

ADDIS ABABA UNIVERSITY
COLLEGE OF HEALTH SCIENCES
SCHOOL OF PHARMACY
DEPARTMENT OF PHARMACEUTICS & SOCIAL
PHARMACY



ASSESSING KNOWLEDGE, ATTITUDE, PREVENTION PRACTICE AND
REGULATORY BODY PRACTICES OF FOOD ADULTERATION ON
SELECTED FOOD ITEMS AMONG BAHIR DAR CITY DWELLERS.

BY: MISGANAW FENTA (BSc)

ADVISORS: AYNADIS TAMENE (PhD)

Mr. WONDAFRASH ABERA (MSc)

A THESIS TO BE SUBMITTED ADDIS ABABA UNIVERSITY, COLLEGE
OF HEALTH SCIENCES, SCHOOL OF PHARMACY, DEPARTMENT OF
PHARMACEUTICS & SOCIAL PHARMACY, IN THE PARTIAL
FULFILLMENT OF THE REQUIREMENTS FOR THE DEGREE OF MASTERS
OF SCIENCE IN REGULATORY AFFAIRS.

December, 2021

Addis Ababa, Ethiopia

Addis Ababa University

College of Health Sciences

School of Pharmacy

Department of Pharmaceutics & Social Pharmacy

Assessing Knowledge, Attitude, Prevention Practice And Regulatory
Body Practices of Food Adulteration on Selected Food Items Among
Bahir Dar City Dwellers, 2021.

By: Misganaw Fenta (BSc)

Email: misganawfenta123@gmail.com

Addis Ababa University

School of Pharmacy

School of Graduate studies

This is to certify that the thesis prepared by Misganaw Fenta, entitled: Assessing Knowledge, Attitude, Prevention Practice and Regulatory Body Practices of Food Adulteration on Selected Food Items among Bahir Dar City Dwellers and submitted in partial fulfillment of the requirements for the Degree of Master of Science in regulatory affairs complies with the regulations of the University and meets the accepted standards with respect to originality and quality.

Signed by Examining Committee

Internal Examiner:-----Signature: -----Date: -----

External Examiner:-----Signature -----Date: -----

Advisors:

----- Signature: ----- Date: -----

----- Signature: ----- Date: -----

Head of Department

Acknowledgment

First and foremost, I would like to give my great thanks to Addis Ababa University, College of Health Sciences, School of Pharmacy, and Department of Pharmaceutics and Center for Food Sciences and Nutrition of Addis Ababa University and all academic carriers for offering me the opportunity to carry out this thesis.

Secondly, I would like to forward my heartfelt gratitude to my advisors Dr. Aynadis Tamene and Mr. Wendafrash Abera for their timely, unreserved, genuine support and constructive comments throughout the study. As well, I would like to extend my thanks to all sub-city official bodies for their valuable study setting information.

Additionally, I would like to extend my thanks to all supervisors, data collectors and study participants. Finally, my sincere gratitude goes to my family, wife and colleagues for the support and encouragement they made during the study.

List of Abbreviations/Acronyms

AAU	Addis Ababa University
ANRS	Amhara National Regional States
CSA	Central Statistics Agency
EFDA	Ethiopian Food and Drug Administration
MOA	Ministry of Agriculture
HHL	Household leaders
H ₂ O ₂	Hydrogen Peroxide
IQR	Interquartile Range
KAP	Knowledge, Attitude, and Practice
NGOs	Non-Governmental Organizations
PPS	Proportionate to Sample Size
WTO	World trade origination
WHO	World Health Organization

Table of contents	
Acknowledgment	i
List of Abbreviations/Acronyms.....	ii
Table of contents.....	iii
List of Tables	vi
List of Figures	vii
Abstract.....	viii
1. Introduction	1
1.1. Background of the study	1
1.2. Statement of the Problem.....	3
1.3. Significance of the study	5
1.4. Objectives of the study.....	5
1.4.1. General Objective	5
1.4.2. Specific Objectives	5
2. Literature Review	6
2.1. Knowledge of study participants about selected food adulteration.....	6
2.2. Attitudes of Study Participants towards Food Adulteration.....	7
2.3. Study Participants’ prevention Practice about Food Adulteration	7
2.4. Regulatory practices of Food Adulteration	9
3. Materials and Methods	12
3.1. Study area and period.....	12
3.2. Study design.....	12
3.3. Population.....	12
3.3.1. Source Population	12
3.3.2. Study population	12

3.4.	Eligibility criteria	12
3.4.1.	Inclusion criteria	12
3.4.2.	Exclusion criteria	12
3.5.	Sample size.....	13
3.6.	Sampling techniques and procedure.....	14
3.7.	Data collection instruments.....	15
3.8.	Study Variables	16
3.8.1.	Dependent variable	17
3.8.2.	Independent Variable	17
3.9.	Operational definitions.....	17
3.10.	Data processing and analysis.....	17
3.11.	Data quality management/control.....	18
3.12.	Ethical consideration	19
3.13.	Dissemination of the study	19
4.	Results and Discussion	21
4.1.	Socio-demographic characteristics.....	21
4.2.	Knowledge of study participants about food adulteration	23
4.2.1.	The Causes of Food Adulteration	24
4.2.2.	Ways, stages, and place of Food Adulteration.....	25
4.2.3.	Common food items subjected for food adulteration and their adulterants.....	25
4.3.	Attitudes of Study Participants towards Food Adulteration.....	27
4.4.	Study Participants' prevention Practice about Food Adulteration	28
4.5.	Regulatory Body practices of Food Adulteration	30
4.5.1.	Food items that are more exposed for adulteration.....	34
4.5.2.	Regulatory body practices about food adulteration	34

4.5.3. Reasons for the unchanged food adulteration situation	35
5. Limitation and Strength of the study	36
6. Conclusions and Recommendations	37
6.1. Conclusions	37
6.2. Recommendations	37
7. References	39
Annexes.....	46
Annex I: Data Collection Instruments (English version)	46
Part II: Knowledge Questions about Food Adulteration.....	48
Annex II Data collection check list (Amharic version).....	54
አባሪ 2: መጠይቆች (በአማርኛ).....	54
Annex III. Declaration Statement	64

List of Tables

Table 1: Socio-demographic characteristics of KAPS respondents (n = 414).....	22
Table 2: Showing identified causes of food adulteration on selected food items among Bahir Dar city dwellers (n = 414).	24
Table 3: Showing ways, methods, stages and place of food adulteration on selected food items among Bahir Dar city dwellers (n = 414).	25
Table 4: Showing common food items subjected for food adulteration and their adulterants among Bahir Dar city dwellers (n = 414).	27
Table 5: Showing the attitudes of study participants towards food adulteration on selected food items among Bahir Dar city dwellers (n = 414).....	28
Table 6: Showing the prevention practice of study participants about food adulteration on selected food items among Bahir Dar city dwellers (n = 414).	29
Table 7: Showing the regulatory body practices about food adulteration on selected food items among Bahir Dar city dwellers (n = 33).	31

List of Figures

Figure 1: Schematic presentation of the sampling procedure among Bahir Dar city dwellers. ..	14
Figure 2: The overall conceptual framework of the study	19
Figure 3: Participants knowledge status about food adulteration on selected food items among Bahir Dar city dwellers (n = 414).	24
Figure 4: Pie chart showing regulatory body responses about food items that are more exposed for adulteration among Bahir Dar city dwellers (n = 33).....	34
Figure 5: Bar chart showing regulatory body practices about food adulteration on selected food items among Bahir Dar city dwellers (n = 33).....	35
Figure 6: Bar chart showing the reasons for the unchanged food adulteration situation on selected food items among Bahir Dar city dwellers (n = 33).	35

Abstract

Background: Food adulteration is an addition of another substance to a food item to increase the quantity which may result in the loss of actual quality of the food item. This practice critically diminishes the nutritional value of food; contributes to the society with many diseases ranging from mild to life-threatening and it has an impact on national economic development. To tackle such public health problems the knowledge, attitude, and prevention practice of the consumer and also regulatory practices of the health regulatory body are playing a great role. However, information on knowledge, attitude, prevention practice and regulatory body practices on food adulteration was not well studied and documented in the study area.

Objectives: The objective of this study was to assess the knowledge, attitude, prevention practice and regulatory body practices of food adulteration on selected food items among Bahir Dar city dwellers.

Methods: Community-based cross-sectional study was conducted from October 2020- November 2021. Systematic random sampling technique was used to select 422 household leader study participants. Face to face Interview administered questionnaires were used to collect the data. All questionnaires were checked for completeness, cleaned manually, coded, and entered into Epi info version 7.2.1.0 software and exported to SPSS version 23 for analysis. Descriptive parameters, such as mean, standard deviation, median and interquartile range for continuous data, frequencies and percentages for categorical data and graphs were used for data presentation.

Result: The mean age and standard deviation of the participants were 43.61 (\pm 13.82) years. A total of 414 participants were participated in this study making a 98.1% response rate. Of the participants 239 (57.7%) were female and the remaining were male participants. From 414 participants, 259 (62.6%), 295 (71.3%), and 208 (50.2%) had good knowledge, favorable attitude, and good prevention practice towards food adulteration respectively. The most identified roles of regional regulatory bodies in this study were conducting inspection and surveillance, performing monitoring and evaluation through laboratory testing and or analysis, undertaking regulatory intelligence and emergency responses, and staff improvement and training programs for sustainable performance.

Conclusion/recommendation: the study revealed that residents have good knowledge and attitude, but less preventive practice in regulating food adulteration. Food adulteration is becoming a public problem in Bahir Dar. It affects the consumers' right to eat safe, high-quality foods. As a result, all responsible persons, organizations, and governments, should do their part to defend the act of food adulteration and to disclose the recognized activities. Furthermore, consumers should take attention to the place where they buy any food items as food adulteration take place at retailing, distribution, and producing stages.

Keywords: Food Adulteration, Knowledge, Attitude, Prevention Practice, & Regulatory Body practices

1. Introduction

1.1. Background of the study

Adulteration of food universally is defined as the addition or subtraction of any ingredient to or from food, so that the normal composition and value of food substances are affected and it was first researched in 1820 by the German chemist Frederick Accum, who detected many toxic metal collections in food and drink items (Bansal, Singh, Mangal, Mangal, & Kumar, 2017; Ghimire, 2016). Adulterants in food adulteration are chemical ingredients that should not be enclosed inside our food or drink and may be deliberately added to more costly materials to increase sizes and decrease manufacturing costs (Ayza & Yilma, 2014).

According to World Health Organization (WHO), food adulteration can be explained as the intentional addition of illegal substances to partially or absolutely substitute health ingredients or to falsely make the product to be fresh (World Health Organization, 2017). Similarly, by the Ethiopian Food and Drug Administration (EFDA) proclamation, food adulteration is adding of any foreign substance or ingredient or substituting the content of the product in whole or in part by such other substance to increase its bulk or weight or reduce its quality or strength or make it appear better or of greater value, than it is (EFDA, 2019).

In the same way, the United States Food and Drug Administration (FDA) considers food as adulterated if: a substance is added which is risky to health, cheaper or inferior quality item added to food, any valuable constituent is removed from the main food article, quality of food is below the standards, any substance has been added to increase bulk or weight, to make it appear more valuable (Bansal *et al.*, 2017). This practice can take place at any of the stages in the supply chain of the food preparation either for marketable gain or due to carelessness and lack of proper hygienic conditions of processing, storing, transportation, and marketing (Nasreen & Ahmed, 2014). This is done for the selfish interest of food sellers for financial gains and not only compromises the health of the consumer but also results in wastage of food which is eliminated if found adulterated (Gahukar, 2014).

Likewise, food is adulterated to earn more profits and to increase the volume of trade by showing lower prices (Pardeshi, 2019). Again, due to lack of effective food laws and government imitativeness (Ravichandran, 2015), due to lack of strict and effective regulatory system, due to

poor buying practices of consumers and availability of adulterants (Adhikari, 2018), due to lack of knowledge of proper food consumption (Ghimire, 2016) food could be adulterated. There is already an increased food demand for a rapidly growing population as the world population is growing at an alarming rate and hence food could be often adulterated to fulfill the needs of this increasing population and to feed the large scale population (Okeke, 2019). Adulteration of food is a long-standing problem. It consists of a large number of practices as substitution, putting up spoiled foods for sale, misbranding, or giving false labels and valuable component is removed from the main food item (Lelisa, 2020). Usually, food and drink products are often a target of adulteration (unintentional and/or intentional) (SGS, 2013).

According to (Banti, 2020) food items like milk, meat, teff flour used for making *injera*, honey, butter, juices items are usually subjected to adulteration. Similarly, according to a study done by (Woldemariam & Abera, 2014) it was indicated that a higher extent of adulteration (15%) was observed for honey with sugar and 13 % was observed for red chili powder with brick powder. Nowadays, food adulteration is a fast-growing problem as an industry (Alauddin, 2012) and in Ethiopia, it becomes common practice and a report through a media outlet very recently showed that in Jimma over 20 tons of butter and honey were adulterated with a foreign added ingredients (Arega, 2020). However, it hasn't got much attention as expected (Lelisa, 2020).

In addition, the regulatory practices done by the government to control the food adulteration practices is not clearly known. Moreover, there is no or very little information on the knowledge, attitude and prevention practices of food adulteration among people in Ethiopia. Therefore, this study was conducted to assess food adulteration knowledge, attitude, prevention practice (KAP) and regulatory body practices on selected food items among Bahir Dar city dwellers, Ethiopia.

1.2. Statement of the Problem

Our environment is blessed with various healthy foods but most of the entrepreneurs are normally adulterating it (Choudhary, Gupta, Hameed, & Choton, 2020). Although adulteration of food began many years ago, this practice is increasing through time as dishonest manufacturers, importers, traders, and restaurant owners are involved in these unethical practices (Nasreen & Ahmed, 2014). Similarly, evidence indicated that this practice is widespread in poor units of society due to consumer's illiteracy and ignorance of their rights and responsibilities towards food adulteration (Kohda & Haque, 2017).

Nowadays, adulteration in food has become a nation alarm (Bansal *et al.*, 2017) since it critically diminishes the nutritional value of food (Manasha & Janani, 2016) which in long term seriously affects our current and future generation's physical and mental growth (Nasreen & Ahmed, 2014). Again, it contributes to the society with many diseases ranging from mild to life-threatening conditions like vision problems, liver problems, and skin diseases (Bansal *et al.*, 2017). Furthermore, its harmful effect is that it is highly carcinogenic if consumed over a continuous period and it can also cause stomach disorders such as diarrhea. Young children and older persons with poor immunity are more susceptible to these problems (Lakshmi, 2012).

According to a study conducted by the Dhaka City Corporation in 2020, more than 76 % of food items on the market were found to be adulterated, with levels of food adulteration ranging from 70 % to 90 % (Arefin, Arefin, Habib, & Arefin, 2020). Similarly, a study done on the extent of awareness and prevalence of adulteration in selected food items in rural Dehradun India pointed out that adulteration was found in 17.3 to 66.2 % of the foods studied (Ghimire, 2016; Srishti Srivastava, 2020; Tiwari, 2016). Every year, approximately 250,000 cancer patients and 220,000 diabetic patients are treated as a result of food adulteration (Huq, 2020). These phenomenon indicate how widespread adulteration is in different countries.

Adulteration of food brings an impact on national economic development by decreasing acceptance in the market due to doubting its originality (Ayza & Yilma, 2014; Ayza, Yilma, & Nurfeta, 2013). Again, this malpractice erodes trust in the integrity and safety of the food supply chains and manufacturing practices (Sadiku, Ashaolu, & Musa, 2019). Evidence showed that unawareness about food adulteration and imbalanced market behavior endangers consumer health

(Alauddin, 2012). The behavior of eating food of any community is also affected by their levels of education, awareness, socio-economic status as well as the accessibility of facilities and services (Ghimire, 2016).

