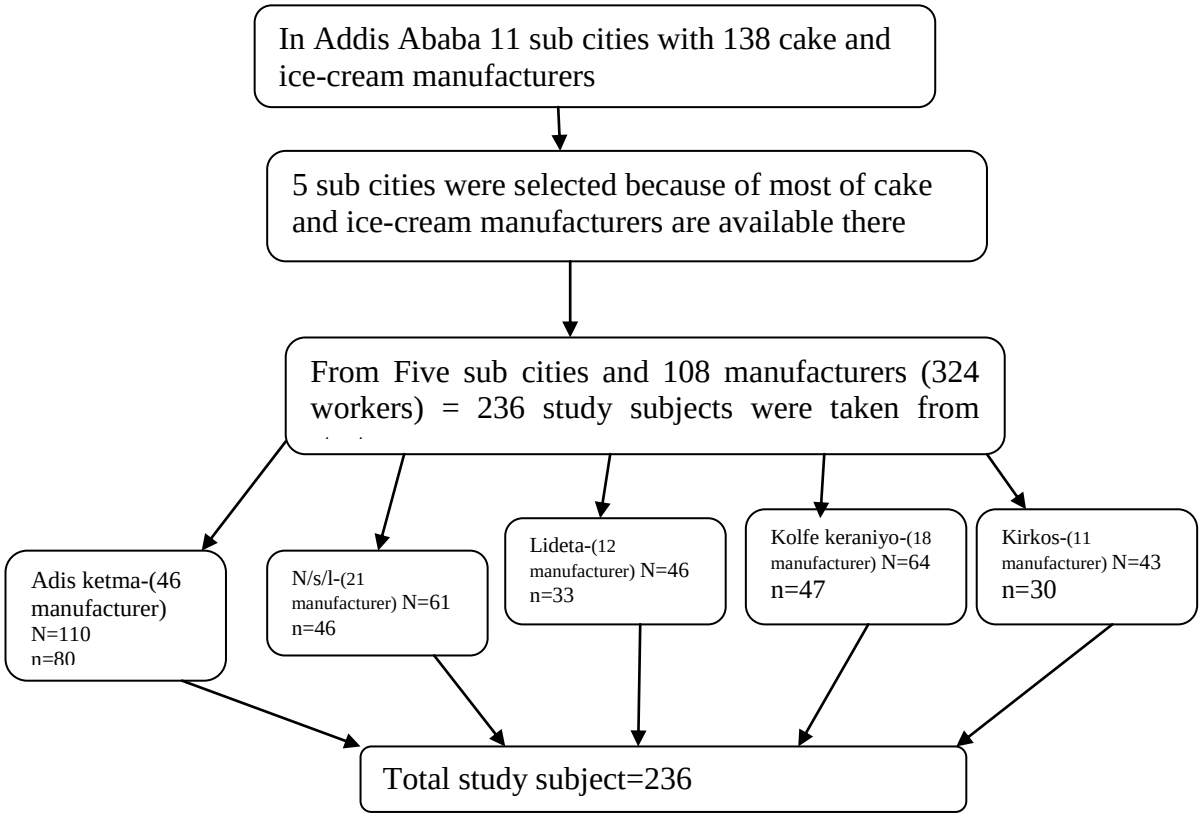

Figure 2.Sampling procedure for KAP study

3.7. Data collection tool

The data were collected by using a questionnaire modified from previous literature (Akabanda et.al, 2017) and developed by an investigator from AAFMHACA regulatory food hygiene and safety requirements (AAFMHACA hygiene directive, 2016). The questionnaire was translated into the Amharic language. Eleven environmental health personnel were involved in the data collection and three days of training was given to them. A brief explanation was given to the participant about the purpose of the study before the interview was administered to workers. The questionnaire for the KAP study includes four parts to know participants' socio-demography characteristics, level of knowledge on regulatory food hygiene and safety requirements, level of attitude on regulatory food hygiene and safety requirements, and practice on regulatory hygiene and safety requirements. Based on adequate knowledge and good practice level of study results, we categorized participants as good and poor level of workers' knowledge, attitude and practice depending on the sums of respondents' score (good practice level with score ≥75% and poor practice level with score <75%) and (good knowledge/attitude level with score ≥70% and poor knowledge/attitude level with score <70%). In a trend of regulatory measures' study also, the questionnaire includes two parts to know participants' socio demography characteristics and to know the trend of implementing regulatory measures on non-complaints of food hygiene and safety requirements.

3.8. Study variable

3.8.1.Dependent variable

- Knowledge, attitude, and practice of cake and ice-cream manufacturers and workers on food hygiene and safety requirements and trend of regulatory measures..

3.8.2. Independent variable

- Age, gender, training exposure, measures type, educational status, work experience, and field of specialization.

3.9. Data Quality Management

To assure data quality structured questionnaires and trained professionals were involved in the data collection process. Measuring instruments software, observational checklist and questionnaires were pre-tested and data collectors' and respondents' gap was identified and addressed carefully. The questions were prepared in simple, clear, short, and acceptable language. Day-to-day activity had been followed by supervision and data was checked for completeness and consistency. Once the data was collected, needed information was filled in Epi info and exported to Excel sheet then it was handled in computer and flash disk for safety. The analysis was also performed by using SPSS version 25. Data cleaning was done by testing with frequency distribution and normal distribution tests.

3.10. Data analysis

Data were entered into Epi-info version 7.2 and cleaned, edited, coded, and checked for missing values and using SPSS version 25 for analysis. A descriptive analysis was carried out to explore the socio-demographic characteristics and KAP of the respondent was also done. Finally, variables with a p-value of <0.05 were considered statistically significant. Based on the results, a conclusion and recommendations were made.

3.11. Ethical consideration

Ethical clearance was taken from the School of pharmacy, ethical review committee, and an official letter was written to Addis Ababa food, medicine, and health care administration and control authority and all cake and ice cream manufacturers in Addis Ababa to conduct a research study. The official letter was approved and distributed to selected manufacturer managers and owners for information and cooperation. The aim and method of the study and the importance of their participation were clearly explained to each study participant. The study participants, who fulfill the criteria for the study and agreed to participate with Amharic written consent, oral consent and signed before data collection starts to give information. Confidentiality was ensured during the data collection period and kept by assuring information was not accessible to anyone except the research personnel. Privacy was maintained by arranging a silent and comfortable place for the interviewer and study participants. Participants had the right to participate or not and to withdraw at any time when they feel discomfort. They did not get a direct benefit like money but they become a beneficiary in the future from the policy development from such study. A formal letter was also submitted to all concerned bodies.