All in all, the ultimate victim of all such malpractices is the consumer who innocently purchases. But evidence showed that the awareness of consumers plays important role in preventing food adulteration (Pardeshi, 2019; Schell, Gallo, & Cook, 2012). Consumer consciousness is the treatment for removing the immoral of adulteration and sale of lower food articles. But, it is very difficult to separate those who take advantage of legal rules from the ones who commit food adulteration (Woldemariam & Abera, 2014). Legal enforcement is only one measure of prevention of food adulteration and it may not have any significant impact unless and until, there is an adequate supply of food at a normal price which the average consumer can afford, awareness of the small traders about the food standards which they are estimated to maintain, awareness of the common consumer regarding the risks of adulteration (Choudhary et al., 2020).

In Ethiopia, the food control system is not well developed and not able to support the manufacturing, supply, and distribution of safe food to the local community. It is also unable to protect the public from diseases that could occur due to food adulteration and even seen with a failure to apply the recognized principles of food safety that have been well-known over many years (Ayalew, Birhanu, & Asrade, 2013). Evidence indicated that though the Ethiopian Food, Medicine and Health Care Administration and Control Authority (FMHACA) was established as an independent government office having its own legal personality, it couldn't bring an improved food regulatory system (Edition, 2010).

Varieties of foods are prone to be adulterated in our country. For example, there is an adulteration of milk and milk products that is done by some selfish producers of raw milk and majorly traders by adding several substances such as water, flour, sugar cane, vegetable oils, and skim milk (Ayza & Belete, 2015). This practice is not restricted to milk but also to other food products like honey, red pepper powder, teff flour, meat, and juice items (Banti, 2020). Food adulteration is not well studied in the study area. As far as we know, little or no study is available that focuses on this issue. Therefore, this study was conducted to assess food adulteration knowledge, attitude, prevention practice and regulatory body practices on selected food items among bahir dar city dwellers.

1.3. Significance of the study

Food adulteration critically diminishes the nutritional value of food; contributes to the society with many diseases ranging from mild to life-threatening conditions like vision problems, liver problems, and skin diseases; can also cause stomach disorders such as diarrhea and has an impact on national economic development. Despite having the above negative effects, adulteration receives little attention in Ethiopia and even it is not well studied in the study area. So, this study would provide important baseline information on KAP, and regulatory body practices of food adulteration on selected food items. The findings of this study will also serve as an input for the health sector (both for the service provider and regulator), for further future researchers in this regard, for country planning about controlling food adulteration, and, coaching to plan the awareness towards food adulteration.

1.4. Objectives of the study

1.4.1. General Objective

- To assess knowledge, attitude, prevention practice and regulatory body practices on selected food items among Bahir Dar city dwellers.

1.4.2. Specific Objectives

- To assess the knowledge of food adulteration among Bahir Dar city dwellers.
- To determine the attitude of food adulteration among Bahir Dar city dwellers.
- To determine the prevention practice of food adulteration among Bahir Dar city dwellers.
- To identify food adulteration regulatory body practices on some selected food items

2. Literature Review

2.1. Knowledge of study participants about selected food adulteration

According to a study conducted in India, one of the main causes of adulteration is the lack of knowledge of consumers regarding their rights and responsibilities towards safe food practices resulting in mal-buying practices. Consumers are the main stakeholders in the prevention of adulteration and their awareness will help to fight this risk (Khapre, Mudey, Chaudhary, Wagh, & Dawale, 2011). Correspondingly, a study deployed on the same setup pointed out that food adulteration is widespread due to lack of awareness, regulation of food items, relevant food laws, commercial ethics among common societies, and money-minded producers (Anu Joseph, Aldha Gelu, & Chithira K R, 2018).

A study conducted in India revealed that the majority of the participants' got some information about consumer protection from a newspaper (60.8 %), radio (53.6 %), and outdoor advertisements (52.0 %). Television (TV) is played a moderate role in creating consumer interest (Krishnakumar & Sakthiventhan, 2012). Another community-based cross-sectional study on the same setup among 100 dwellers regarding their source of information put that; the most common source information is mass media especially TV (65 %) and the remaining 40 % of consumers are unaware of food adulteration (Ishwar, Dudeja, Shankar, Swain, & Mukherji, 2018).

A study done in India among 100 respondents was found that out of all respondents about 72 % of respondents know about adulteration of foods. However, the remaining of them do not know about it (Nagvanshi, 2015). A similar study also revealed that among 150 people, 87.33 % of them knew about food adulteration and concluded the fact that food was being adulterated by some retailers and distributors to add more profit to their goods (Anindita Deb Pal & Tania Das, 2017).

A cross-sectional survey conducted in Bangladesh among 96 residents showed that 79 (82 %) of the respondents shared the information with others if they found any adulterated food item and 77 %, 47 %, 26 %, 10 %, and 2 % of them were used TV, newspapers, friends, co-buyers, and radio as sources of information respectively. Of the respondents, 89 (93 %) stated that they would stop consuming a food item if they had learned that it was adulterated, four (4 %) would continue to consume it while two (2 %) would continue to consume since they had no alternative. If they

suspected any food item to be adulterated while buying, 87 (91 %) of them mentioned that they will buy unadulterated food from another seller (Nasreen & Ahmed, 2014).

A study done in Nepal among 120 households revealed that 87.5 % of the participants were know about food adulteration and the rest 12.5 % of them didn't hear about it. Regarding their source of information; 28.6 %, 38.1 %, 19 %, and 14.3 % of them had heard about it from radio, TV, Friends, and books respectively (Ghimire, 2016).

A study done in Uganda highlighted that public awareness regarding food adulteration is minimal and recommends that public awareness creation through different mass communication channels using various local languages should be conducted regularly (Namusisi). A research conducted in Ethiopia's Oromia area found that approximately 94 % and 36 % of respondents were aware of honey and beeswax adulteration, respectively. (Gemedo & Negera, 2017).

2.2. Attitudes of Study Participants towards Food Adulteration

A cross-sectional study done in India showed that 63 % of the participants have a favorable attitude towards food adulteration while the majorities 75 % of the respondents have unfavorable attitudes towards food adulteration. Almost all participants' opinions showed that widespread adulteration is present not only due to the complex provisions of adulterated items but mainly due to consumers' indifferent attitude towards adulteration (Gurupadappa, 2016). A study done in north Kordofan-Sudan revealed some of the consumers said that their beliefs affect food selection and therefore they don't care about sources of food safety information (Hamad & Ahmed, 2018).

2.3. Study Participants' prevention Practice about Food Adulteration

A community-based cross-sectional study done in India showed that 94 % of consumers purchase food items by inspection manufacturing date, while 36 % of the consumer used to check portions like food standards before buying a product. The remaining 32 % did not check any definite feature for buying food items. Again the majority (48 %) of the consumers check the only expiry date, followed by ingredients and price at the time of buying any food articles (Anu Joseph *et al.*, 2018). A similar study conducted in India among 100 households about adulteration of common food

items revealed that less than half (48 %) checked the seal of packaged food items, and 29% of them checked the expiry date before purchasing (Ishwar *et al.*, 2018).

A study done in developing countries cases in China and Sudan pointed out that commonly milk is adulterated by chemicals like water, hydrogen peroxide, formalin, and antibiotics to increase its shelf life. Among these, water is the most common (87 %) adulterant in milk and occasionally hydrogen peroxide (H₂O₂) is used as a preservative (Salih & Yang, 2017).

According to a study conducted in the Southern Zone of Sindh, Pakistan it is indicated that milk sellers dilute the milk with unnecessary water to increase the bulk of milk (G. Barham, Khaskheli, Soomro, Nizamani, & Shah, 2018). A comparable study done in Ethiopia put that in Boditi town market adulterated milk was found 95 % and adulteration of milk was practiced mainly by some manufacturers and the majority of sellers practice intentionally. In this place, water is the most milk adulteration in most cases. Again in this study area, participants had used different traditional mechanisms to check the quality of milk. Some respondents (32 %), check adulterated milk by putting a few drops of milk in the mouth and if they feel that the milk is thick, the milk is normal otherwise it was adulterated (Woldearegay, 2016).

According to a study done in Mexico, it was mentioned that honey is a high-value food item that is prone to adulteration (Rios-Corripio, Rojas-López*, & Delgado-Macuil, 2012). Likewise, a study done in the Oromia region, Ethiopia showed that the majority of respondents assumed that adulteration of honey is done mainly by retailers and collectors and less amount by wholesalers, roadside sellers, and beekeepers. This study indicated that sugar, candy, a mixture of sugar and banana, and maize flour are used to adulterate honey. Again it was pointed out that the main (69.2 %) adulterant material of honey is sugar and the least adulterating material mentioned by respondents are soil and stone 1.5 % (Gemeda & Negera, 2017).

Similarly, a study done in Ethiopia described that a higher extent of adulteration (15 %) was observed for honey adulterated with sugar and a lower extent (13 %) was observed for red chili powder adulterated with brick powder gravel (Woldemariam & Abera, 2014). Also, another study reported that adulteration of honey is conducted in different ways including boiling sugar with honey, directly adding sugar powder to the honey, melting, and boiling soap, candle, maize powder, or flex with honey. 59.5 % of the respondents identify adulterated honey by testing and smelling while 17.2 % estimate by continuous flows. 80.2 % of the respondents cannot identify

adulterated honey, 3.4 % can identify by the color of the honey while the rest identify by smell, observation consistency, and brittleness of the foundation sheet (Gemedda & Negera, 2017).

According to a cross-sectional study done among 96 dwellers of Dhaka city, Bangladesh it is showed that the majority (85 %) of the participants knew that there is a law in the country that deals with food adulteration; among them, 25 (33 %) thought that the present law and enforcement was sufficient (Nasreen & Ahmed, 2014). A study that was done in Wardha district, India revealed that 86 %, 70.7 %, and 43.8 % didn't see the nutritional label, manufacturing, and expiry date respectively but 77.5 % regularly see the maximum selling price of the product (Ishwar et al., 2018). Likewise, a cross-sectional survey conducted in Bangladesh among 96 residents showed that Only 9 (9 %) study participants complained to the seller when faced with adulterated food items and bought pure food from another seller (Nasreen & Ahmed, 2014).

2.4. Regulatory practices of Food Adulteration

Regulations are basic social elements necessary to make systems work healthier and also to prevent potential troubles (Abidfaheem, Nayak, & Andrade, 2013; Elias, 2015). Regulations deal with the protection of the public (individually or in groups) by setting standards and implementing them through legal provisions. Regulatory activities are often government functions to protect the community and the environment. The primary role of regulatory authorities is to protect public health by ensuring the safety, quality of food, and preventing the circulation of tainted products ((FAO, 2002). To this effect, regulatory authorities are expected to have basic elements to execute their core functions. Regulatory organizations can employ different policy and administrative tools to ensure compliance with the manufacturing, labeling, distribution, and marketing of food (Buckley & Riviere, 2012).

Studies showed that the five important characteristics of an effective regulation known by the agency on strengthening core elements of food and drug regulatory systems in developing countries include: responsiveness, outcome-oriented performance, predictability, proportional risk-based system, and independence). In addition, a good food regulatory system should strike the balance between public health protection and facilitating market access to essential products (Abidfaheem et al., 2013; Buckley & Riviere, 2012).

Food adulteration is a major threat, which is frequently faced by everybody. As a result, regulation of food adulteration is an essential requirement for ensuring the safety of foods consumed by people globally. In today's globalized world where food production is on rapid increase and movement of food products through international trade is growing, regulating the quality and safety of locally produced food products become basic requirements (M. M. Pal, Meenu, 2020).

Written evidence indicated that there is no identical regulatory principle for the adoption and application of effective enforcement approaches design for consumer protection applicable to all countries across the world. This is due to the difference in socio-economic and political features existing among nations in the world. However, some common execution strategies are advocated by many legal scholars as 'effective designs for consumer protection enforcement', and are implemented by many countries. These are: (i) using more of preventive and educative approach than punitive approach; (ii) setting priority to risk-based inspection for intervention; (iii) coordination and cooperation with sectors having similar objectives; (iv) facilitation of business enterprise self-regulation; and (v) using legal guidelines for alternative dispute resolution mechanisms (Elias, 2015).

Food adulteration is a socioeconomic problem, mainly observed in developing nations in the world. It is stated that about, 22% of foods are adulterated annually. Globally, around 57 % of people have developed health problems due to the consumption of adulterated foods (Devrani & Pal). Adulteration of food is commonly largest in many developing countries of the world including India, China, Mexico, Pakistan, Bangladesh, Vietnam, Indonesia, Afghanistan, Somalia, Ethiopia, and others (M. Pal, 2015).

All over the world, governments have employed different mechanisms to protect their citizens from unnecessary risks and to ensure the socio-economic development of their country. Regulation is one of the many systems used to protect the public interest. It maintains public interest both by preventing unfounded risks, to which the society would be exposed and by enhancing markets for cost-effective improvement (Bank, 2005).

In Ethiopia, food regulation is a shared responsibility of Ministry of Health, Ministry of Trade and Industry, and Ministry of Agriculture, but, there is no strong teamwork among these government regulatory agencies. Again, there is no general food law that clearly defines the activities of each regulatory body (Temesgen & Abdisa, 2015). Due to the improper implementation of consumer

protection law, consumers in Ethiopia have for long been victims of unreliable marketing of goods and services. adulterations of food articles and selling of sacked food items also were major threats for consumers (Abidfaheem *et al.*, 2013). FDA put the enforcement strategic tools as giving warning letters, license suspensions and withdrawals, detention, product seizures, destruction, recalls and civil penalty proceedings (Parker, 2005).

3. Materials and Methods

3.1. Study area and period

The study was conducted in Bahir Dar city, Northwest Ethiopia, which is the capital city of the Amhara National Regional State (ANRS). This town is found on the southern shore of Lake Tana, the tributary of Blue Nile. The city is located approximately 565 km north to Northwest of Addis Ababa, having a latitude and longitude of 11°36'N 37°23'E and an elevation of 1840 meters above sea level. From the 2007 National Housing & Population Census, the population projected by Central Statistics Agency (CSA) for the year 2019 is 397,923 of which 199,172 are males and 198,751 are females. The city has a total of 6 sub-cities namely: Belay Zeleke, Fasilo, Gish Abay, Minilik, Tana, and Tewodros. In these sub-cities, there were 700, 496, 450,893, 832, and 904 household leaders respectively and the study was conducted from October 2020- November 2021.

3.2. Study design

A community-based cross-sectional study was conducted within the study period.

3.3. Population

3.3.1. Source Population

All household (HH) leaders who live in Bahir Dar City were the source population.

3.3.2. Study population

All selected household leaders who live in Bahir Dar City were the study population.

3.4. Eligibility criteria

3.4.1. Inclusion criteria

All selected household leaders who lived in Bahir Dar city for 6 months and more and aged above 18 years and who were volunteer.

3.4.2. Exclusion criteria

Household leaders who were not voluntary to participate and seriously ill were excluded.

3.5. Sample size

The minimum required sample size (n) for the KAP study was calculated using the single population proportion formula by considering the following assumptions: Proportion of household leaders KAP on food adulteration as 50 % (since no study was done in the study area), considering 95 % confidence interval and a 5 % margin of error. The calculated sample size was:

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

Where:

n = sample size

Z = desired confidence interval = 95 % (1.96)

P = proportion of knowledge on food adulteration = 50 % (0.5)

d = acceptable margin of error in case of this study =5 % (0.05)

$$\text{Calculated Sample Size, } n = \frac{(1.96)^2 \times 0.5 \times 0.5}{(0.05)^2} = 384$$

Considering 10 % non-response rate = 38. The final sample size was = 38+384 = **422**.

Proportionate to sample size (PPS) by sub-city

Belay Zeleke	= $\frac{422 \times 700}{4275} = 69$	Minilik	= $\frac{422 \times 893}{4275} = 88$
Fasilo	= $\frac{422 \times 496}{4275} = 49$	Tana	= $\frac{422 \times 832}{4275} = 82$
Gish Abay	= $\frac{422 \times 450}{4275} = 45$	Tewodros	= $\frac{422 \times 904}{4275} = 89$

Total = 422 household leaders

In addition, 33 regulatory bodies were taken to assess their regulatory practices. This figure represents the total number of officers in the region working in regulatory aspects. Specifically, 18 officers from Northwest Ethiopia, Bahir Dar branch FDA, 9 officers from the Amhara regional

health bureau and health and health-related department, and 6 officers from each of the six sub-cities. All in all, the above-mentioned 33 participant officers were included in the study.