3.12. Operational definitions

Cake product: An item of soft sweet food made from a mixture of flour, fat, eggs, sugar, and other ingredients, baked and sometimes iced or decorated.

Ice cream product: Ice cream is a frozen food that uses dairy products, cocoa powder, and chocolate chips as main ingredients, mixing them with sugar or syrup, egg products, emulsifier, stabilizer flavors, and colors, produced through a series of processing steps

License: A certificate issued for a food manufacturer to provide manufacturing services.

Premises: The establishments'/institutions'/ environmental conditions and building design floor, wall, ceiling and materials made it with manufacturing activities.

Product: Manufactured or bought food, drinks and health related items to consumers.

Profession: Morkers fild of study with respect to the service delivery or products manufacturing type.

Practices: The way/technique/ workers exercise or procedures the institutions pass-through in delivering services or manufacturing products

Food Safety: It is a process of producing and assuring the service of safe food to customers.

Food hygiene: Is practices in order to produce and supply food which is safe to eat.

Regulatory requirements: IS a quality or qualification that you must have in order to be allowed to do something or to be suitable for something.

Regulations: Are the rules established by an agency that interprets the laws to facilitate their practical implementation.

Regulatory measure: Any measure derived from law, regulation, rule, procedure, decision, policy or administrative action like, Warning, lockdown, Withdrawal of market, Withdrawal of certificate, Access to appeal.

Adequate knowledge: There were ten statements for each in this part and the workers were asked regarding the food hygiene and safety regulatory requirements. Each question had two choices. A correct answer was given 1 score, whereas a 0 score was given for a wrong answer. The scores varied from 0 to 10 points and were classified into two levels as follows: 1. Poor knowledge: less than 7(70%) score and 2. good knowledge: greater than or equal to 7 (70%) score (Akabanda et.al, 2017).

Adequate practice: There were ten statements for each in this part and the workers were asked regarding the food hygiene and safety regulatory requirements. Each question had two choices. A correct answer was given 1 score, whereas a 0 score was given for a wrong answer. Based on AAFMHACA food hygiene and safety requirements and directive, to be licensed for work, scores of 75% and above is mandatory. The scores varied from 0 to 10 points and were classified into two levels as follows: 1. poor practice: less than 7.5 (75%) score and 2. good practice: greater than or equal to 7.5 (75%) score (AAFMHACA hygiene directive, 2016).

Good attitude: This part is regarding the attitude of the workers' food hygiene and safety regulatory requirements in cake and ice cream work; it was assessed using a Likert scale. There were ten statements. The rating scale was measured as follows: statement with choices agree, not known, and disagree and scores 3, 2, and 1 respectively. The scores varied from 10 to 30, and all individual answers were summed up for total scores and calculated for mean. The scores were classified into two levels 1. Poor attitude: less than 21(70%) score and 2. good attitude: greater than or equal to 21(70%) score (Akabanda et.al, 2017).

4. Results and discussion

4.1. Demographic characteristics

The demographic data were collected regarding the field of specialization, marital status, age, gender, education level, and workers' experience as presented in Tables 1 and 2. The result in the KAP study revealed that out of 236 cake and ice cream workers who participated in this study, 55.9 %(132) were females and 44.1 %(104) were males. A greater number of participants were married 58.9 % (139) whereas 41.1 %(97) were single. According to this study, the mean age and work experience of participants were 30.03 and 5.72 years, respectively. Among 236 participants, 63.6 %(150) of them were aged between 26-40 years old, 31.4 %(74) were less than 25 years old and 5.1 %(12) were aged greater than 40 years old. Nearest to 46.6 %(110) of participants hadn't formal educational background. In general, participants' educational levels were not more than secondary education. Almost all workers have previous experience in manufacturing services. In a previous study in Ghana, a greater number of participants (76.2%) had >5 years of work experience in the foodservice industry (Akabandaet. al, 2017). According to food hygiene and safety regulatory requirement, workers who are working in food manufacturers should have a food and health-related profession or training background (AAFMHACA hygiene directive, 2016). But in this study, only2.5% (6) of participants have health or food safety-related professional backgrounds (Table 1).

Table 1 Demographic information of KAP study participants (n=236)

Variables	Category	Frequency	%	Mean/SD
Age	≤25.001 years old	74	31.4	30.03/7.094
	26-40 years old	150	63.5	
	>40 years old	12	5.1	
Gender	Female	132	55.9	
	Male	104	44.1	
Marital status	Married	139	58.9	
	Single	97	41.1	
Educational status	No formal education	110	46.6	
	Primary school	101	42.8	
	Secondary school	25	10.6	
Work experience	1-5 years	134	56.8	5.72/3.929
	6-10 years	76	32.2	
	>10 years	26	11	
Field of specialization	Health related	6	2.5	
	Social science	230	97.5	

All participants interviewed for the purpose of evaluating trends of the regulatory measure had health professional background and their educational levels were degree and above. The mean age and work experience of participants were 35.3 and 11.6 years, respectively. 90 % (9) of participants were males and aged between 26-40 years old. On the other hand, 70% of them were married and the remaining were single (Table 2).

Table 2 Demographic information of regulatory trend study participants (n=10)

Variables	Category	Frequency	%	Mean/SD
Age	≤25.001 years old	0	0	35.3/4.945
	26-40 years old	9	90	
	>40 years old	1	10	
Gender	Female	1	10	
	Male	9	90	
Marital status	Married	7	70	
	Single	3	30	
Educational status	No formal education	0	0	
	primary school	0	0	
	Secondary school	0	0	
	Tertiary school	10	100	
Work experience	1-5 years	1	10	11.6/6.204
	6-10 years	5	50	
	>10 years	4	40	
Field of specialization	Health related	10	100	
	Social science	0	0	

4.2. Knowledge of cake and ice cream workers related to food hygiene and safety regulatory requirements

The workers answered a total of ten close-ended questions regarding food hygiene and safety regulatory requirements. Each correct response was given 1 mark with a total of 10 marks. Based on the result indicated below in table 4, 72.9 % of cake and ice cream workers who participated in this study, had poor knowledge levels about food hygiene and safety regulatory requirements because they gave correct responses for less than 7 questions. This result is not compatible with the good level of food workers' food hygiene and safety knowledge on requirements (Akabanda al., 2017). The knowledge level of 53.7% of food handlers in the study conducted in Turkey reported a poor level with a score less than the expected level(Tuncer and Akoğlu, 2020). Other related studies also presented that 58.3 % of food handlers' knowledge level was poor with a below-expected level (UMMI MOHLISI et.al, 2018). These poor hygienic conditions frequently contribute to food-borne illnesses which indicates that food workers' knowledge and handling practices need to be improved (KUSUMA, 2016). Therefore; continuous food hygiene and safety education and motivation for food workers are very important.

The majority of cake and ice cream workers 97.5 % (230), 84.3% (199), and 70.3%(166) knew the fact that handwashing practices before work reduces risks of food contamination, suffering from foodborne illness cannot continue without informing to their manager and taking hygiene and safety requirement training is important to improve knowledge status of workers, respectively. But in most of other hygiene and safety requirements, workers had a low understanding; less than half of the participants 48.3 % (114) do have knowledge about the necessity of taking leave from work during the infectious disease of the skin, only 33.5 % (79) of them knew that proper cleaning and

sanitization of materials does not increase the risk of food contamination, 30.1 % (71) of the participants had knowledge about the correct temperature used for storing perishable foods, relatively higher number of participants 69.9 % (165) were aware of the fact that bacteria are normally found on the surfaces of human skin, nearly half of the participants 49.29 % (116) knew the importance of using food-grade packaging material for packing food products, 44.5% (105) of participants informed about food prepared in advance reduces the risk of food contamination and only 22.5% (53) of participants knew that the health status of workers should be evaluated before employment(Table 3). Other related studies also showed that only 21.1% of the food handlers say that washing removes contamination (JOANNE MJOKA and MOSA SELEPE, 2018), food workers were less familiar with time and temperature abuse and its' effect on food safety and food prepared in advance reduces the risk of food contamination (21.3%) (Akabanda et.al, 2017).

Table 3 Knowledge of cake and ice cream workers towards food hygiene and safety regulatory requirements (n=236)

No.	**Variables**	**Frequency/n/%**	
		Correct	Incorrect
1	Taking hygiene and safety requirement training is important to improve knowledge status of workers	166/70.3	70/29.7
2	Workers who are suffering from food borne illness can continue their routine work without informing to their manager	199/84.3	37/15.7
3	The health status of workers should be evaluated before employment	53/22.5	183/77.5
4	During infectious disease of the skin, it is necessary to take leave from work	114/48.3	122/51.7
5	Proper cleaning and sanitization of materials increase the risk of food contamination	157/66.5	79/33.5
6	Hand washing practices before work reduce risk of food contamination	230/97.5	6/2.5
7	The correct temperature for storing perishable foods is 5 °C	71/30.1	165/69.9
8	Bacteria are normally found on the surfaces of human skin	165/69.9	71/30.1
9	Packaging material for food product is important to be food graded	116/49.2	120/50.8
10	Food prepared in advance reduces the risk of food contamination	105/44.5	131/55.5

Table 4 Knowledge score of participants (n=236)

Variable	Knowledge level	
	Poor	Good
Knowledge	Score less than 7	Score greater than or equal to 7
	72.9 %(172) of participants	27.10% (64) of participants

4.3. Attitude of cake and ice cream workers related to food hygiene and safety regulatory requirements

This part of the study includes questions regarding the attitude of the workers toward the hygiene and safety regulatory requirements that were assessed using the Likert scale. There were ten statements measured with choices agree, disagree, and not known and scores 3, 1, and 2, respectively. The scores varied from 10 to 30 and were classified into two levels as 1. good attitude level (score greater than or equal to 21) and 2. Poor attitude level (score less than 21). Based on our study, 37.3 %(88) of participants had poor attitude levels towards food hygiene and safety regulatory requirements because of the score less than 21 (Table 6). This attitude level is unsatisfactory to work in the food preparation area (Akabandaet. al, 2017). A reduction of food-borne illnesses incidence is highly influenced by the attitudes of food handlers towards the implementation of food safety requirements. That means, there is a strong linkage between positive attitudes and education of food handlers in maintaining safe food handling practices ((Daru Lestantyo , Adi Heru Husodo et.al, 2017). But in other studies, the general attitudes of the food handlers towards food safety was satisfactory, except on issues relating to refrozen of defrosted food (Akabanda et al., 2017). The divergence between these studies' results may be due to exposure and the culture of the community.

Looking at each requirement, all of the participants agreed on the issue that proper hand hygiene can prevent food-borne diseases, all of them also agreed that at the time of cleaning, products should be closed, almost all of the participants 98.3% (232) agreed that safe food handling is an important part of food workers job responsibilities, 96.6% (228) of them agreed that food handlers can be a source of foodborne outbreaks, 74.7% (176) of the participants agreed that well-cooked foods are free of contamination. On the other hand, the attitude of participants towards certain requirements was relatively low; less than half of the participants 33.97% (80) agreed that checking the temperature of refrigerators/freezers periodically is important. A related study also mentioned that only 33.6% of participants agreed that it is necessary to check the temperature of refrigerators/ freezers periodically to reduce the risk of food contamination (Akabanda et al., 2017). But the study conducted in Ghana stated that 56.9% of respondents agreed that not monitoring refrigerator and freezer temperatures might be harmful to health (Teferi SC,(020). Out of all participants, 38.1%

(90) of them not agreed that eggs must be washed immediately after delivery, 68.6 % (162) of them were aware of the necessity of wearing masks, nearly half of the participants 49.2 % (116) agreed on the importance of food safety training to reduce the risk of food contamination and 53.4% (126) of participants agreed that defrosted foods should not be refrozen (Table 5). About 81.7% of food-handlers had an unsatisfactory attitude towards defrosting and refrozen foods, and refreezing a completely thawed food can present a serious health risk, as this process leads to faster growth of contaminating bacteria (Akabanda et al., 2017).

Table 5 Attitude of cake and ice cream workers towards food hygiene and safety regulatory requirements (n=236)

No.	Variables	Frequency/%	
		Agree	Disagree
1	Proper hand hygiene can prevent food-borne diseases	236/100	0/0
2	At the time of cleaning products should be closed	236/100	0/0
3	It is necessary to check the temperature of refrigerators/freezers periodically to reduce the risk of food contamination	80/33.9	156/66.1
4	Safe food handling is an important part of food workers job responsibilities	232/98.3	4/1.7
5	Food handlers can be a source of food borne outbreaks	228/96.6	8/3.4
6	Wearing masks is an important practice to reduce the risk of food contamination.	162/68.6	74/31.4
7	Learning more about food safety through training courses is important to you	116/49.2	120/50.8
8	Defrosted foods should not be refrozen	126/53.4	110/46.6
9	Eggs must be washed immediately after delivery	146/61.9	90/38.1
10	Well-cooked foods are free of contamination	176/74.7	60/25.4

Table 6 Attitude score of participants (n=236)