3.6. Sampling techniques and procedure

A systematic random sampling technique by proportionally allocating the total sample size was used to select study participants from the six sub-cities. The numbers of household leaders in the city were 4275. To reach each study participant: **first**, the sampling interval was calculated as follows:

$$K = N/n$$

Where; N = total population and n = total sample size.

$$K = 4275/422 = 10.13 \approx 10$$

Then, the first participant was selected by the lottery method. **Finally**, based on the order every 10th interval household leader was selected (**Figure 1**).

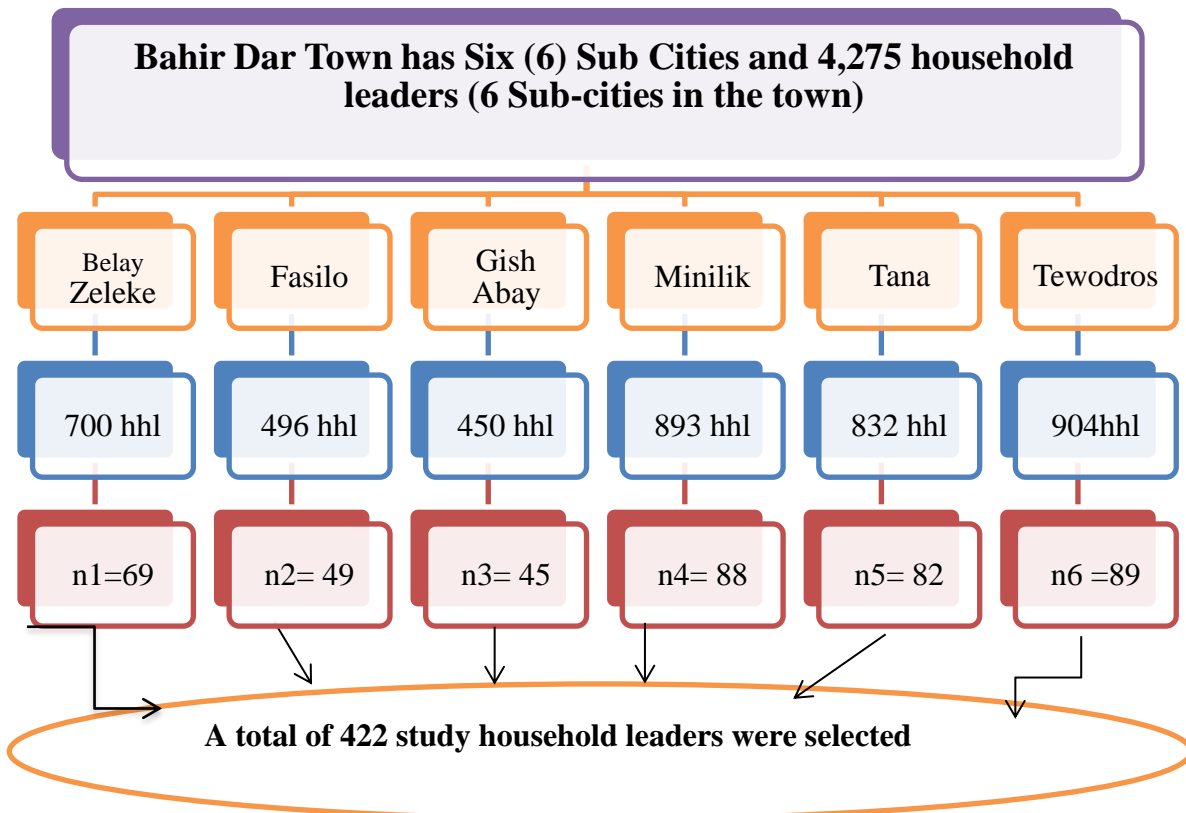


Figure 1: Schematic presentation of the sampling procedure among Bahir Dar city dwellers.

3.7. Data collection instruments

Data was collected by using a semi-structured and face-to-face interviewer-administered questionnaire. The questionnaire was developed after reviewing different relevant literatures (Admasu & Kelbessa, 2018; Aishwarya & Duza, 2017; Atsbaha, 2015; Gameda & Negera, 2017; Ványi, Csapó, & Kárpáti, 2011) and was pre-tested among Zenzelima Bahir Dar zuria dwellers, which were not included in the study. The questionnaire, which was initially prepared in English and later, translated to a local language, Amharic, and then back to English to obtain the required information from the respondents, was used for data collection. These questionnaires then were organized into two main sections; the first section consisted of the KAP questions and the second section consisted of questions to assess the regulatory body practices of food adulteration. The KAP section has four parts by itself. The first part consisted of questions that assessed the socio demographic characteristics of the respondents. The second part of the questionnaire consisted of questions to assess the knowledge of the respondents, the third part of the questionnaire consisted of questions to assess the attitude of the respondents toward food adulteration. The fourth part of the questionnaire consisted of questions related to prevention practices of food adulteration. The second section contained questions for the regulatory bodies to assess their regulatory body practices on food adulteration. The reliability of the tool was checked via Cronbach's alpha value using the data obtained from the pretest and found to be 0.867, 0.821, and 0.794 for knowledge, attitude, and prevention practice respectively. Similarly, to ensure its validity, the developed tool was given to experts for critiquing. The questionnaire measured the following:

Knowledge of food Adulteration: a total of 27 questions were asked to measure Participants' food adulteration knowledge. Each question had a 2-level response (0 = no and 1 = yes), with a possible minimum score of 0 to a maximum of 27. Each respondent's total knowledge score was checked for normality using the Shapiro–Wilk test. Knowledge score about food adulteration was not normally distributed (W statistic = 0.968, df = 414 and p-value <0.001). The median with interquartile range (IQR) of the knowledge score about food adulteration was 13 (± 7). Respondents having knowledge scores equal and above the median score were categorized as having “good knowledge” and those having below the median score as “poor knowledge” on selected food adulteration.

Attitude towards food adulteration: Ten questions were asked to measure participants' attitudes towards food adulteration. Each question had a 5-point Likert scale (0 = strongly disagree, 1 = disagree, 2 = neutral, 3 = agree, and 4 = strongly agree) with a minimum score of 0 and a possible maximum score of 40. According to the Shapiro Wilk test, attitude score was not approximately normally distributed (W statistic = 0.947, df = 414 and p-value < 0.001). Hence, the median (IQR) of attitude score, 24 (± 4), was used as a cutoff point. Participants who scored equal and above the cutoff point were labeled as having a "favorable attitude" if not as an "unfavorable attitude".

Prevention practice on food Adulteration: Ten questions were asked to measure participants' prevention practice on food adulteration. Each practice question had a two-point scale (0 = No and 1 = Yes). Each respondent had a possible total practice score ranging from 0 to 10. The normal distribution of the respondent's practice score was checked by the Shapiro Wilk test and found not normally distributed (W statistic = 0.913, df = 414, and p-value < 0.001). The median (IQR) practice score about food adulteration was 7 (± 2). Respondents who were score equal and more than the median were categorized as having "good practice" otherwise "poor practice" on selected food adulteration.

Regulatory body practices of Food Adulteration: a total of sixteen questions were asked to assess participants' food regulatory practices including type of regulatory measures apply during inspection and enforcement, food items that are more exposed to adulteration and role of regional regulatory bodies, major weaknesses of food regulatory authorities, future challenges of food regulation in the city and the responsible body to reduce this mal practice. Questions weather present or absent food adulteration -related law in the region, current law and law enforcement are adequate to control the problem, and how to practice the law and finally how to work by harmonization and collaboration with sectors having similar objectives.

3.8. Study Variables

3.8.1. Dependent variable

- ❖ Knowledge of Food Adulteration
- ❖ Attitude on Food Adulteration
- ❖ Prevention Practice on Food Adulteration
- ❖ Food Adulteration Regulatory Practices

3.8.2. Independent Variable

- **Socio-demographic variables:** age, sex, marital status, educational level, place of residence
- Source of information about food adulteration

3.9. Operational definitions

- **Respondents with good knowledge:** Respondents who scored equal to or above the median of knowledge questions.
- **Respondents with poor knowledge:** Respondents who scored below the median of knowledge questions.
- **Respondents with favorable attitude:** Respondents who scored equal to or above the median of attitude questions.
- **Respondents with unfavorable attitude:** Respondents who scored below the median of attitude questions.
- **Respondents with good prevention practice:** Respondents who scored equal to or above the median of prevention practice questions.
- **Respondents with poor prevention practice:** Respondents who scored below the median of prevention practice questions.
- **Regulatory body practices of food Adulteration:** any regulatory activities aimed at reducing the practice of food adulteration.

3.10. Data processing and analysis

Before conducting analysis, all questionnaires were checked for completeness, cleaned manually, coded, and entered into Epi info version 7.2.1.0 software and exported to SPSS version 23 for analysis. Descriptive parameters such median with interquartile range (IQR) for continuous data, frequencies, and percentages for categorical data and graphs and tables were used for data presentation.

3.11. Data quality management/control

To assure the quality of data, a pretest was done on 10 % (n=43) of the sample size among residents residing in Zenzelma Bahir Dar zuria dwellers, which were not included in the study. It was conducted two weeks before the actual data collection time to check the reliability and validity of the tool and to modify the questionnaire accordingly. Six data collectors, who have BSc in Nutrition and three supervisors who have MSc in Nutrition were recruited. They took two days of training to be familiarize with the aim of the study, contents of the questionnaire, confidentiality, participant rights, and written informed consent. Supervisors closely followed the data collection process. The principal investigator was made the overall supervision. Every day after data collection, the questionnaires were reviewed and checked for completeness by supervisors. Then, necessary feedback was given to data collectors in each morning.

Conceptual framework

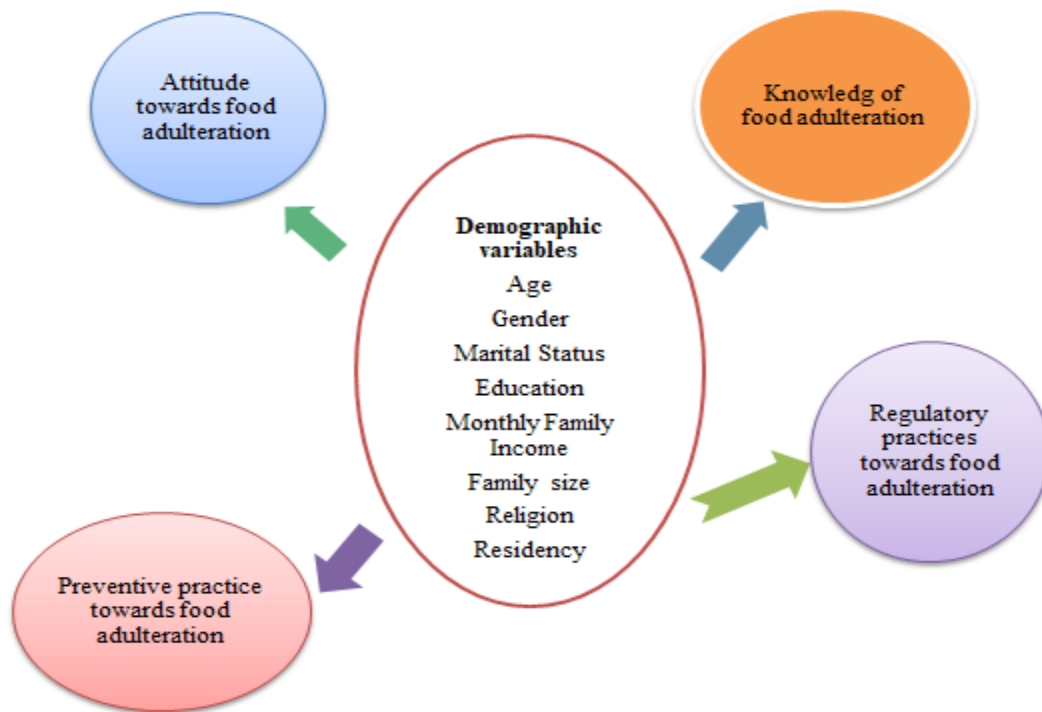


Figure 2: The overall conceptual framework of the study

3.12. Ethical consideration

Before conducting the study, ethical clearance was obtained from the ethical review committee of School of Pharmacy, Addis Ababa University. Before beginning data collection, a permission letter was obtained from the Department of Pharmaceutics and Social Pharmacy and was submitted to the six sub-cities official bodies of Bahir Dar city. From each participant, written informed consent was obtained after clearly describing the purpose, benefit, and risk of the study. Again, study participants were informed about their full right to skip or ignore any interview questions. Their name was omitted for assurance of confidentiality and privacy. The interview was performed at a suitable and secure place for respondents. The questionnaire was cleaned and stored at a secure place; finally, confidentiality was maintained by using anonymous questionnaires.

3.13. Dissemination of the study

The findings of the study will be submitted to Addis Ababa University (AAU), College of Health Science, and Department of Pharmaceutics & Social Pharmacy. It will also be communicated to Bahir Dar City administration offices, and Amhara National Regional State (ANRS) health bureau FDA focal personnel. Finally, an effort will be made to publish the findings in peer-reviewed journals.

4. Results and Discussion

4.1. Socio-demographic characteristics

A total of 422 participants were invited and of which 414 of them were participated in the study making a response rate of 98.1 %. The mean age and standard deviation of the participants were 43.61 (\pm 13.82) years; with a minimum and maximum age value of 20 and 85 years respectively. Based on the quartile classification of age, the largest proportion 111 (26.8 %) of participants were aged between 33-40 years followed by 103 (24.9 %) participants belonging to the age group of 20-32 years. The majority of participants (57.7 %) were female and nearly half of them (43.7 %) of the participants had college-level and above educational status. With regard to their occupational status, 113 (27.3 %) of them were merchants, 108 (26.1 %) were government employees, 109 (26.3 %) were private employees and 84 (20.3 %) were housewives. The majorities (80.0 %) of the respondents were married, 65.2 % of them were Orthodox and 64.0 % of them had a medium (4-6) family size.

According to quartile income classification, 151 (36.5 %) participants had a monthly income of less than 2000 birr, followed by 124 (30.0 %) participants having a monthly income of 3001-6000 birr. The rest 72 (17.4 %) and 67 (16.2 %) had a monthly income of > 6000 and 201-3000 birr, respectively (**Table 1**).

Table 1: Socio-demographic characteristics of KAPS respondents (n = 414)

Variables	Categories	Number	Percent (%)
Age in year	20-32	103	24.9
	33-40	111	26.8
	41-53	98	23.7
	>53	102	24.6
Gender	Male	175	42.3
	Female	239	57.7
Educational status	Unable to read and write	54	13.0
	Primary complete	68	16.4
	Secondary Complete	111	26.8
	College and above	181	43.7
Occupational status	Housewife	84	20.3
	Government employee	108	26.1
	Private employee	109	26.3
	Merchant	113	27.3
Marital status	Single	68	16.4
	Married	331	80.0
	Divorced	13	3.1
	Widowed	2	0.5
Religion	Orthodox	270	65.2
	Muslim	82	19.8
	Protestant	62	15.0
Sub-city	Tana	81	19.6
	Minilik	87	21.0
	Fasilo	49	11.8
	Tewodros	88	21.3
	Belay Zeleke	66	15.9
	Gish Abay	43	10.4
The average family income per month	200-2000	151	36.5
	2001-3000	67	16.2
	3001-6000	124	30.0
	>6000	72	17.4
Family size	Small (≤ 3)	125	30.2
	Medium (4-6)	265	64.0
	Large (≥ 7)	24	5.8

4.2. Knowledge of study participants about food adulteration

Nowadays, food adulteration is a fast-growing problem as an industry (Alauddin, 2012). All in all, the ultimate victim of such malpractices is the consumer who innocently purchases. But evidence showed that the awareness of consumers plays important role in preventing food adulteration (Pardeshi, 2019; Schell *et al.*, 2012). In this study, about 259 or 62.6 % (95% CI: 57.7, 67.4) of participants had good knowledge about food adulteration whereas the rest 155 (37.4 %) of the respondents had poor knowledge about food adulteration. This finding is higher when compared to the study conducted in Karnataka, western India, Chhattisgarh, India and Chennai, eastern India where 21.3 %, 23.33 % and 12.5 % had good knowledge of food adulterations respectively (Abidfaheem *et al.*, 2013; Chatterjee & Sharma, 2017; Kurup, 2021). In addition, this finding is supported by a cross-sectional study done on a sex-wise comparison of knowledge about food adulteration in India that was found only 10 % of study subjects had good knowledge regarding adulteration (Vikas, 2018).