Variable	**Attitude level**	
	Poor	Good
Attitude	Score less than 21	Score greater than or equal to 21
	37.3 %(88) of participants	62.7 %(148) of participants

4.4. Practices of cake and ice cream manufacturers towards food hygiene and safety regulatory requirements

Most foodborne illness occurs due to a lack of proper food handling practices. Table 8 highlights the fact that the level of cake and ice cream workers' practices is poor with 59.3 % (140) of them scoring less than 7.5. This shows that their level of food hygiene and safety practices is poor since they couldn't answer 75% of questions (AAFMHACA hygiene directive, 2016). In other related studies also, 73% of food handlers' food safety and hygiene practices were in poor level in which they score less than expected level (Marcia Thelwell-Reid,2014 et al., 2014). But, a lack of knowledge in food safety can lead to poor hygienic practices by food-handlers (Mulugeta Admasu and Wogari Kelbessa, 2018). However, 63% of food handlers demonstrating knowledge in food safety did not demonstrate a corresponding positive behavior towards food safety and hygienic practices (Lígia Isoni Auad *et al*, 2019). This shows that food-handlers might not necessarily be practicing strict food safety procedures during food handling, even when they provide answers to show that they have knowledge in a study. Therefore, other factors such as employee motivation and continuous education and training on the job should be provided to inspire food workers, which will affect attitudes and subsequently food-safety practices (Huda N *et al*, 2002).

In assessing the food hygiene and safety requirements practices' of cake and ice cream workers,75.4% of workers washed hands properly before using gloves and 93.6% of them were using the fire extinguishers in the working area. Not more than 75 % of participants responded positively to the other eight variables. Only 41.5% of participants properly clean the food storage area before storing new products,43.6% of participants were providing advice for customers on perishable food and how to handle it, 59.7% reported that they used gloves during the distribution of unpackaged foods, majority of workers, 72% wearing an apron while working, about 57.6% of participants used the mask in distributing unwrapped foods, out of all study participants 59.7% of them used work uniform at work, 65.3% of respondents checking the shelf life of foods at the time of delivery and only 28.8 % of participants did not eat or drink at workplace (Table 7). Some previous studies presented that,88.1% of food handlers do not use gloves during the distribution of unpackaged foods and 61.7% of the food handlers do not use aprons and wear masks when necessary(Akabanda et al., 2017).

Table 7 Cake and ice-cream workers/manufacturers practices related to food hygiene and safety regulatory requirements (n=236)

No.	Variables	Frequency/%	
		yes	no
1	Do you use gloves during the distribution of unpackaged foods?	141/59.7	95/40.3
2	Do you wash your hands properly before or after using gloves?	178/75.4	58/24.6
3	Do you wear an apron while working	170/72	66/28
4	Do you wear a mask when you distribute unwrapped foods?	136/57.6	100/42.4
5	Do you eat or drink at your work place	168/71.2	68/28.8
6	Do you properly clean the food storage area before storing new products?	98/41.5	138/58.5
7	Do you check the shelf life of foods at the time of delivery?	154/65.3	82/34.7
8	Are you provided counselling customer on perishable food and how to handle?	103/43.6	133/56.4
9	Did you practice using fire extinguisher in working area?	221/93.6	15/6.4
10	Did you use work uniform in working place?	141/59.7	95/40.3

Table 8 Practice score of participants (n=236)

Variable	**Practice level**	
	Poor	Good
Practice	Score less than 7.5	Score greater than or equal to 7.5
	59.3 %(140) of participants	40.7 %(98) of participants

Generally, our study indicated that most workers didn't have good knowledge and practice towards food hygiene and safety regulatory parameters. The education level of food handlers is generally perceived as one of the factors that compromised food safety and hygiene. The study conducted in Malaya indicated that, improvement in the food safety knowledge among those with tertiary education, food handlers with lower education levels, particularly those who had no formal education outperformed those with higher education (Hui Key Lee, Hishamuddin Abdul et.al, 2017l). Other factors such as employee motivation and continuous education and training on the job should be provided to inspire food workers, which will affect attitudes and subsequently food-safety

practices (Huda N et al, 2002). On the other hand, weak regulatory activities and laws were the main issues to the poor practice of food safety and hygiene requirements.

4.5. Trend of regulatory measures on noncompliant of food hygiene and safety regulatory requirements

There were no studies conducted on this topic before, related to Addis Ababa regulatory body. So this study will contribute to the responsible body by evaluating different experiences and problems including important recommendations. In our finding, the measure taken was conducted in a different way; 73.67% of measures taken were warning, 21 % lockdown, 4.7 % withdrawal from the market and only 3 % of total measures were access to appeal (figure 4). This shows that low trended regulatory measure type was access to appeal by the regulatory body and there was a lack of taking a serious type of measures based on the level of fault that the non-compliant were done. Regulatory measures taken by the regulatory bodies on non-compliant of the requirements within 2019 and 2020 four consecutive half years were 129 and 99 in the 1st and 2ndhalf years of 2019, respectively. And it was also 115 and 128 in the 1st and 2ndhalf years of 2020, respectively (figure 3). Based on our finding, the trend can be discussed as, from 2019 first half-year to second half-year measurement activity was declined and then after increased immediately through 2020 first half-year to a second half-year. In 2019 and 2020 working years' regulation activity become somewhat weak. It may be reason out that two working years was a time of reformation of the government management system and it was a transition period at that time. Then after the second half-year of 2020 covid 19, pandemic diseases might be a pushing factor for increased prevention measure activities of the regulatory body.