However, this finding is lower when compared with a study done in Nepal and two Indian studies where 87.5 %, 72 % and 78 % of the study participants had good knowledge about food adulterations respectively (Ghimire, 2016; Srishti Srivastava, 2020; Tiwari, 2016). This inconsistency could be from the time of the study and the study population difference. Three hundred eighty-two (92.3 %) of the participants were know about food adulteration. This result is comparable when compared with previous studies done in Ethiopia, India and Nepal that revealed about 94 %, 95.45 % and 87.5 % of respondents had awareness about food adulteration, respectively (Gemedda & Negera, 2017; Ghimire, 2016; Sundaramoorthy & Abirami).

In this study, about 259 or 62.6 % (95% CI: 57.7, 67.4) of participants had good knowledge about food adulteration whereas the rest 155 (37.4 %) of the respondents had poor knowledge about food adulteration (**Figure 3**).

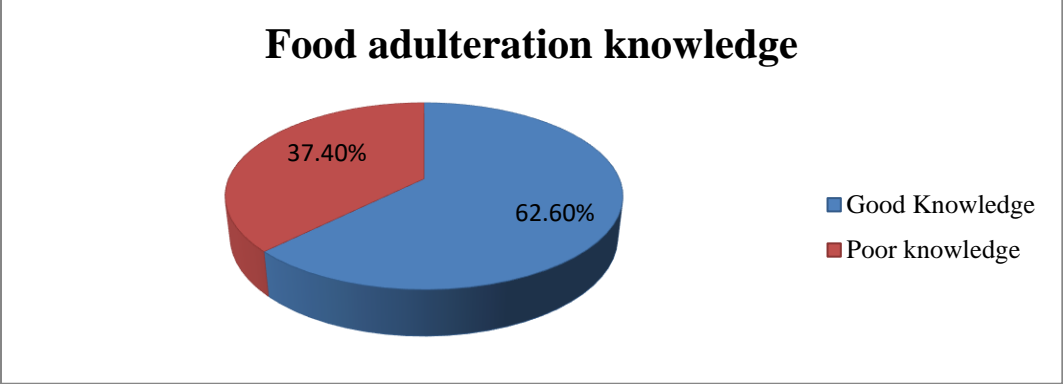


Figure 3: Participants knowledge status about food adulteration on selected food items among Bahir Dar city dwellers (n = 414).

4.2.1. The Causes of Food Adulteration

In this study, the main identified reasons for food adulteration among selected food items were to get more profits and to increase the volume of trade by showing lower prices which accounted for 272 (65.7 %) and 250 (60.4 %) respectively (**Table 2**). A study conducted in Ethiopia and Nepal supports this result as these days the main reason (77 %) for adulteration was to fetch higher cash income or to increase profit margins (Ayza & Yilma, 2014) and (Ghimire, 2016) and the greedy nature of business persons (Khan, 2013). Similarly, this result agrees with a study done in Pakistan where adulteration took place mainly for increasing the producers’ or traders’ profit margin and concluded that the main reason that attracts adulteration `was for boosting cash income by increasing its volume (Afzal, Mahmood, Hussain, & Akhtar, 2011). However, in the reverse, a study done in Ethiopia deals that even though increasing the profit margin initiates adulteration done by some selfish producers, processors and retailers, the main cause for adulteration is dishonesty and lack of accidental quality assessment on products suspected (Ayza & Yilma, 2014).

Table 2: Showing identified causes of food adulteration on selected food items among Bahir Dar city dwellers (n = 414).

No	Causes for food adulteration	Percent
1.	To get more profits	272 (65.7%)
2.	To increase the volume of trade by showing lower prices	250 (60.4%)
3.	Due to a lack of knowledge on the consequences & associated food adulteration risks	175 (42.3%)
4.	Due to the imbalance between supply and demand	129(31.2%)

4.2.2. Ways, stages, and place of Food Adulteration

In this study, participants respond that most food adulteration (75.8%) was practiced in an intentional way. Similarly, study participants mentioned that most food adulteration, 71.3 % and 76.1 %, took place at retailing and street vendors respectively. Again they pointed out that the main actors in food adulteration were retailers which accounted for 363 (87.8 %) of all study participants (Table 3).

Table 3: Showing ways, stages and place of food adulteration on selected food items among Bahir Dar city dwellers (n = 414).

Variables	Category	Number	Percent
Ways of food adulteration	Intentionally	314	75.8
	Accidentally	75	18.1
Stages in which most adulteration take place	Retailing	295	71.3
	Distribution	146	35.3
	Manufacturer	113	27.3
Place where most food adulteration found	Street vendors	315	76.1
	Shopping store	136	32.9
	Formal market place	117	28.3
Main actors in food adulteration	Retailer	363	87.8
	Whole seller	213	51.4
	Manufacturer	53	12.8

4.2.3. Common food items subjected for food adulteration and their adulterants

In this study, the most identified food items that are subjected to food adulterations were honey 264 (63.8 %) and red chili powder 193 (46.6 %). Sugar, red brick powder and water were the most identified adulterants for honey, red chili powder and milk respectively (Table 4).

In this study, it was found that honey; red chili powder and milk are adulterated at a proportion of 63.8 %, 46.6 % and 45.9 % respectively meaning honey is more subjected to adulteration. This finding is in contrast with the study done in India (Ishwar *et al.*, 2018) which states that 96 % of the participants respond milk being the food item commonly adulterated.

Sugar is found to be a high adulterant item for honey. It was found that 86.7 % of honey is added with sugar while 13.3 % with ripen bananas. This is consistent with a study done in Ethiopia Oromo region that states all respondents answered that sugar is the major honey adulterating material (Gemedo & Negera, 2017). Again this is a similar finding with another Ethiopian study that the most common currently adulterant materials usually added to honey as adulterants are sugar and banana (Damto, 2019).

The most common identified adulterants for milk in this study were water (72.7 %), crushed chalk (20.5%) and urea (5.1%) and crushed maize powder (1.7 %). Earlier studies reported a reasonably higher percentage of milk adulteration with water for instance 100% water added with milk at Hyderabad, Latifabad, Qasimabad and coastal cities of Pakistan and at Barisal district of Bangladesh (Chanda, Debnath, Hossain, Islam, & Begum, 2012; Memon et al., 2018; Shaikh, Soomro, Sheikh, & Khaskheli, 2013; Soomro et al., 2014), in Sudan 95 % of milk was adulterated with water (Adam, 2009) and 93.33 % water adulterated milk was found by Lateef et al (Lateef, Faraz, Mustafa, Akhtar, & Bashir, 2009) and 70 percent water by (Beniwal & Khetarpaul, 1999) and 59.12 % in Ethiopia (Ayza & Yilma, 2014) but the lower percentage of milk adulteration with water was observed in a study done in Pakistan (2011) as 30 % (Afzal *et al.*, 2011). The reason could be agreed that the addition of water to milk was assumed to increase the quantity of milk (Bhatti, Khan, Muhammad, & Ehsan, 2010).

In Asian and Pakistan studies, it was found that 80 % and 7 % of milk was mixed with urea (Jaiswal & Goyal, 2016) and (G. S. Barham, Khaskheli, Soomro, & Nizamani, 2015). The reason why urea is added to milk is to increase the non-protein nitrogen content (Azad & Ahmed, 2016). Again, it could be agreed that crushed chalk and crushed maize powder were added to milk to increase the total solid contents of milk.

Based on the results obtained, a higher extent of adulteration (86.7 %) was honey adulterated with sugar and a lower extent (13.3 %) was with a ripen banana. This is in line with a study done by Woldemariam HW (Woldemariam & Abera, 2014) that conclude the high adulterant for honey was sugar. The possible reason could be that though everyone has the right to get pure food unfortunately because of greedy traders it has become almost impossible (Khan, 2013).

In this study, red chili powder was adulterated with red brick powder (88.6 %), beetroot (4.8 %), and red ink (6.5 %). This is in line with the results of Lakshmi *et al.*, 2012 who reported brick

powder is the common adulterant for chilly-powder (Lakshmi, 2012) and a study done by Woldemariam HW in Bahir Dar (Woldemariam & Abera, 2014). The probable reason why red chili powder was added with these items is to increase its weight and enhance the appearance and for economic gains (Mohiuddin, 2020) and (Abidfaheem *et al.*, 2013).

Table 4: Showing common food items subjected for food adulteration and their adulterants among Bahir Dar city dwellers (n = 414).

Variables	Category	Number	Percent
Food items that are more subjected to adulteration	Honey	264	63.8
	Red chili powder	193	46.6
	Milk	190	45.9
Common adulterants for honey	Sugar	359	86.7
	Ripen banana	55	13.3
Common adulterants for Red chili powder	Red brick powder	367	88.6
	Red ink	27	6.5
	Beetroot	20	4.8
Common adulterants for milk	Water	301	72.7
	Crushed chalk	85	20.5
	Urea	21	5.1
	Crushed maize powder	7	1.7

4.3. Attitudes of Study Participants towards Food Adulteration

Of all, 295 (71.3 %) [95% CI: 66.9-75.0 %] of the respondents had a favorable attitude towards food adulteration. Based on the findings, 135 (32.6%) of the respondents strongly agreed they thought that food adulteration could be a serious problem to our current and future generations shamefully 46.4 % of the respondents agreed that food adulteration practice is increasing from time to time in the community (**Table 5**). A similar finding is observed in Boditti town and its surrounding, Southern Ethiopia that majority of the respondents agreed that adulteration is present in their area (Ayza & Yilma, 2014). The current study shows a more favorable attitude of participants when compared to another study carried out in India that the participants had a 50 % favorable attitude towards food item adulteration (Gurupadappa, 2016). It could be agreed that

participants believe food adulteration is a global problem and having a favorable attitude is the first step to start decreasing it.

Table 5: Showing the attitudes of study participants towards food adulteration on selected food items among Bahir Dar city dwellers (n = 414).

Attitude Questions	SD		D		N		A		SA	
	N	%	N	%	N	%	N	%	N	%
Food adulteration could be a serious problem to our current and future generations.	30	7.2	79	19.1	29	7.0	141	34.1	135	32.6
Food adulteration practice is increasing from time to time in the community.	9	2.22	38	9.2	45	10.9	192	46.4	130	31.4
Giving attention to the label of the food product reduces the risks of food adulteration.	25	6.0	166	40.1	66	15.9	143	34.5	14	3.4
Eating adulterated food is not important for health.	35	8.5	73	17.6	38	9.2	205	49.5	63	15.2
Dwellers have adequate information about food adulteration.	208	50.2	151	36.5	24	5.8	17	4.1	14	3.4
Buying food product from the producer could be better for the consumers.	13	3.1	23	5.6	27	6.5	216	52.2	135	32.6
Buying food without looking at its label on the packaging material is harmful to health.	28	6.8	41	9.9	23	5.6	199	48.1	123	29.7
The producers and retailers should not adulterate the food for the purpose of attracting the consumer.	73	17.6	121	29.2	37	8.9	133	32.1	50	12.1
Young children and older persons with poor immunity are more susceptible food adulteration problem.	33	8.0	42	10.1	80	19.3	210	50.7	49	11.8
During buying the food item, looking at the manufacture and expire date of the food product on the label is very important.	13	3.1	51	12.3	42	10.1	196	47.3	112	27.1

Key: SD: strongly disagree, D: disagree, N: neutral, A: agree, SA: strongly agree.

4.4. Study Participants' prevention Practice about Food Adulteration

Of all, 208 (50.2 %) [95% CI: 44.9, 55.0] study participants had good prevention practice about food adulteration on selected food items. In this study, about 323 (78 %) of the study participants have faced any adulterated food items during buying but 181 (43.7 %) study participants do not give attention to the label of food items (eg. manufacture and expiration date) before buying (**Table 6**). In this study, about 329 (79.5 %) of the study participants had ever encountered adulterated items during buying and 253 (61.1 %) of them had lessened either the extent of food buying or intake due to adulteration. This is higher than studies done in India which revealed nearly half (43 %) and 62.50 % of the participants had experienced adulterated food at least once during buying food items (Ishwar *et al.*, 2018; Rekha & Paul, 2018).

The current study shows less prevention practice of participants when compared to that of other studies carried out among studies in Bangladesh when the consumers were asked whether they have ever come across adulteration items, 90 % of the respondents said yes and 10 % replied no (Arefin *et al.*, 2020) and Wardha in India 86 % and 70.7 % never see the label and manufacturing and expiry date respectively. This difference might be due to methodological differences and ironically, people from all walks of life are aware of foods adulteration, but this knowledge is not translated into practice (Rasul, 2013). Participants stated that the most common criteria to identify pure from adulterated food items is by comparing different items (86.7 %), expiry date (69.1 %), smelling (68.1 %), physical appearance (54.8%) and using previous experience (48.6%). This was similar to the result of Gemeda M (Gemeda & Negera, 2017) who reported that the main criteria 59.5 % to identify adulterated food is by smelling and physical appearance 46.4 % (Sapkota & Phuyal, 2016)

Table 6: Showing the prevention practice of study participants about food adulteration on selected food items among Bahir Dar city dwellers (n = 414).

No.	Practice Questions	Categorie s	Number	Percen t
1.	Have you got any adulterated food items during buying?	No	91	22
		Yes	323	78
2.	Do you buy food items carefully to avoid adulteration?	No	57	13.8
		Yes	357	86.2
3.		No	195	47.1

	During buying the food item, do you observe the physical appearance of the food product?	Yes	219	52.9
4.	Do you check the adulteration status of food items by using smelling and odor during buying food items?	No	137	33.1
		Yes	277	66.9
5.	When you buy milk, honey and red chili powder, do you check using tasting method?	No	63	15.2
		Yes	351	84.8
6.	Do you think that your careful purchasing practice help to prevent food adulteration?	No	220	53.1
		Yes	194	46.9
7.	Do you check the expiry date as a means of assessment tools to identify adulterated food items?	No	133	32.1
		Yes	281	67.9
8.	Do you observe the price as an assessment tools to identify adulterated food items?	No	194	46.9
		Yes	220	53.1
9.	Do you pay attention to the label of food items (eg. manufacture and expiration date) before buying?	No	181	43.7
		Yes	233	56.3
10.	Did you consume food items if their color and appearance changed?	No	118	28.5
		Yes	296	71.5

4.5. Regulatory Body practices of Food Adulteration

In this study, about 27 (81.8 %) of the regulatory bodies were faced with or found any adulterated food items during their inspection practices. Also, they put that the major (93.9 %, 90.9 %, 27.3 % and 21.2 %) responsible bodies to control the practice of food adulteration were government, self, NGOs and civil society respectively (**Table 7**). A similar result in Nepal revealed that most respondents believed that the government is the highly responsible organization for control the practice of food adulteration and additionally 15 % and 35 % of the respondents said NGOs and self is responsible for controlling the practice of food adulteration (Ghimire, 2016).

In this study, all (33) study participants knew the presence of food adulteration-related law in the region and also about 12 (36.4 %) of them think this law and law enforcement are inadequate to control the problem. A similar study done in Bangladesh states that the majority (85%) of the respondents knew that there is a law in the country that deals with food adulteration; among

them, 25 (33 %) thought that the existing law and enforcement was insufficient (Nasreen & Ahmed, 2014).

Most (93.9%) respondents said that political influence and poor regulatory system were the crucial reasons for the unchanged food adulteration situation in the study area. This finding is consistent with another study that food adulteration has increased in Nepal as a result of occasional inspections by the concerned body, as well as a lack of punishment to adulterators (Sapkota & Phuyal, 2016). The reason for unchanged adulteration situation could be the fact that even though Ethiopia has passed multiple food adulteration regulating laws throughout the years, adulteration has recently been documented and researched thoroughly by several scholars. This could point to a weak implementation system in the region, as well as the country as a whole, and inadequate coordination among federal agencies, as well as between federal and state regulatory authorities involved in the operations, and outdated and fragmented food-related regulations, according to Tolla (2010), are the issues (Tolla, 2010). Again, this might be associate due to duplication and lack of applicable legislation, lack of commitment, coordination from stakeholders, and competence among the many enforcing entities (Majed, Real, Isreq, Akter, & Azam, 2016).

There are different regulation methods through which food adulteration can be controlled. In this study 28 (84.8 %), 19 (57.6 %), 21 (63.6 %) of study participants respond that prevention, detection, and response are the main pillars in the regulation of this malpractice respectively.

Table 7: Showing the regulatory body practices about food adulteration on selected food items among Bahir Dar city dwellers (n = 33).

No	Regulatory body practices	Category	Number	Percent
1.	Did you apply food regulatory measures during your inspection and enforcement if you faced adulterated food?	Yes	33	100
		No	0	0
2.	Did you face or get any adulterated food during your inspection practices?	Yes	27	81.8
		No	6	18.2
3.	Which type of measure/s do you take?	Warning letter	18	54.5
		Suspension	7	21.2

		Criminal Action	5	15.2
		Recall	3	9.1
4.	Do you found red chili powder, honey or milk during your inspection practices?	Yes	27	81.8
		No	6	18.2
5.	Which product is more exposed for adulteration based on your inspection experience?	Honey	18	54.5
		Milk	9	27.3
		Red chili powder	6	18.2
6.	What are the most common pillars of regulatory bodies to solve food adulteration problems?	Prevention	28	84.8
		Detection	19	57.6
		Response	21	63.6
7.	Who is the responsible body to control the practice of food adulteration?	Government	31	93.9
		NGOs	9	27.3
		Civil Society	7	21.2
		Self	30	90.9
8.	Is there a food adulteration- legal provision in the region?	Yes	33	100.0
		No	0	0
9.	Do you practice the legal provision in the region?	Yes	26	78.8
		No	7	21.2
10.	Do you think the current law and law enforcement are adequate to control the problem?	Yes	21	63.6
		No	12	36.4
11.	What was in the law?	Refuse to Renew License	29	87.9
		Detention/restriction/prohibition	26	78.8
		Criminal action/prosecution	24	72.7
		Recall	17	51.5
		Did not know	1	3.0
12.		Conduct inspection and surveillance of food products.	27	81.8

	What are the roles of regional regulatory bodies/ Authorities?	Perform regular monitoring and evaluation of food product quality through laboratory testing and/or analysis;	16	48.5
		Staff improvement and training programs for sustainable performance;	24	72.7
		Undertake regulatory intelligences and emergency responses	23	69.7
13.	What are the major weaknesses of food regulation in the city?	Weak coordination among lead government organizations	32	97.0
		Low management capacity and knowledge of regulatory bodies	16	48.5
		Low level of social awareness of food regulation activities	21	63.6
		Lack of enforcement mechanism of regulatory body & inspection authority	22	66.7
		Lack of technical competence in terms of qualified manpower	25	75.8
14.	What do you think the future challenges of food adulteration management will be?	Changes in food and agricultural technology	27	81.8
		Increases in international trade and travel	16	48.5
		Increases in susceptible populations	20	60.6
		Changes in lifestyle and consumer demands	19	57.6
15.	What are the major problems for the unchanged food adulteration in the authority?	Poor regulatory system	28	84.8
		Insufficient penalty	24	72.7
		Political influence	31	93.9
16.	What kind of steps should be taken to overcome food adulteration problems?	Warning letter	28	84.8
		Suspension/ withdrawal from market/	17	51.5
		Criminal Action	19	57.6

4.5.1. Food items that are more exposed for adulteration

Fifty-five percent of the regulatory bodies respond that honey is the most exposed food item for adulteration where 27.3 % of respondents stated that milk is the second food item that is subjected for adulteration (**figure 4**).

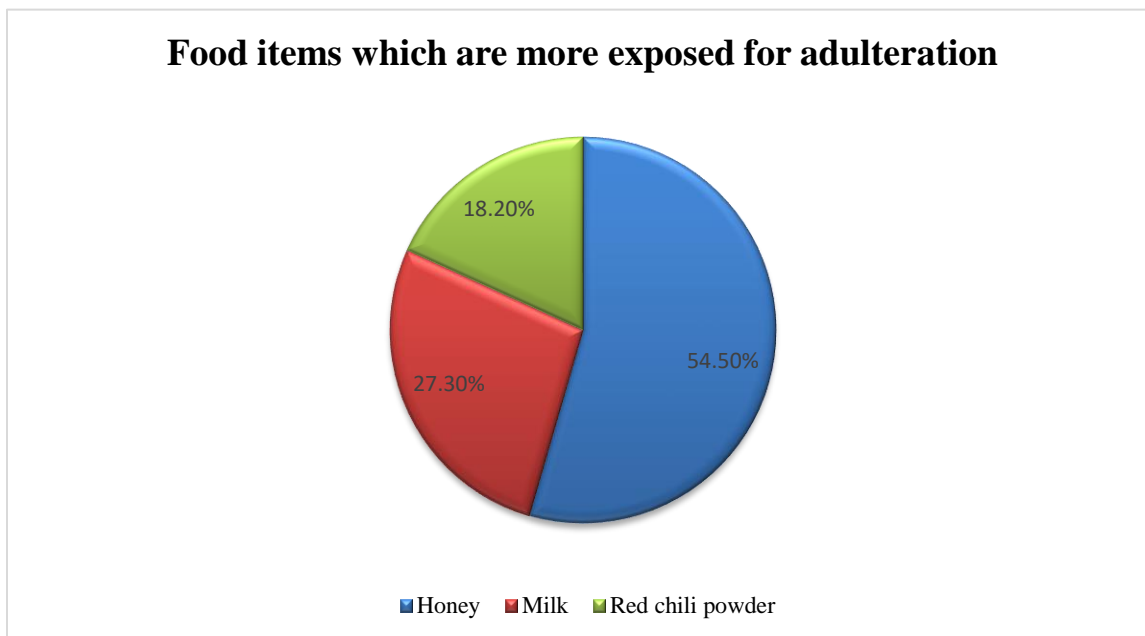


Figure 4: Pie chart showing regulatory body responses about food items that are more exposed for adulteration among Bahir Dar city dwellers (n = 33).

4.5.2. Regulatory body practices about food adulteration

In this study, the major identified roles of regional regulatory bodies were conducting inspection and surveillance and staff improvement and training programs for sustainable performance which accounted for 81.8% and 72.7% respectively (**Figure 5**).

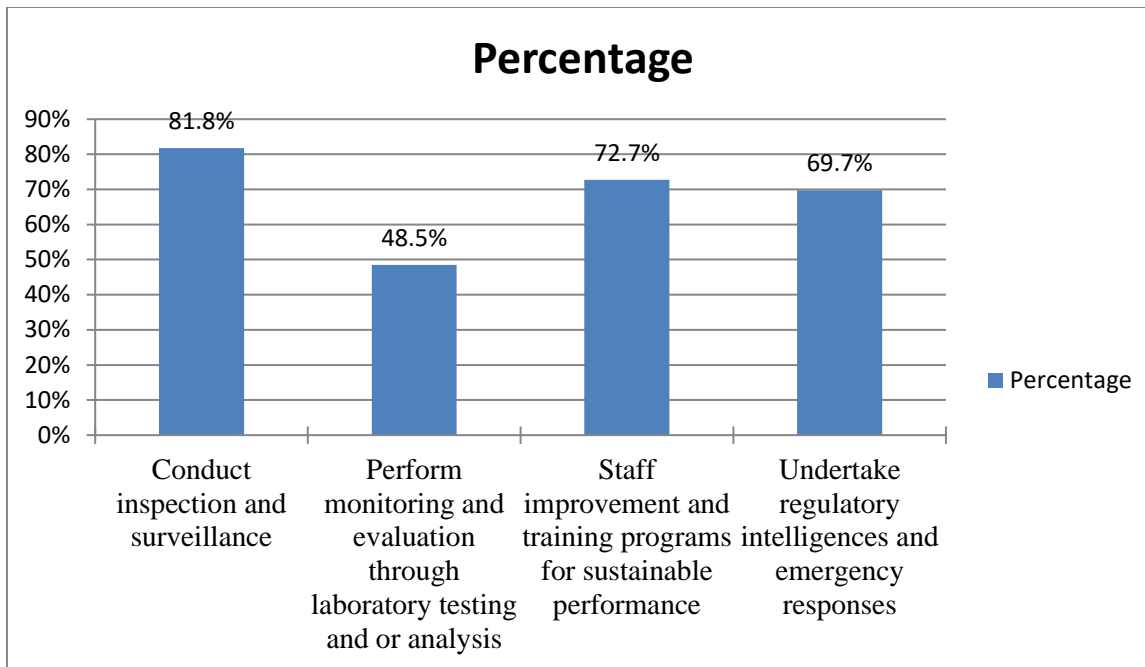


Figure 5: Bar chart showing regulatory body practices about food adulteration on selected food items among Bahir Dar city dwellers (n = 33).

4.5.3. Reasons for the unchanged food adulteration situation

Most (93.9 %) respondents said that political influence and poor regulatory system were the crucial reasons for the unchanged food adulteration situation in the study area (**Figure 6**).

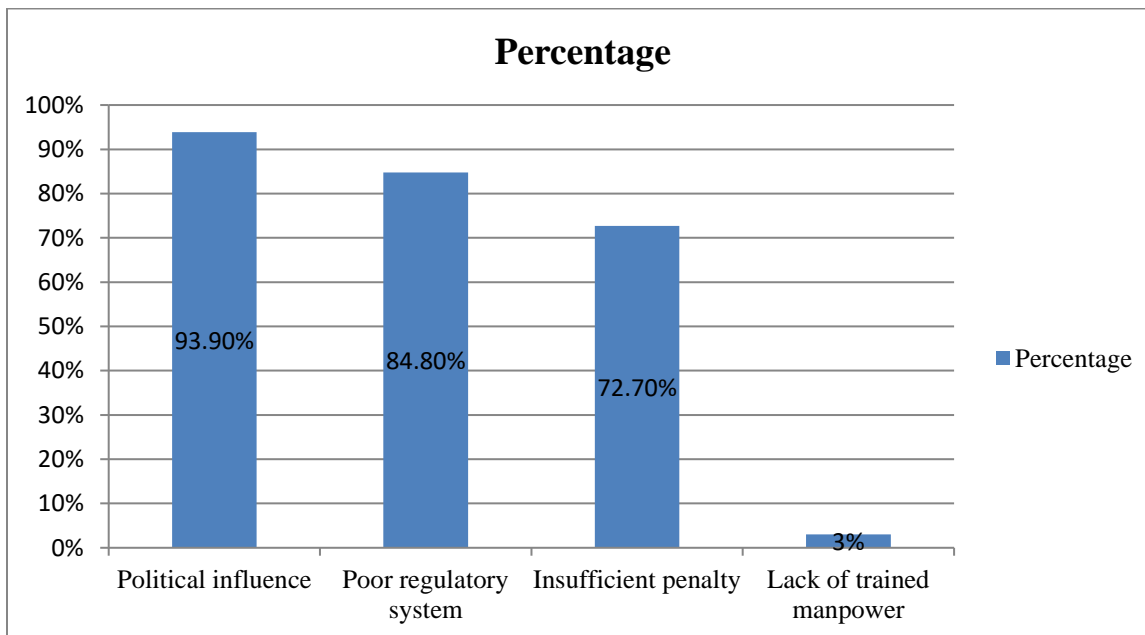


Figure 6: Bar chart showing the reasons for the unchanged food adulteration situation on selected food items among Bahir Dar city dwellers (n = 33).

5. Limitation and Strength of the study

Strengths of the Study

- This study has some strength as compared to other studies. This study used standard instruments (since we checked its Cronbach alpha value) to assess KAP and regulatory body practices of food adulteration on selected food items.
- Studying KAP on food adulteration by integrating regulatory bodies' practices is also another strength
- There is a high response rate, which is about 98.1%.

Limitations of the Study

- This study has limitations. The study was involved only in Bahir Dar city dwellers. Therefore, the findings could not be generalized to regional or national indicators.
- Data was collected using face to face interviewer-administered questionnaire. Therefore, the participants might have over or under-reporting responses.
- Even though this quantitative study pointed out certain findings regarding KAP and regulatory body practices of food adulteration on selected food items, it would be stronger if we support by qualitative approaches.

6. Conclusions and Recommendations

6.1. Conclusions

Our study revealed that residents have good knowledge and attitude, but prevention practice to a lesser extent in regulating food adulteration. The most identified roles of regional regulatory bodies in this study were conducting inspection and surveillance, performing monitoring and evaluation through laboratory testing and or analysis, undertaking regulatory intelligence and emergency responses, and staff improvement and training programs for sustainable performance.

Honey is among the most adulterated food products. The main reasons for food adulteration were to get more profit and to increase the volume of trade by showing lower prices. Sugar, red brick powder, and water were the most identified adulterants for honey, red chili powder, and milk respectively. Participants responded that expiry date (69.1%), smelling (68.1%), physical appearance (54.8%) are the most popular ways for identifying pure from adulterated food items.

6.2. Recommendations

Based on the findings of this study, the following recommendations were made to the following stakeholders:

Consumers:

- Consumers should take attention to the place where they buy any food items as food adulteration take place at retailing, distribution, and producing stages.
- Consumers should inform to whom it may concern when they face adulterated food.
- More familiarization trainings shall be made to increase the public awareness, detection and prevention ways of preventions
-

Regulatory bodies:

- Now to save ourselves and our societies, we have to fight all together against these ill trends of adulteration. Regulatory bodies should also take serious action with tougher laws against those criminals.
- Regulatory bodies should conduct a time to time action research on food adulteration in the community to reduce the problems associated with it.

- Publicize the legal actions taken to illegal entities making adulteration through the mass media and other social media platforms
- harmonized work and enforcement is needed
- coordination between different regulatory bodies (EFDA,MOA,MOT and others)

Stakeholders:

- Food adulteration infringes on consumers' right to eat safe, high-quality meals. As a result, all responsible persons and organizations, including the government, should do their part to defend the act of food adulteration and to disclose the recognized activities.

Further researchers:

- Although, this study had tried to assess the knowledge, attitude, prevention practice and regulatory body practices of food adulteration on selected food items among Bahir Dar city, the researcher believes that supporting with qualitative approach could help in assessing the real food adulteration situation.