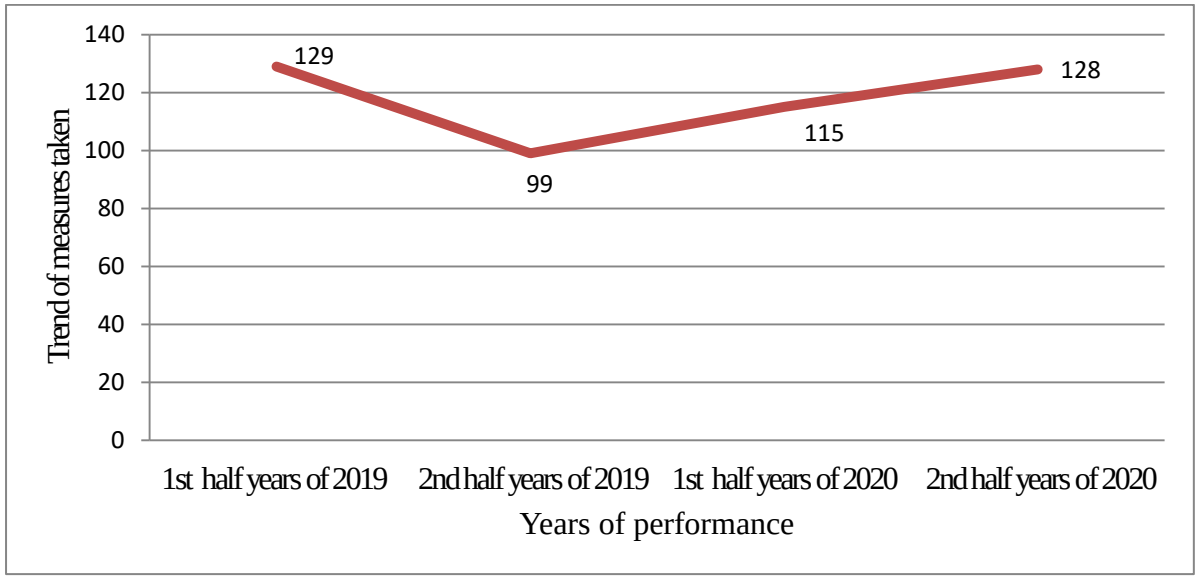

Figure3 Graphical representations for trend of regulatory measures on noncompliant of food hygiene and safety regulatory requirements

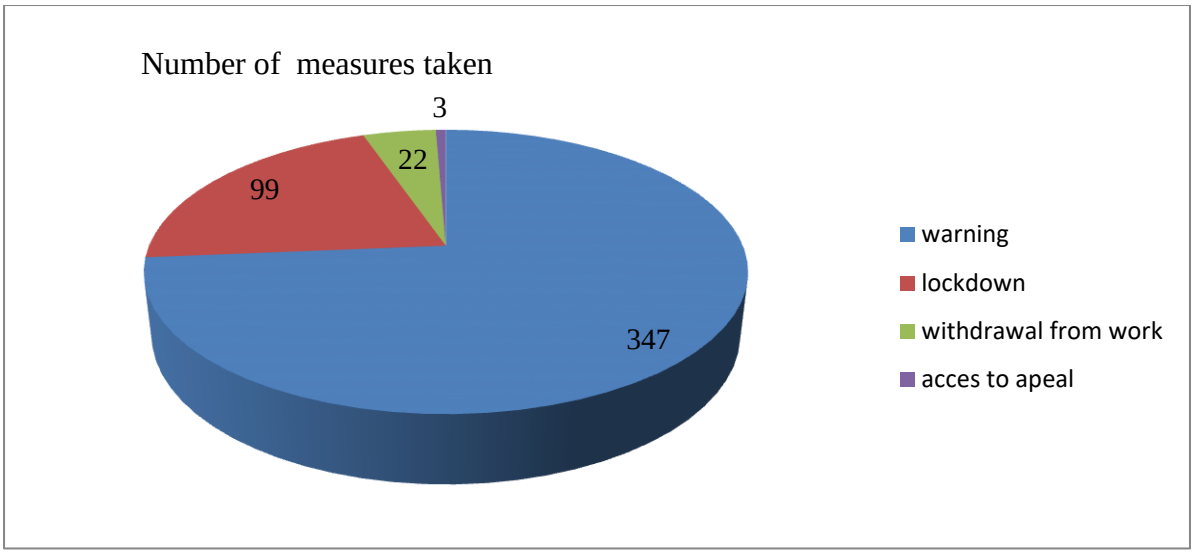

Figure 4 Graphical representations for type of measures taken within 4 half years'

Participants responded that the main reasons for not taking measures were lack of inspectors (42.86 %), the gap of law (21.43%), lack of political commitment (21.43%), and inspectors gap (14.29 %)(Figure 5).

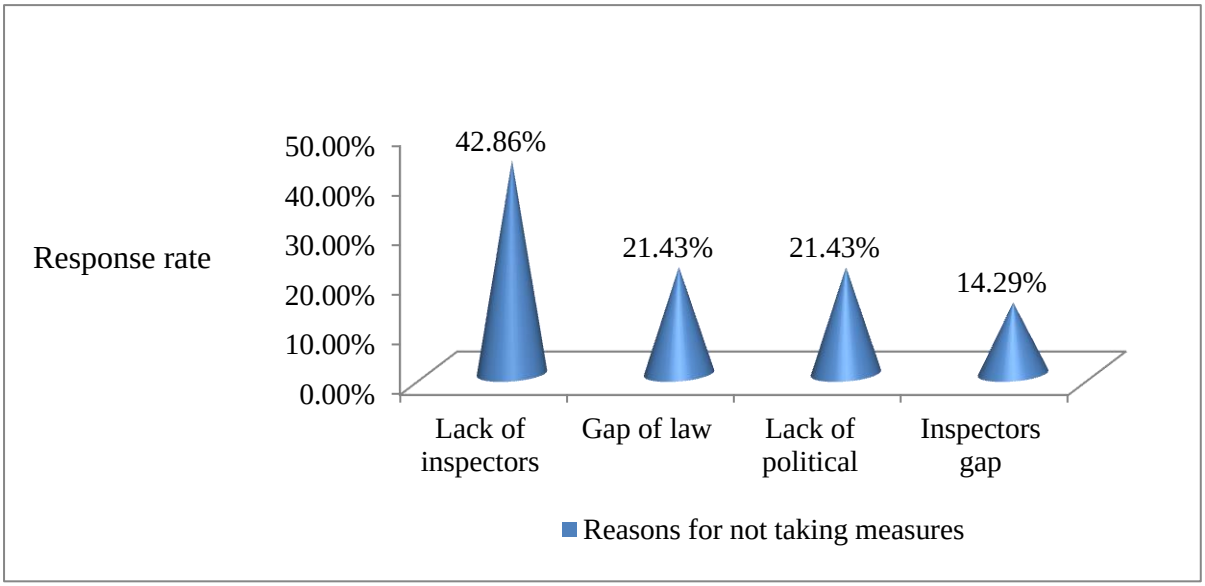

Figure 5 Graphical representations of reasons for not taking measures on non-complaints of requirement

Based on our study result, there is weak regulatory measures activity on non-complaints of requirement and lack of enforcement mechanism for existing regulation due to inadequately defined, demarcated and streamlined responsibilities and mandate given to regulatory bodies and inspection authorities.

5. Strength and limitations of the study

5.1. Strength of the study

This is the first study to evaluate trend of regulatory measures and to assess cake and ice cream workers' knowledge, attitude and practice

5.2. Limitations of the study

- Lack of literature related to this study title:
- Participants recall bias, and difficulty to get exact much of the study subject:
- The main limitation of this study was the exclusion of the workers from the unlicensed manufacturers, The reason was due to the limited information to these unlicensed manufacturers and insuffi- resources while conducting the research.
- In trend of regulatory mesears' study, the data collected were limited to on four consecuitive half years' document review, becuase of no enough and acuarate document to collect data. Future scholars should include data from a more accurate representation of the data.