7. References

- Abidfaheem, T., Nayak, B. S., & Andrade, M. (2013). Food adulteration and family's knowledge on food adulteration in selected village of Udupi Taluk, Karnataka. *Nitte University Journal of Health Science*, 3(2), 33.
- Adam, A. A. H. (2009). Milk adulteration by adding water and starch at Khartoum state. *Pakistan Journal of Nutrition*, 8(4), 439-440.
- Adhikari, S. (2018). Food adulteration, types of food adulteration and mitigation measures. *Public Health Notes, Reported August, 5*, 2018.
- Admasu, M., & Kelbessa, W. (2018). Food Safety Knowledge, Handling Practice and Associated Factors among Food Handlers of Hotels/Restaurants in Asosa Town, North Western Ethiopia. *SM J Public Health Epidemiol*, 4(1), 1051.
- Afzal, A., Mahmood, M., Hussain, I., & Akhtar, M. (2011). Adulteration and microbiological quality of milk (a review). *Pakistan Journal of Nutrition*, 10(12), 1195-1202.
- Aishwarya, M., & Duza, M. B. (2017). A review on adulteration of milk. *Pharmaceutical Research*, 7(08).
- Alauddin, S. (2012). Food adulteration and society. *Global Research Analysis*, 1(7), 3-5.
- Anindita Deb Pal, & Tania Das. (2017). Determination of knowledge, attitude and practice towards tea adulteration. *International Journal of Food Science and Nutrition*, 2(6), 187-191.
- Anu Joseph, Aldha Gelu, & Chithira K R. (2018). *Consumer awareness on food adulteration*. International Journal of Creative Research Thoughts (IJCRT).
- Arefin, A., Arefin, P., Habib, M. S., & Arefin, M. S. (2020). Study on Awareness about Food Adulteration and Consumer Rights among Consumers in Dhaka, Bangladesh. *Journal of Health Science Research*, 69-76.
- Arega, B. (2020). Over 20 tons of adulterated butter and honey seized in Jimma reported by FDA representative in Jimma . <https://capitalethiopia.com/capital/over-20-tons-of-adulterated-butter-honey-seized-in-jimma/> (accessed on November 24, 2020).
- Atsbaha, M. (2015). *Value chain analysis of movable frame hive honey: the case of Ahferom Woreda, Tigray, Ethiopia*. MSc. Thesis, Aksum University, Ethiopia.
- Ayalew, H., Birhanu, A., & Asrade, B. (2013). Review on food safety system: Ethiopian perspective. *African journal of food science*, 7(12), 431-440.

- Ayza, A., & Belete, E. (2015). Food adulteration: its challenges and impacts. *Food Sci Qual Manag*, 41, 50-56.
- Ayza, A., & Yilma, Z. (2014). Patterns of milk and milk products adulteration in Boditti town and its surrounding, South Ethiopia. *J Agric Sci*, 4(10), 512-516.
- Ayza, A., Yilma, Z., & Nurfeta, A. (2013). Characterization of milk production systems in and around Boditti, South Ethiopia. *Development*, 25, 10.
- Azad, T., & Ahmed, S. (2016). Common milk adulteration and their detection techniques. *International Journal of Food Contamination*, 3(1), 1-9.
- Bank, W. (2005). Food Safety and Agricultural Health Standards: Challenges and Opportunities for Developing Country Exports. *World Bank, Washington DC*.
- Bansal, S., Singh, A., Mangal, M., Mangal, A. K., & Kumar, S. (2017). Food adulteration: Sources, health risks, and detection methods. *Critical reviews in food science and nutrition*, 57(6), 1174-1189.
- Banti, M. (2020). Food Adulteration and Some Methods of Detection, Review. *International Journal of Nutrition and Food Sciences*, 9(3), 86.
- Barham, G., Khaskheli, M., Soomro, A., Nizamani, Z., & Shah, A. (2018). Frequent Supply of Adulterated Milk at Southern Zone of Sindh, Paki-stan. *J Dairy Res Tech*, 1(002).
- Barham, G. S., Khaskheli, M., Soomro, A. H., & Nizamani, Z. A. (2015). Risk of adulteration in milk consumed at Shaheed Benazirabad District of Sindh. *Int. J. Adult*, 1, 31-37.
- Beniwal, A., & Khetarpaul, N. (1999). Knowledge of consumers regarding the nature and extent of adulteration of Indian foods. *Nutrition and health*, 13(3), 153-160.
- Bhatti, S. A., Khan, M. S., Muhammad, S., & Ehsan, U. (2010). Organizing milk competition in dairy animals: experience of a milk competition at University of Agriculture, Faisalabad, Pakistan. *Pakistan Veterinary Journal*, 30(4), 255-259.
- Buckley, G. J., & Riviere, J. E. (2012). *Ensuring safe foods and medical products through stronger regulatory systems abroad*: National Academies Press.
- Chanda, T., Debnath, G., Hossain, M., Islam, M., & Begum, M. (2012). Adulteration of raw milk in the rural areas of Barisal district of Bangladesh. *Bangladesh Journal of Animal Science*, 41(2), 112-115.
- Chatterjee, R., & Sharma, P. (2017). A comparative study regarding food adulteration and food safety in rural and urban area. *Research Journal of Humanities and Social Sciences*, 8(1), 65-68.

- Choudhary, A., Gupta, N., Hameed, F., & Choton, S. (2020). An overview of food adulteration: Concept, sources, impact, challenges and detection. *IJCS*, 8(1), 2564-2573.
- Damto, T. (2019). A Review on Effect of Adulteration on Honey Properties. *Available at SSRN 3359494*.
- Devrani, M., & Pal, M. How to Detect Adulteration of Maltodextrin in Milk? Edition, S. (2010). List of medicines for Ethiopia.
- EFDA. (2019). Ethiopian Food and Medicine Administration Proclamation No. 1112/2019. <https://www.tobaccocontrolaws.org/files/live/Ethiopia/Ethiopia%20-%202019%20Proclamation%20-%20national.pdf> (accessed on November 18, 2020).
- Elias, T. (2015). Gaps and challenges in the enforcement framework for consumer protection in Ethiopia. *Mizan Law Review*, 9(1), 83-107.
- FAO, W. (2002). Global Forum of Food Safety Regulators. *Marrakech, Morocco: World Health Organisation*.
- Gahukar, R. (2014). Food adulteration and contamination in India: occurrence, implication and safety measures. *International Journal of Basic and Applied Sciences*, 3(1), 47.
- Gemeda, M., & Negera, T. (2017). Assessing the Effect of Adulteration on Honey and Beeswax Quality and Designing Way of Identification in Oromia. *International Journal of Research Studies in Biosciences (IJRSB)*, 5(8), 34-39.
- Ghimire, S. (2016). *Knowledge on Food Adulteration and Their Effects on Health*. Faculty of Education, Tribhuvan University Kirtipur.
- Gurupadappa, J. (2016). A study of consumer attitudes towards food adulteration: a case of few selected food items. *Indian Streams Research Journal*, Vol. VI, Issue. V. DOI:10.9780/22307850, <http://isrj.org/UploadedData/8376.pdf>. (accessed November 24, 2020).
- Hamad, M. A., & Ahmed, A. I. (2018). Assessing awareness and perception towards food quality and safety among households in Elobeid, North Kordofan-Sudan. *American Journal of Food Science and Nutrition Research*, 5(1), 1-4.
- Huq, D. A. K. (2020). Obidul. Integrated Measures of Food Adulteration: Ensuring Food Safety and Security. 10.13140/RG.2.2.25391.07847.
- Ishwar, S., Dudeja, P., Shankar, P., Swain, S., & Mukherji, S. (2018). 'Jago Grahak Jago': A cross-sectional study to assess awareness about food adulteration in an urban slum. *Medical Journal Armed Forces India*, 74(1), 57-60.

- Jaiswal, P., & Goyal, S. (2016). Identification of common milk adulterants using in Mirzapur city. *South Asian J. Food Technol. Environ*, 2, 313-320.
- Khan, M. (2013). Food adulteration and its effect on health. *Community Based Medical Journal*, 2(2), 1-3.
- Khapre, M., Mudey, A., Chaudhary, S., Wagh, V., & Dawale, A. (2011). Buying practices and prevalence of adulteration in selected food items in a rural area of Wardha district: a cross-sectional study. *Online Journal of Health and Allied Sciences*, 10(3).
- Kohda, Y., & Haque, I. (2017). Knowledge and Perception about Food Adulteration Problem among School Children in Bangladesh Iffat Haque. *European Journal of Public Health*, 27(suppl_3).
- Krishnakumar, B., & Sakthiventhan, S. (2012). A study on consumer protection awareness among rural consumers in Cuddalore District. *IJEMR*, 2(6), 1-15.
- Kurup, M. (2021). A Study To Assess The Knowledge Of Adolescent Regarding Food Adultration In Selected School Of Chennai, Tamilnadu. *European Journal of Molecular & Clinical Medicine*, 7(7), 6090-6091.
- Lakshmi, V. (2012). Food adulteration. *International Journal of Science Inventions Today*, 1(2), 106-113.
- Lateef, M., Faraz, A., Mustafa, M., Akhtar, P., & Bashir, M. (2009). Detection of adulterants and chemical composition of milk supplied to canteens of various hospitals in Faisalabad city. *Pak. J. Zool*, 9, 139-142.
- Lelisa, B. (2020). Content Analysis of Media Coverage of Food Safety Issues/Adulteration: The Case of Addis Admas And Addis Zemen Newspapers. <http://etd.aau.edu.et/bitstream/handle/123456789/16366/Bezawit%20Lelisa.pdf?sequence=1&isAllowed=y> (accessed on November 19, 2020).
- Majed, N., Real, M., Isreq, H., Akter, M., & Azam, H. M. (2016). Food adulteration and bio-magnification of environmental contaminants: a comprehensive risk framework for Bangladesh. *Frontiers in Environmental Science*, 4, 34.
- Manasha, S., & Janani, M. (2016). Food adulteration and its problems (Intentional, Accidental and natural food adulteration). *International Journal of Research in Finance and Marketing*, 6(4), 131-140.
- Memon, M., Khaskheli, M., Kamboh, A., Soomro, N., Mangsi, A., Barham, G., & Korejo, N. (2018). Surveillance of milk adulteration and its influence on physico-chemical

- characteristics of milk in Hyderabad, Pakistan. *A Review. J. Anim. Health Prod*, 6(1), 5-12.
- Mohiuddin, A. K. (2020). Health hazards with adulterated spices: Save the “Onion Tears”. *Asian Journal of Research in Pharmaceutical Science*, 10(1), 21-25.
- Nagvanshi, D. (2015). A study on common food adulterants and knowledge about adulteration among women of Rae Bareilly district. *International Journal of Home Science*, 1(3), 5-8.
- Namusisi, M. Food Fraud Manifestation, Deterrence and Regulation— the Ugandan Perspective. March, 2014. <https://edepot.wur.nl/303383> (accessed on November 29, 2020).
- Nasreen, S., & Ahmed, T. (2014). Food adulteration and consumer awareness in Dhaka City, 1995-2011. *Journal of health, population, and nutrition*, 32(3), 452.
- Okeke, O. (2019). Food adulteration as an emerging issue in food chemistry.
- Pal, M. (2015). Food adulteration, detection, and impact on human health. MSc Lecture Note. Addis Ababa University, College of Veterinary Medicine, Debre Zeit, Ethiopia. 1-14.
- Pal, M. M., Meenu. (2020). Food adulteration: A global public health concern. 1, 38-40.
- Pardeshi, S. (2019). Food Adulteration: Its Implications and Control Approaches in India.
- Parker, F. R. (2005). *FDA administrative enforcement manual*: CRC Press.
- Rasul, C. H. (2013). Alarming situation of food adulteration. *Bangladesh Medical Journal Khulna*, 46(1-2), 1-2.
- Ravichandran, S. (2015). Food adulteration has taken away the joy of life. *Int J MediPharm Res*, 1(3), 150-154.
- Rekha, N. S., & Paul, M. M. (2018). Consumer awareness regarding food adulteration and its incidence in the market. *International Journal of Research in Applied*, 6(10), 29-34.
- Rios-Corripio, M., Rojas-López*, M., & Delgado-Macuil, R. (2012). Analysis of adulteration in honey with standard sugar solutions and syrups using attenuated total reflectance-Fourier transform infrared spectroscopy and multivariate methods. *CyTA-Journal of Food*, 10(2), 119-122.
- Sadiku, M. N., Ashaolu, T. J., & Musa, S. M. (2019). Food adulteration: a gentle introduction. *Int. J. Sci. Environ. Technol*, 8(4), 786-789.
- Salih, M. A. M., & Yang, S. (2017). Common milk adulteration in developing countries cases study in China and Sudan: a review. *J Adv Dairy Res*, 5, 192.

- Sapkota, S., & Phuyal, R. K. (2016). An analysis of consumers' awareness and their purchasing behavior for adulterated rice-grains in Nepal. *World Review of Business Research*, 6(2), 98-119.
- Schell, L. M., Gallo, M. V., & Cook, K. (2012). What's NOT to eat—food adulteration in the context of human biology. *American Journal of Human Biology*, 24(2), 139-148.
- SGS. (2013). An overview of current and emerging issues in food safety .Food hot source .FSI(5).PP 12-13,").
- Shaikh, N., Soomro, A. H., Sheikh, S. A., & Khaskheli, M. (2013). Extent of water adulteration and its influence on physical characteristics of market milk. *Pakistan Journal of Nutrition*, 12(2), 178.
- Soomro, A. A., Khaskheli, M., Memon, M. A., Barham, G. S., Haq, I., Fazlani, S. N., . . . Soomro, R. (2014). Study on adulteration and composition of milk sold at Badin. *International Journal of Research in Applied, Natural and Social Sciences*, 2(9), 57-70.
- Srishti Srivastava, A. S. a. M. N. (2020). An interventional Study on Prevalence of Food Adulterants And Imparting Awareness of Its Health Impact To Rural Population In Field Practice Area of Mysore Medical College, Mysore. *World Journal of Pharmaceutical Research*, 10(1), 1640-1650.
- Sundaramoorthy, S., & Abirami, A. CONSUMERS' AWARENESS TOWARDS FOOD ADULTERATION IN TENKASI.
- Temesgen, M., & Abdisa, M. (2015). Food standards, food law and regulation system in Ethiopia: a review. *Public Policy and Administration Research*, 5(3), 58-73.
- Tiwari, A. (2016). A Study on food adulterants and awareness about adulteration among student of Gorakhpur district. *International Education and Research Journal*, 2(5), 1-3.
- Tolla, T. (2010). *Food quality regulation in Ethiopia*. Addis Ababa University.
- Ványi, G. Á., Csapó, Z., & Kárpáti, L. (2011). Evaluation of consumers' honey purchase habits in Hungary. *Journal of Food Products Marketing*, 17(2-3), 227-240.
- Vikas, C., C.Vijaykumar. (2018). Sex wise comparison of knowledge regarding food adulteration in urban Jaipur: A cross-sectional study. *International Multispecialty Journal of Health (IMJH)*, 4(6).
- Woldearegay, T. A. (2016). COW MILK MARKET VALUE CHAIN ANALYSIS AND RAW MILK ADULTERATION TEST IN GORODOLA DISTRICT, GUJI ZONE, OROMIA REGION.

Woldemariam, H. W., & Abera, B. D. (2014). The extent of adulteration of selected foods at Bahir Dar, Ethiopia. *Int J Interdisciplin Res*, 1(6), 1-6.

World Health Organization, W. (2017). "Food Safety." South-East Asia Regional Office.

<http://www.searo.who.int/bangladesh/areas/foodsafety/en/>.

Annexes

Annex I: Data Collection Instruments (English version)

Addis Ababa University, College of Health Sciences, School of Pharmacy, Department of Pharmaceutics & Social Pharmacy

This questionnaire is prepared to assess knowledge, attitude & practice (KAP), and regulation practices on food adulteration in selected food items among Bahir Dar city dwellers in 2020.

Informed consent

_____ I am a postgraduate student in AAU to hold Master of Science in food regulatory. Currently, I am conducting my research thesis to assess knowledge, attitude & practice (KAP), and regulatory practices on food adulteration in selected food items among Bahir Dar city dwellers. The finding of this research is very important to know the status of food adulteration and it will help the official bodies to carry out regulation activities in the future. So your response to the questions is vital for achieving the goal of the research and to improve future regulation practice. So I am asking you for your cooperation. It is your right to refuse any or all of the interview questions.

Here there are questions for you to be asked by the interviewer. Your honest participation is vital. You may also ask me to clarify questions if you don't understand them or can stop the interview at any time. Finally, all the information will be used for the study and is kept completely confidential. Your responses to the questions are identified only by numbers; never by name, as explained above the purpose of the study is purely to solve the problem and to improve future interventions.

Do you agree to participate in the study?

1. Yes

2. No

If "yes" continue to the next page

Thank you for your participation!

Name of data collector _____ Signature _____ Date _____

Name of supervisor _____ Signature _____ Date _____

Participant's code number: _____

Part I: Questions related to the socio-demographic characteristics of the participants

101. Age (in years) _____

102. Sex

A. Male

B. Female

103. Educational level

A. Unable to read and write

D. College and above

B. Primary complete

E. Others (Specify)_____

C. Secondary Complete

104. Occupational status

A. Housewife

D. Merchant

B. Government employee

E. Others (specify) _____

C. Private employee

105. Marital status

A. Single

C. Divorced

B. Married

D. Widowed

106. Religion

A. Orthodox

C. Protestant

B. Muslim

D. Others (Specify)_____

107. Residence/sub-city

A. Tana

D. Tewodros

B. Minilik

E. Belay Zeleke

C. Fasilo

F. Gish Abay

108. Average monthly income _____ ETB

109. Family size _____

Part II: Knowledge Questions about Food Adulteration

No.	Questions	Alternatives		Skip
201	Do you know the definition of food adulteration?	A. No	B. Yes	
202	Food adulteration is the addition of unhealthy or unsafe food substances to a food item.	A. No	B. Yes	
203	Food adulteration may include coloring of substances that are not prescribed or that are colored in excess of the prescribed limits.	A. No	B. Yes	
204	Addition of small amounts of non-authenticated substances to mask inferior quality ingredient is called food adulteration.	A. No	B. Yes	
205	Any food item that has been packed or kept in unhygienic conditions could not be considered as food adulteration.	A. No	B. Yes	
206	Food can be adulterated intentionally by the selfish interest of food sellers.	A. No	B. Yes	
207	Accidental food adulteration occurs when undesired items are added to food during processing, due to ignorance, negligence, or a lack of sufficient equipment and cleanliness.	A. No	B. Yes	
208	One of the reasons for food adulteration is to earn more profit.	A. No	B. Yes	
209	Food adulteration is caused due to imbalance between supply and demand.	A. No	B. Yes	
210	Food adulteration occurs as a result of inadequate knowledge about its consequences.	A. No	B. Yes	
211	Food adulteration is carried out in order to increase trade volume by showing lower prices.	A. No	B. Yes	

212	The removal of a food ingredient without the knowledge of the purchaser can be considered as food adulteration.	A. No	B. Yes	
213	Adulteration can occur during the manufacturing process.	A. No	B. Yes	
214	Adulterated foods could be obtained from a formal market during buying food items.	A. No	B. Yes	
215	Adulterated Food can be found from a street vendor during buying food items.	A. No	B. Yes	
216	Adulterated Food may be found at a shopping store in case of food buying.	A. No	B. Yes	
217	Whole seller is one type of actor in case of food adulteration.	A. No	B. Yes	
218	Food adulteration could be done by a retailer.	A. No	B. Yes	
219	Producer is one actor of food adulteration during food processing.	A. No	B. Yes	
220	Honey is one of the food products which are subjected to adulteration.	A. No	B. Yes	
221	Milk is a food items which are subjected to adulteration.	A. No	B. Yes	
222	Chili powder is one part of food items which are subjected to adulteration.	A. No	B. Yes	
223	One of the adulterant materials for honey is sugar.	A. No	B. Yes	
224	Water is a milk adulterant that could be added to increase its volume.	A. No	B. Yes	
225	Brick powder is one part of adulterant materials which is added in red chili powder.	A. No	B. Yes	
226	Radio and television program are good sources for people to be informed about food adulteration problem.	A. No	B. Yes	

227	Improving communities' awareness level is important to prevent food adulteration practice.	A. No	B. Yes	
-----	--	-------	--------	--

Part III: Attitude Questions about Food Adulteration

The next questions are about dwellers' attitudes towards food adulteration. **Please put (√) sign** corresponding to each question.

No.	Questions	Alternatives				
		SD	D	N	A	SA
301	Food adulteration could be a serious problem to our current and future generations.					
302	Food adulteration practice is increasing from time to time in the community.					
303	Giving attention to the label of the food product reduces the risks of food adulteration.					
304	Eating adulterated food is not important for health.					
305	Dwellers have adequate information about food adulteration.					
306	Buying food product from the producer could be better for the consumers.					
307	Buying food without looking at its label on the packaging material is harmful to health.					
308	The producers and retailers should not adulterate the food for the purpose of attracting the consumer.					
309	Young children and older persons with poor immunity are more susceptible food adulteration problem.					
310	During buying the food item, looking at the manufacture and expire date of the food product on the label is very important.					

Key: SD = Strongly Disagree; D = Disagree; N = Neutral; A = Agree; SA = Strongly Agree

Part IV: Prevention Practice Questions about Food Adulteration

In this section, we are asking you about your food adulteration prevention practice. For each question, please answer either No or Yes.

No.	Questions	Alternatives	Skip
401	Have you got any adulterated food items during buying?	A. No B. Yes	
402	Do you buy food items carefully to avoid adulteration?	A. No B. Yes	
403	During buying the food item, do you observe the physical appearance of the food product?	A. No B. Yes	
404	Do you check the adulteration status of food items by using smelling and odor during buying food items?	A. No B. Yes	
405	When you buy milk, honey and red chili powder, do you check using tasting method?	A. No B. Yes	
406	Do you think that your careful purchasing practice help to prevent food adulteration?	A. No B. Yes	
407	Do you check the expiry date as a means of assessment tools to identify adulterated food items?	A. No B. Yes	
408	Do you observe the price as an assessment tools to identify adulterated food items?	A. No B. Yes	
409	Do you pay attention to the label of food items (eg. manufacture and expiration date) before buying?	A. No B. Yes	
410	Did you consume food items if their color and appearance changed?	A. No B. Yes	

Part V: Regulatory practices related questions regarding food adulteration

501. Did you face or get any adulterated food during your inspection practices?

A. Yes

B. No

502. Did you apply food regulatory measures during your inspection and enforcement if you faced adulterated food?

A. Yes

B. No

503. If yes for question number 502, which type of measure/s do you take? (can choose more than one)

A. Warning letter

C. Criminal Action

B. Suspension

D. Recall

504. Do you find red chili powder, honey or milk during your inspection practices?

A. Yes

B. No

505. Which product is more exposed for adulteration based on your inspection experience?

A. Honey

C. Red chili powder

B. Milk

506. What are the most common pillars of regulatory bodies to solve food adulteration problems?

A. Prevention

C. Response

B. Detection

507. What are the roles of regional regulatory bodies/ Authorities?

A. Conduct inspection and surveillance of food products.

B. Perform regular monitoring and evaluation of food product quality through laboratory testing and/or analysis;

C. Staff improvement and training programs for sustainable performance;

D. Undertake regulatory intelligences and emergency responses

508. What are the major weaknesses of food regulation in the city?

- A. Weak coordination among lead government organizations
- B. Low management capacity and knowledge of regulatory bodies
- C. Low level of social awareness of food regulation activities
- D. Lack of enforcement mechanism of regulatory bodies and inspection authorities,
- E. Lack of technical competence in terms of qualified manpower, facilities, and set-up, at the regional level.

509. What do you think the future challenges of food adulteration management will be?

- A. Changes in food and agricultural technology
- B. Increases in international trade and travel
- C. Increases in susceptible populations
- D. Changes in lifestyle and consumer demands

510. Who is the responsible body to control the practice of Food Adulteration?

- | | |
|---------------|------------------|
| A. Government | C. Civil Society |
| B. NGOs | D. Self |

511. Is there a food adulteration- legal provision in the region?

- | | |
|--------|-------|
| A. Yes | B. No |
|--------|-------|

512. Do you practice the legal provision in the region?

- | | |
|--------|-------|
| A. Yes | B. No |
|--------|-------|

513. What was the law in the region?

- | | |
|--------------------------------------|--------------------------------|
| A. Refuse to Renew License | C. Criminal Action/prosecution |
| B. Detention/restriction/prohibition | D. Recall |
| | E. Did not know |

514. Do you think the current law and law enforcement are adequate to control the problem?

- | | |
|--------|-------|
| A. Yes | B. No |
|--------|-------|

515. What are the major problems for the unchanged food adulteration in the authority?

- A. Poor regulatory system
- B. Insufficient penalty
- C. Political influence

516. What kind of steps should be taken to overcome food adulteration problems?

- A. Refuse to Renew License/cancellation of license

- B. Detention/restriction/prohibition
- C. Criminal Action/prosecution
- D. Recall

Annex II Data collection check list (Amharic version)

አባሪ 2፡ መጠይቆች (በአማርኛ)

በአዲስ አበባ ዩኒቨርሲቲ የህክምና እና ጤና ሳይንስ ኮሌጅ የፋርማሲዩቲክስ እና ሶሻል ፋርማሲ ትምህርት ክፍል ይህ መጠይቅ በ2013 ዓ/ም የባህር ዳር ከተማ ነዋሪዎች ስለምግብ ብክለት/ምግብን ከባድ ነገር ጋር መቀላቀል/ ያላቸውን እውቀት፣ አመለካከትና ልምድ እንዲሁም በተቆጣጣሪ መስሪያ ቤቱ የሚተገበሩ የቁጥጥር ስራዎች ምን እንደሚመስሉ ለማወቅ የተዘጋጀ መጠይቅ ነው።

የስምምነት ዉል

የተከበራችሁ የጥናቱ ተሳታፊዎች

እኔ ምስጋናው ፈንታ በአሁኑ ስዓት በአዲስ አበባ ዩኒቨርሲቲ በስነምግብ ቁጥጥር የድህረ ምረቃ ተማሪ ስሆን መመረቂያ ፅሁፍ እየሰራዉ እገኛለሁ። በአሁኑ ወቅትም በባህር ዳር ከተማ ነዋሪዎች መካከል በተመረጡት የምግብ ፍጆታዎች ላይ እውቀትን፣ አመለካከትንና ልምድን (KAP) እና የቁጥጥር አሰራሮችን ለመገምገም የመመረቂያ ፅሁፍ እየሰራዉ እገኛለሁ። የዚህ ጥናት ግኝትም የምግብ ክለሳ/ /ምግብን ከባድ ነገር ጋር መቀላቀል/ሁኔታን ለማወቅ በጣም አስፈላጊ እንዲሁም ለተቆጣጣሪ መስሪያ ቤቱ የቁጥጥር እንቅስቃሴዎችን አጠናክረው እንዲሰሩ ይረዳቸዋል። ስለዚህ ለጥያቄዎቹ የሚሰጡት ምላሽ የጥናቱን ግብ ለማሳካት እና የወደፊቱን የቁጥጥር አሰራር ለማሻሻል በጣም አስፈላጊ ነው። ስለዚህ ትብብራችሁን እጠይቃለሁ። ለጥያቄዎቹ ምላሽ ለመስጠት ካልተመቸዎት አልስማማም ማለት መብትዎት ነው።

ጥያቄዎቹ በቃለ መጠይቅ አድራጊ የሚጠየቁ ሲሆን እርስዎ በዚህ መጠይቅ ላይ የሚሰጡት መረጃ ለምርምር እና ለጥናት ከማገልገል ውጭ በአርሰዎ ላይ ምንም አይነት ተፅዕኖ አይኖረውም። ሚስጥርን ከመጠበቅም አንፃር በቃለ መጠይቁ ላይ ስም አይፃፍም። ስለሆነም እርሰዎም በዚህ ጥናት ውስጥ ለተጠየቁት ጥያቄዎች መልስ እንዲሰጡኝ በትህትና እጠይቀዎታለሁ። ጥያቄዎችን ካልተረዷቸው

ቃለመጠይቁን በማንኛውም ጊዜ በማስቆም ጥያቄዎች እንዲብራሩ መጠየቅ ይችላሉ። ስለዚህ የእርስዎ ቀናት-ብብር ከላይ ያስቀመጡትን ግብ እንድንመታ ስለሚረዳን እባክዎ ጥያቄዎችን በመመለስ ይተባበሩን።

በመጨረሻም ጥናቱ ላይ ለመሳተፍ ተስማምተዋል

አዎ

አልተስማማሁም

ከተስማሙ ወደሚቀጥለው ገፅ ይለፉ

ስለ ተሳትፎዎ አመሰግናለሁ!

የጠያቂው ስም _____ ፊርማ _____ ቀን _____

የተቆጣጣሪ ስም _____ ፊርማ _____ ቀን _____

የተሳታፊ ኮድ ቁጥር _____

ክፍል 1: የነዋሪዎችን ስነ-ህዝባዊ መረጃዎች በተመለከተ የተዘጋጀ መጠይቅ

ተ.ቁ	ጥያቄዎች	መልስ
101	እድሜዎት	_____ ዓመት
102	ጾታ	U. ወንድ ለ. ሴት
103	የትምህርት ደረጃዎ	U. ማንበብና ማፃፍ የማትችል/ይችል ለ. የመጀመሪያ ደረጃ ያጠናቀቀ/ች ሐ. ሁለተኛ ደረጃን ያጠናቀቀ/ች መ. ኮሌጅ እና ከዚያ በላይ የጨረሰ/ች ሠ. ሌላ ካለ (ይጥቀሱ) _____
104	የስራ-ሁኔታ	U. የቤት እመቤት ለ. የመንግስት ተቀጣሪ ሐ. የግል ተቀጣሪ መ. ነጋዴ ሠ. ሌላ ካለ (ይጥቀሱ) _____
105	የጋብቻ ሁኔታ?	U. ያገባ/ች ለ. ያላገባ/ች ሐ. አግብታ የፈታ/ች መ. የሞተባት/
106	የሀይማኖት ሁኔታ	U. አርቶዶክስ ተዋህዶ ለ. ሙስሊም ሐ. ፕሮቴስታንት መ. ሌላ ካለ (ይጥቀሱ)

- 107 የሚኖሩበት ክፈለ ከተማ U. ጣና ክፈለ ከተማ ለ. ምኒልክ ክፈለ ከተማ
 ሐ. ፋሲሎ ክፈለ ከተማ መ. ቴዎድሮስ ክፈለ ከተማ
 ሠ. በላይ ዘለቀ ክፈለ ከተማ ረ. ግሽ አባይ ክፈለ ከተማ
- 108 አማካይ የቤተሰብ ገቢ ምን ያህል ይሆናል? _____ በብር
- 109 በቤት ዉስጥ ምን ያህል ሰዊ ይኖራል? _____

ክፍል 2: እዉቀትን መሰረት ያደረጉ የምግብ ክለሳ/ቅየጣ/ ነክ ጥያቄዎች

201. ስለ ምግብ ክለሳ /ምግብን ከባዕድ ነገር ጋር መቀላቀል/ ምንነት እዉቅናዉ አለዉት?ሀ. አዎ ለ. የለም
202. የምግብ ክለሳ ማለት ጤናማ ያልሆነ ወይም ደህንነቱ ያልተጠበቀ የምግብ ንጥረ ነገር በምግብ ላይ መጨመር ነዉ::ሀ. አዎ ለ. የለም
203. የምግብ ክለሳ /ምግብን ከባዕድ ነገር ጋር መቀላቀል/ ያልተደነገጉ ወይም ከተወሰነው ገደብ በላይ ቀለም ያላቸውን ንጥረ ነገሮች መጨመር ሊያካትት ይችላል::ሀ. አዎ ለ. የለም
204. ዝቅተኛ ጥራት ያላቸውን ንጥረ ነገሮች ለመሸፈን አነስተኛ መጠን ያላቸው ያልተረጋገጡ ንጥረ ነገሮች መጨመር የምግብ መክለስ ይባላል.ሀ. አዎ ለ. የለም
205. ማንኛውም የታሸገ ወይም ንጽህና በጎደለው ሁኔታ ውስጥ የተቀመጠ ምግብ እንደ ምግብ ክለሳ ተደርጎ ሊወሰድ አይችልም::ሀ. አዎ ለ. የለም
206. በምግብ ሻጮች ራስ ወዳድነት ምግብ ሆን ተብሎ ሊባላሽ ይችላል::ሀ. አዎ ለ. የለም
207. በአጋጣሚ የተከለሰ ምግብን መበላሸት የሚከሰተው በማቀነባበር ወቅት ያልተፈለጉ የምግብ ጭማሬ ወደ ምግብ ሲጨመሩ, ባለማስተዋል, በቸልተኝነት, ወይም በቂ መሳሪያ እና በንጽህና እጥረት ምክንያት ነዉ.ሀ. አዎ ለ. የለም
208. ለምግብ ክለሳ አንዱ ምክንያት ያለአግባብ ትርፍ ለማግኘት ነዉ::ሀ. አዎ ለ. የለም
209. የምግብ ክለሳ የሚከሰተው በአቅርቦት እና በፍላጎት መካከል ባለው አለመመጣጠን ምክንያት ነዉ::ሀ. አዎ ለ. የለም