6. Conclusion

Most of the workers' profession was not directly related to their working position. Even their educational level was not higher than the secondary level. The study also indicated that most workers didn't have good knowledge and practice towards food hygiene and safety regulatory parameters.

Based on our findings, regarding knowledge level, overall, workers did not have good knowledge about hygiene and safety requirements. Specifically, almost all cake and ice cream workers knew the fact that handwashing practices before work can reduce the risk of food contamination. But in most other hygiene and safety requirements, workers had a low understanding. Though most of the workers knew the importance of handwashing practices, practically they were not complying and this requires managers to promote the delivery of continuous training to the staff members on hygiene and safety practices.

In contrast to the knowledge level, overall, more than half of the participants had a good level of attitude towards food hygiene and safety regulatory requirements. Most of them have also a good attitude for each of the attitude assessing parameters they were asked. Likewise, the attitude of participants towards certain food hygiene and safety regulatory requirements was relatively low (only less than half of the participants 33.97% (80) agreed that checking the temperature of refrigerators/freezers periodically is important).

With regard to practice issues, the study found out that their overall level of food hygiene and safety regulatory practices was poor. Though the sum total practice level was poor, the majority of them were also good at some of the specific requirements, to mention,75.4 % of workers wash their hands properly before using gloves and 93.6% of them used a fire extinguisher in the working area.

The present study also pointed out that most of the regulatory measures taken by the regulatory bodies on non-fulfillment were simple types of measures like warnings, which might not help to fill the gap of manufacturers based on requirements.

7. Recommendation

Based on our study findings, the following important issues are recommended:

Community and customer education and enlightenment regarding the risk associated with noncompliance with cake and ice cream hygiene and safety laws, particularly to the cake and ice cream workers, should be routinely practiced through mass media. Similarly, future educational programs in the mode of the spread of pathogens, foodborne diseases, and personnel to carry out these manufacturers and products inspection should be properly taken into account for an effective compliance regulatory hygiene and safety requirements.

However, a proper motivation of the workers toward maintaining a positive attitude and good practice regarding compliance with regulatory laws as well as enforcing all the existing laws governing the food instituitions operation in the country should be encouraged.

Addis Ababa Food, Medicine and Health Care Administration and Control Authority

- Formulate action plans to create awareness of regulatory hygiene and safety requirements.
- Strict implementation of hygiene and safety regulatory requirements and directives.
- Preventive measures after awareness and announcement
- Future studies should involve a collaboration with the government and a larger number of food manufacturers so that the authority can establish a more comprehensive approach to ensure food safety

Cake and ice cream manufacturers

- Facilitate training opportunity on main gaps of hygiene and safety requirements
- The requirement for new employee should be based on profession and adequate training
- Always check and monitor the implementation of requirements and their policy.

Researchers

- It is recommended that future research should focus on the determination of KAP and the level of compliance with regulatory laws in both licensed and unlicensed cake and ice cream manufacturers across the State.
- And also it is better to conduct the research on trend of regulatory measures and related factors

References

Abdullah Sani, N., & Siow, O. N. (2014). Knowledge, attitudes and practices of food handlers on food safety in food service operations at the Universiti Kebangsaan Malaysia. Food Control, 37, 210–217. Acikel

Addis Ababa food,medicine and health care administration and control authority,(2020)-Annual report ,p 15-20

Addis Ababa food,medicine and health care administration and control authority, (2016), hygiene directive,

Anokye M. Adam,(2020), Sample Size Determination in Survey Research, Department of Finance, School of Business, University of Cape Coast, Ghana, 26(5): 90-97,

Bach Xuan Tran, HOA THI DO, Luong Thanh Nguyen, Victoria Boggiano, Huong Thile *et al*. (2018), Evaluating Food Safety Knowledge and Practices of Food Processors and Sellers Working in Food Facilities, Hanoi, Vietnam. J. Food Prot. *13.15*.

Daru Lestantyo , Adi Heru Husodo , Susi Iravati , Zahroh Shaluhiyah,(2017), Safe Food Handling Knowledge, Attitude and Practice of Food Handlers in Hospital Kitchen, dept. Faculty of Medicine Gadjah Mada University, Indonesia, Vol.6, No.4, pp. 324~330.

Ethiopian Public Health Institute, (2020) - assessment of standards on food, drink, health related organization and manufacturing industries, heath facilities and professionals in Addis Ababa, Ethiopia,20 -70

Ethiopian food and medicine administration : ,(2019) proclamation1112/19,Ethiopia, 35 -43.

FAO/WHO, (2004), Second FAO/WHO Global Forum of Food Safety Regulators; pp. 12–1

Fortune Akabanda, Eli Hope Hlortsi, and James Owusu Kwarteng, (2017), Food safety knowledge, attitudes and practices of institutional food-handlers in Ghana v.*17*.

Hislop, N., & Shaw, K. (2009). Food safety knowledge retention study. Journal of Food

Protection, 72(2), 431-435.

Hui Key Lee 1 , Hishamuddin Abdul Halim 2 , Kwai Lin Thong 1 and Lay Ching Chai,(2017), Knowledge, Attitude, Self-Reported Practices, and Microbiological Hand Hygiene of Food Handlers Occupational Safety & Health Unit, Registrar's Department, University of Malaya, ,14, 55,

Hsu.Ckhsino.Sy.Cheng.wc.et.al.(2011),the progress of HACCP certificated program carried out iin food and beverage industry in tiawan,77.82

Jianu, C., & Chis, C. (2012). Study on the hygiene knowledge of food handlers working in small and medium-sized companies in Western Romania. Food Control, 26, 151-156.

Junchao Lu, Xiao-Hui Pua, Chi-Te Liu, Che-Lang Chang, Kuan-Chen Cheng (2014). The implementation of HACCP management system in a chocolate ice cream plant.

JOANNE MJOKA and MOSA SELEPE, (2018), assessment of food hygiene and practices among food handlers in selected hotels in south Africa vol.7(4).

Kokkinakis EN, Fragkiadakis GA, Ioakeimidi SH, et al. Microbiological quality of ice cream after HACCP implementation: a factory case study. Czech J Food Sci 2008;*26*:383e91.

Lígia Isoni Auad 1, Verônica Cortez Ginani , Elke Stedefeldt , Eduardo Yoshio Nakano , Aline Costa Santos Nunes and Renata Puppin Zandonadi,(2019), food Safety knowledge, attitudes, and practices of Brazilian food truck food handlers, University of Brasilia,11,

Mohd. Firdaus Siau, A., Son, R., Mohhiddin, O., Toh, P.S. and Chai, L.C,(2015) Food court hygiene assessment and food safety knowledge, attitudes and practices of food handlers, Universiti Putra Malaysia 22(5): 1843-1854 .

Mulat Abegaz, (2004). UNIDO Food Safety and Technology Projects Coordinator and Consultant, Gap Analysis Report, Recommendations & Proposals on Food Control System in Ethiopia, UNIDO's Regional Programme on Harmonization of Food Control System in East-Africa, December (2003), Addis Ababa, paper presented in Uganda, Kampala, for regional workshop on "Regional Harmonization of Food safety and Quality System in East Africa" 25-27.

Mulugeta Admasu and Wogari Kelbessa, (2018),.food safety knowledge, handling Practice and Associated Factors among Food Handlers of Hotels/Restaurants in Asosa Town, North Western Ethiopia,1-9

Marcia Thelwell-Reid,(2014), Food Safety Knowledge and Self-Reported Practices of Food Handlers in Jamaica, Public Health Faculty.

Nadvi, K. and Waltring, F. (2003). Making Sense of Global Standards. In: Schmitz, H. (ed.) Local Enterprises in the Global Economy: Issues of Governance and Upgrading. Edward Elgar, Cheltenham.

Teferi SC,(2020). A Review on Food Hygiene Knowledge, Practice and Food Safety in Ethiopia. Sci J Food Sc Nutr. 6(1): 004-010.

Tuncer, A., Akoğlu, A. (2020). Food safety knowledge of food handlers working in hotel kitchens in Turkey. Food and Health, 6(2),77-89

Ummi moHliSi moHd ASmAwi1*, AliSSA AzUrEEn norEHAn1, KHASnoorSAni SAliKin1, nUr Ain SyAFiqAH roSdi1,(2018), Knowledge, Attitudes and Practices in Food Safety Among Food Handlers Engaged in Food Courts, Vol. 06, Pg. 346-353

Van Tonder, I., Lues, J., & Theron, M. (2007). The personal and general hygiene practices of foodhandlers in the delicatessen sections of retail outlets in South Africa. Journal of Environmental Health, 70(4), 33–38-

W. Claeys, J.F. Schmit, (2010) - principles of hygiene and food safety management. PIP and COLEACP, 22 : 508-516.

Questionnaires for KAP study part

Annex- 1: Information Sheet (English version)

Addis Ababa University Health Science College

Dear respondents: My name is ———————————— I am here on behalf of Getachew Abebe a student of regulatory affair. Investigator is conducting a research on "KAP of cake and ice cream manufacturer/workers in Addis Ababa Ethiopia. He received permission from Addis Ababa University Health Science College and AAFMHACA to conduct this study. You are selected to participate in this study because you are currently working in this manufacturer selected for study purpose. Your participation on this study will only be on based on your willingness. You have the right to choose not to take part in this study. If you choose to take part, you have the right to stop at any time. If you are willing to participate or refuse or decide to withdraw later, you will not be subjected to any ill-treatment. If you agree to participate in the study, Face-to-face interviews will be conducted using structured questionnaire to collect information on the knowledge, attitude and practices of the cake and ice cream workers on regulatory hygiene/safety requirements. The study could provide information that would be useful in the formulation of better training, support and computation for manufacture and service delivery on cake and ice cream product. It could also give insight on the current knowledge, attitude and practices status that could be addressed during training and inspection that could effect of requirements implementation. The information that you provide will be kept confidential by using only code numbers and locking the data. Your name will not be written on the questionnaire. No one will have access to the non-coded data except the principal investigator not be used for purposes other than the study. Your willingness and active participation is very important for the success of this study.

Annex 2. Informed consent form

Detail information about the study explained to me. I have understood that the objective of this study is to assess knowledge, attitude and practices of cake and ice cream workers toward hygiene and safety requirements.

In addition, I understand about how the data collection is proceeding and the time it takes to complete the data collection. I also understand that the research imposes no risk on me. I assured that there would be confidentiality of my response and collected data used only for the study.

It also explained to me that I have the right to stop participation at any time.

In addition, I understood that participating in this study is important for scientific knowledge and base for further study. Therefore, I have now consented to participate in the study by signing this form.

Signature of participants_____ date _____

Name and signature of data collector_____ date _____

Based on the understanding of the above information, are you willing to participate in this study?

A) Yes B) No

If yes, you will continue to respond for the following questioners.

Date_____

Result of response

A) Completed B) Partially completed C) Not completed D) Refused

Checked by Supervisor: Name _____Signature_____

For further explanation use the Principal Investigator's Address;

Name Getachew Abebe

Email: gahaawrga123@gmail.com

Cell phone: +251 920348402

Thank you !!

Annex-3: Questionnaires in English version

Questions on KAP of manufacturers and workers, circle your answer

Section 1: General characteristics of the participants. (1-9)

Respondent No._____

1. Name of the manufacturer you are working in _____
2. Department you are working in _____
3. What is your Position in the institution _____
4. Your sex- 1) Male 2) Female
5. Your age in year_____
6. Marital status -1. Single 2. Married 3. Divorced 4. Widowed 5. Other (specify) ---
7. Your educational status- 1. Illiterate 2. Primary education 3. Secondary education 4. Tertiary education
8. Work experience in year_____
9. What is your field of specialization please encircling?1) Food related 2) health related3) Social science 4) food related training only5) If other (please specify) _____

Section 2- To determine cake and ice cream workers knowledge towards regulatory hygiene and safety requirements, circle your answer (`10-19)

10. Taking hygiene and safety training on requirements has change on knowledge

    1. Correct 2. Incorrect

11. Food handlers who are suffering from food borne illness can continue without informing to their manager

    1. Correct 2. Incorrect

12. The health status of workers should be evaluated before employment

    1. Correct 2. Incorrect

13. During infectious disease of the skin, it is necessary to take leave from work

    1. Correct 2. Incorrect

14. Proper cleaning and sanitization of materials increase the risk of food contamination

    1. Correct 2. Incorrect

15. Hand washing practices before work reduce risk of food contamination

    1. Correct 2. Incorrect

16. The correct temperature for storing perishable foods is 5 °C

    1. Correct 2. Incorrect

17. Bacteria are normally found on the surfaces of human skin

    1. Correct 2. Incorrect

18. Packaging material for food product is important to be food graded

    1. Correct 2. Incorrect

19. Food prepared in advance reduces the risk of food contamination

    1. Correct 2. Incorrect

Section 3- To determine the level of attitude on regulatory food hygiene and safety requirements among cake and ice-cream workers: Agree or disagree with the statement circle your answer (20-29)

20. Proper hand hygiene can prevent food-borne diseases

    1. Agree 2, Disagree 3, Not known

21. At the time of cleaning products should be closed

    1. Agree 2, Disagree 3, Not known

22. It is necessary to check the temperature of refrigerators/freezers periodically to reduce the risk of food contamination

    1. Agree 2, Disagree 3, Not known

23. Safe food handling is an important part of food workers job responsibilities

    1. Agree 2, Disagree 3, Not known

24. Food handlers can be a source of food borne outbreaks

    1. Agree 2, Disagree 3, Not known

25. Wearing masks is an important practice to reduce the risk of food contamination.

    1. Agree 2, Disagree 3, Not known

26. Learning more about food safety through training courses is important to you

    1. Agree 2, Disagree 3, Not known

27. Defrosted foods should not be refrozen

    1. Agree 2, Disagree 3, Not known

28. Eggs must be washed immediately after delivery

    1. Agree 2, Disagree 3, Not known

29. Well-cooked foods are free of contamination

1. Agree 2, Disagree 3, Not known

Section 4-Assessment of practice of cake and ice cream manufacturers on regulatory hygiene and safety requirements: Circle answer (30-39)

30. Do you use gloves during the distribution of unpackaged foods?

    1. Yes 2. No

31. Do you wash your hands properly before or after using gloves?

    1. Yes 2. No

32. Do you wear an apron while working

    1. Yes 2. No

33. Do you wear a mask when you distribute unwrapped foods?

1. Yes 2. No

34. Do you eat or drink at your work place

1. Yes 2. No

35. Do you properly clean the food storage area before storing new products?

1. Yes 2. No

36. Do you check the shelf life of foods at the time of delivery?

1. Yes 2. No

37. Are you provided counseling customer on perishable food and how to handle?

1. Yes 2. No

38. Did you practice using fire extinguisher in working area?

1. Yes 2. No

39. Did you use work uniform in working place?

1. Yes 2. No

Questionnaires for the study of trend of regulatory measures part

Annex- 4: Information Sheet (English version)

Addis Ababa University Health Science College

Dear respondents: My name is ———————————— I am here on behalf of Getachew Abebe a student of regulatory affair. Investigator is conducting a research on trend of regulatory measures in AAFMHACA, Addis Ababa Ethiopia. He received permission from Addis Ababa University Health Science College and AAFMHACA to conduct this study. You are selected to participate in this study because you are currently working in this manufacturer selected for study purpose. Your participation on this study will only be on based on your willingness. You have the right to choose not to take part in this study. If you choose to take part, you have the right to stop at any time. If you are willing to participate or refuse or decide to withdraw later, you will not be subjected to any ill-treatment. If you agree to participate in the study, Face-to-face interviews will be conducted using structured questionnaire to collect information on the trend of regulatory measures. The information that you provide will be kept confidential by using only code numbers and locking the data. Your name will not be written on the questionnaire. No one will have access to the non-coded data except the principal investigator not be used for purposes other than the study. Your willingness and active participation is very important for the success of this study.

Annex 5. Informed consent form

Detail information about the study explained to me. I have understood that the objective of this study is to evaluate trend of regulatory measures.

In addition, I understand about how the data collection is proceeding and the time it takes to complete the data collection. I also understand that the research imposes no risk on me. I assured that there would be confidentiality of my response and collected data used only for the study.

It also explained to me that I have the right to stop participation at any time.

In addition, I understood that participating in this study is important for scientific knowledge and base for further study. Therefore, I have now consented to participate in the study by signing this form.

Signature of participants_____ date _____

Name and signature of data collector_____ date _____

Based on the understanding of the above information, are you willing to participate in this study?

A) Yes B) No

If yes, you will continue to respond for the following questioners.

Date_____

Result of response

A) Completed B) Partially completed C) Not completed D) Refused

Checked by Supervisor: Name _____Signature_____

For further explanation use the Principal Investigator's Address;

Name Getachew Abebe

Email: gahaawrga123@gmail.com

Cell phone: +251 920348402

Thank you !!

Annex-6: Questionnaires in English version

Questions on trend of regulatory measures**,** circle your answer

Section 1: **General characteristics of the participants**. (1-9)

Respondent No._____

1. Name of the manufacturer you are working in _____
2. Department you are working in _____
3. What is your Position in the institution _____
4. Your sex- 1) Male 2) Female
5. Your age in year_____
6. Marital status -1. Single 2. Married 3. Divorced 4. Widowed 5. Other (specify) ---
7. Your educational status- 1. Illiterate 2. Primary education 3. Secondary education 4. Tertiary education
8. Work experience in year_____
9. What is your field of specialization please encircling? 1) Food related 2) health related 3) Social science 4) food related training only 5) If other (please specify) _____

Section 2- Evaluation of two consecutive year's trend of regulatory measures on non-complaint cake and ice cream manufacturers in Addis Ababa food, medicine and health care administration (10-20)

10. Did you apply regulatory measures on non-complaint of critical regulatory hygiene and safety requirements at 2019-2020?
    1, Yes 2, No
11. which type of measures?(answer can be more than one)
    1. Warning 2,fines 3,suspension/withdrawal from market/work 4, access to appeal 5, all
12. On how many non-complaints the measure had been taken in first half year of 2019?
    1. Warning ---2.Fines---3.Suspension/withdrawal from market/work4, access to appeal----
13. On how many non-complaints the measure had been taken in second half year of 2019?
    1. Warning ---2. Fines---3.Suspension/withdrawal from market 4, access to appeal--
14. On how many non-complaints the measures had been taken in first half year of 2020?
    1. Warning ---2. Fines---3.Suspension/withdrawal from market 4, access to appeal-
15. On how many non-complaints the measures had been taken in second half year of 2020?
    1. Warning ---2. Fines---3.Suspension/withdrawal from market 4, access to appeal--
16. How many non-complaints were reported in first half year of 2019?
    1. ----- 2. Unknown
17. How many non-complaints were reported in second half year of 2019?

1. ------- 2 unknown

18. How many non-complaints were reported in first half year of 2020?

    1. ------- 2. Unknown

19. How many non-complaints were reported in second half year of 2020?

    1. ------- 2. unknown

20. What were the main reasons to fail taking measure on non- complaints?

    1. Gaps in law/tools 2.lack of political commitment

       3. Inspectors gap 4. Others----------