- 210. የምግብ ክለሳ የሚከሰተው በህብረተሰቡ ዘንድ ስለ አስከፊ ውጤቶች በቂ እውቀት ባለመኖሩ ነው።ሀ. አዎ ለ. የለም
- 211. የምግብ ክለሳ የሚከናወነው ዝቅተኛ ዋጋዎችን በማሳየት የንግድ ልውውጥን ለመጨመር ነው ሀ. አዎ ለ. የለም
- 212. ገዢው ህብረተሰብ እዉቅና ጠቃሚ የምግብ ንጥረ ነገርን ማስወገድ እንደ ምግብ ክለሳ ሊቆጠር ይችላል.ሀ. አዎ ለ. የለም
- 213. የምግብ ክለሳ /ምግብ ላይ ባዕድ/ ነገሮችን መጨመር በማምረት ሂደት ውስጥ ሊከሰት ይችላል.ሀ. አዎ ለ. የለም
- 214. የምግብ ክለሳ በሚገዙበት ጊዜ ከመደበኛ ገበያ ሊያጋጥምዎት ይችላል. ሀ. አዎ ለ. የለም
- 215. የምግብ ክለሳ ከመንገድ ዳር የምግብ ዉጤቶችን በሚገዙበት ጊዜ ሊገኝ ይችላል.ሀ. አዎ ለ. የለም
- 216. ምግብ በሚገዙበት ጊዜ የተከለሰ ምግብ በገበያ መደብር ውስጥ ሊገጥመዎት ይችላል።ሀ. አዎ ለ. የለም
- 217. ጅምላ አከፋፋዮች ለምግብ ክለሳ አንድ ተዋናይ ናቸው።ሀ. አዎ ለ. የለም
- 218. የምግብ ክለሳ /ምግብ ላይ ባዕድ/ ነገሮችን መጨመር በቸርቻሪዎች ሊከናወን ይችላል። ሀ. አዎ ለ. የለም
- 219. አምራቾች በምግብ ሂደት ወቅት ለምግብ ክለሳ አንድ ተዋናይ ናቸው።ሀ. አዎ ለ. የለም
- 220. ማር ለምግብ ክለሳ ከተጋለጡ የምግብ ምርቶች አንዱ ነው።ሀ. አዎ ለ. የለም
- 221. ወተት ለምግብ ክለሳ ከተጋለጡ የምግብ ምርቶች አንዱ ነው።ሀ. አዎ ለ. የለም
- 222. የበርበሬ ዱቄት የምግብ ክለሳ ከሚደርስባቸው የምግብ ዉጤቶች አንዱ ክፍል ነው።ሀ. አዎ ለ. የለም
- 223. ስካር ማር ላይ ከሚጨመሩ የምግብ መክለሻ /ምግብ ላይ /ከሚጨመሩ የምግብ ዉጤቶች አንዱ ነው።ሀ. ነው.ሀ. አዎ ለ. የለም
- 224. ውሃ መጠኑን ለመጨመር ከወተት ላይ የሚጨመር ተዋጽኦ ነው።ሀ. አዎ ለ. የለም
- 225. የሸከላ አፈር በቀይ በርበሬ ዱቄት ውስጥ ከሚጨመር የምግብ ዉጤቶች አንዱ ነው።ሀ. አዎ ለ. የለም

226. የሬዲዮ እና የቴሌቪዥን ፕሮግራሞች ስለ ምግብ ክለሳ ችግር ለሰዎች ግንዛቤ የሚሰጡ ጥሩ የመረጃ ምንጮች ናቸው። ሀ. አዎ ለ. የለም

227. የምግብ ክለሳ ልምምድን ለመከላከል የማህበረሰቡን የግንዛቤ ደረጃ ማሻሻል አስፈላጊ ነው። ሀ. አዎ ለ. የለም

ክፍል 3፡ አመለካከትን መሰረት ያደረጉ የምግብ ክለሳ /ምግብን ከባዕድ ነገር ጋር መቀላቀል/

ጥያቄዎች

301. ከምግብ ላይ ባዕድ ነገሮችን መጨመር ለአሁኑ እና ለወደፊት ትውልዶቻችን ከባድ ችግር ሊሆን ይችላል።

ሀ. በጣም እቃወማለሁ

መ. እስማማለሁ

ለ. እቃወማለሁ

ሠ. በጣም እስማማለሁ

ሐ. ገለልተኛ ነኝ

302. በህብረተሰቡ ውስጥ የምግብ መከለስ ልምምድ ከጊዜ ወደ ጊዜ እየጨመረ ነው.

ሀ. በጣም እቃወማለሁ

መ. እስማማለሁ

ለ. እቃወማለሁ

ሠ. በጣም እስማማለሁ

ሐ. ገለልተኛ ነኝ

303. ለምግብ ምርቶች መለያ ምልክቶች ትኩረት መስጠት የምግብ መከለስ አደጋዎችን ይቀንሳል።

ሀ. በጣም እቃወማለሁ

ለ. እቃወማለሁ

መ. እስማማለሁ

ሐ. ገለልተኛ ነኝ

ሠ. በጣም እስማማለሁ

304. የተከለሱ ምግቦችን መመገብ ለጤና ጠቃሚ አይደለም.

ሀ. በጣም እቃወማለሁ

ለ. እቃወማለሁ

ሐ. ገለልተኛ ነኝ

መ. እስማማለሁ

ሠ. በጣም እስማማለሁ

305. የባህር ዳር ነዋሪዎች ስለ ምግብ ክለሳ ምንነት በቂ መረጃ አላቸው።

ሀ. በጣም እቃወማለሁ

ለ. እቃወማለሁ

ሐ. ገለልተኛ ነኝ

መ. እስማማለሁ

ሠ. በጣም እስማማለሁ

306. የምግብ ምርትን ከአምራች መግዛት ለተጠቃሚዎች የተሻለ ሊሆን ይችላል.

ሀ. በጣም እቃወማለሁ

ለ. እቃወማለሁ

ሐ. ገለልተኛ ነኝ

መ. እስማማለሁ

ሠ. በጣም እስማማለሁ

307. በማሸጊያው ላይ ያለውን መለያ ሳይመለከቱ ምግብ መግዛት ለጤና ጎጂ ነው.

ሀ. በጣም እቃወማለሁ

ለ. እቃወማለሁ

ሐ. ገለልተኛ ነኝ

ሐ. ገለልተኛ ነኝ

መ. እስማማለሁ

ሠ. በጣም እስማማለሁ

308. አምራች እና ቸርቻሪዎች ሸማቹን ለመሰብሰብ ሲሉ ምግቡን መከለስ የለባቸውም።

ሀ. በጣም እቃወማለሁ

ለ. እቃወማለሁ

ሐ. ገለልተኛ ነኝ

መ. እስማማለሁ

ሠ. በጣም እስማማለሁ

309. በሽታ መከላከል አቅማቸው ደካማ የሆኑ፣ ትንንሽ ልጆች እና አረጋውያን ለምግብ ክለሳ የጤና ችግር ተጋላጭ የሆኑ የማህበረሰብ ክፍሎች ናቸው።

ሀ. በጣም እቃወማለሁ

ለ. እቃወማለሁ

ሐ. ገለልተኛ ነኝ

ሠ. በጣም እስማማለሁ

መ. እስማማለሁ

310. የምግብ ፍጆታውን በሚገዙበት ጊዜ, ምርቱን ያመረተውን አካል እና የሚያበቃበትን ቀን መመልከት በጣም አስፈላጊ ነው.

ሀ. እቃውማለሁ

መ. እስማማለሁ

ለ. እቃውማለሁ

ሠ. በጣም እስማማለሁ

ሐ. ገለልተኛ ነኝ

ክፍል 4: የምግብ ክለሳን/ምግብን ከባድ ነገር ጋር መቀላቀል/ በተመለከተ ክልምድ/ከተግባር/ ጋር

የተያያዙ ጥያቄዎች

- 401. በሚገዙበት ጊዜ የተከለሰ/ባዕድ ነገር የተጨመረበት/ የምግብ ፍጆታ አጋጥሞዎት ያዉቃል? ሀ. አዎ ለ. የለም
- 402. ባዕድ ነገር የተጨመረበትን/ የተከለሰ የምግብ ፍጆታ ለማስወገድ በጥንቃቄ የምግብ እቃዎችን ይገዛሉ? ሀ. አዎ ለ. የለም
- 403. የምግብ ፍጆታውን በሚገዙበት ጊዜ, የምግብ ምርቱን አካላዊ ገጽታ ይመለከታሉ? ሀ. አዎ ለ. የለም
- 404. የምግብ ፍጆታውን በሚገዙበት ጊዜ በማሸተት እና በጠረኑ በመጠቀም የምግብ ዉጤቶችን የክለሳ ደረጃ ማወቅ ይችላሉ? ሀ. አዎ ለ. የለም
- 405. ወተት፣ ማር እና ቀይ በርበሬዱዌት ሲገዙ የመቅመስ ዘዴን በመጠቀም ያረጋግጣሉ? ሀ. አዎ ለ. የለም
- 406. ጥንቃቄ የተሞላበት የግዢ ልምምድዎ የምግብ ክለሳን ለመከላከል የሚረዳ ይመስልዎታል? ሀ. አዎ ለ. የለም
- 407. ባዕድ ነገር የተጨመረበትን/ የተከለሰ ምግብ ለመለየት ዋጋውን ግምት ዉሥጥ ማስገባት እንደ የግምገማ መስፈርት ይመለከታሉ? ሀ. አዎ ለ. የለም
- 408. ባዕድ ነገር የተጨመረበትን/ ምግብ ለመለየት የአገልግሎት ማብቂያዉን ቀን እንደ አንድ መገምገሚያ መሰፈርት ይጠቀሙታል? ሀ. አዎ ለ. የለም
- 409. ከመግዛትዎ በፊት ለምግብ ዉጤቶች መለያ (ለምሳሌ የምርት እና የአገልግሎት ማብቂያ ቀን) ትኩረት ይሰጣሉ? ሀ. አዎ ለ. የለም

410. ቀለማቸው/ምንነታቸው/ እና መልካቸው የተቀየሩ የምግብ ፍጆታዎችን ትመገባለህ? ሀ. አዎ ለ. የለም

ክፍል 5: ተቆጣጣሪ መስሪያ ቤቱ ቁጥጥር ላይ የሚሰራውን ስራ መሰረት ያደረጉ የምግብ ክለሳ/ምግብን ከባድ ነገር ጋር መተቀላቀል/ጥያቄዎች:

501. በቁጥጥር እና በክትትል ወቅት የተበላሽ ምግብ አጋጥሞዎት ወይም አግኝተው ያዉቃሉ? ሀ. አዎ ለ. የለም

502. በቁጥጥር እና በክትትል ወቅት ባዕድ ነገር የተጨመረበትን/ ምግብ ሲጋጠሙዎት የቁጥጥር እርምጃዎችን ተግባራዊ ያደርጋሉ? ሀ. አዎ ለ. የለም

503. በቁጥጥር እና በክትትል ወቅት ባዕድ ነገር የተጨመረበትን/ ምግብ ሲጋጠሙዎት የትኛውን ዓይነት እርምጃ ነው የሚወስዱት?

ሀ. የማስጠንቀቂያ ደብዳቤ መጻፍ

ለ. ባለበት የማስቆም ስራ መስራት

ሐ. የወንጀል እርምጃዎችን መውሰድ

መ. ምርቱን ከገብያ ላይ መሰብሰብ

504. በቁጥጥር እና በክትትል ወቅት የበርበሬ ዱቄት፣ ማር ወይም ወተት አጋጥሞዎትል? ሀ. አዎ ለ. የለም

505. በቁጥጥር እና በክትትል ልምድዎት ላይ በመመስረት በበዛት ለክለሳ የተጋለጠው የትኛው ምርት ነው?

ሀ. ማር

ለ. ወተት

ሐ. ቀይ የበርበሬ ዱቄት፣

506. የምግብ ክለሳ ችግሮችን ለመፍታት በጣም የተለመዱ የቁጥጥር ስልቶች ምንድናቸው?

ሀ. ቅድመ መከላከል ማድረግ

ለ. ለምግብ ምርቶች ምርመራ ማድረግ

ሐ. ግብር መልስ መስጠት

507. የክልል ተቆጣጣሪ አካል / ባለሥልጣናት ሚና ምንድነው?

ሀ. የምግብ ምርቶችን ፍተሻ እና ክትትል ያካሂዳሉ

ለ. በቤተ ሙከራ / ወይም በመተንተን የምግብ ምርት ጥራት መደበኛ ክትትል እና ግምገማ ያካሂዳሉ
ሐ. ለዘላቂ አፈፃፀም የሰራተኞች ማሻሻያ እና የሥልጠና ፕሮግራሞች መስጠት
መ. የቁጥጥር ብልህነት እና የድንገተኛ ጊዜ ምላሾችን ማካሄድ

508. በከተማዉ ውስጥ የምግብ ቁጥጥር ዋና ዋና ድክመቶች ምንድናቸው?

- ሀ. በአጋር የመንግስት መስሪያ ቤቶች መካከል ደካማ ቅንጅት መኖሩ
- ለ. የቁጥጥር አካላት ዝቅተኛ የአስተዳደር አቅም እና ዕውቀት መኖሩ
- ሐ. የምግብ ቁጥጥር ተግባራት ዝቅተኛ የማኅበራዊ ግንዛቤ ደረጃ መኖሩ
- መ. የቁጥጥር አካላት እና ባለሥልጣናት የማስፈጸሚያ ዘዴ ክፍተት መኖር
- ሠ. በፌዴራል እና በክልል ደረጃ ብቃት ያለው የሰው ኃይል አለመኖር

509. የምግብ ደህንነትን ለማስጠበቅ የወደፊት ተግዳሮቶች ምን ምን ናቸው?

- ሀ. በምግብ እና በግብርና ቴክኖሎጂ ላይ ለውጦች
- ለ. በዓለም አቀፍ ደረጃ ከጊዜ ጊዜ እየጨመረ የሚመጣ የንግድ ግንኙነት
- ሐ. ተጋላጭ የሆኑ የህዝብ ብዛት መጨመር
- መ. የአኗኗር ዘይቤ እና የሽማቾች ፍላጎቶች ለውጦች

510. የምግብ ክለሳ/ምግብን ከባዕድ ነገር ጋር መቀላቀልን/ አሰራርን ለመቆጣጠር ኃላፊነት ያለበት አካል ማን ነዉ?

- ሀ. መንግስት
- ለ. መንግስታዊ ያልሆኑ ድርጅቶች
- ሐ. ሲቪል ማህበረሰቡ
- መ. እያንዳንዱ ግለሰብ

511. በክልሉ ውስጥ የምግብ ክለሳን ለመቆጣጠር የሚያስችል ሕግ አለ ወይ?

- ሀ. አለ
- ለ. የለም
- ሐ. አላዉቅም

512. ህጉ በክልሉ ውስጥ ተግባራዊ ተደረጋል ወይ? ሀ. አለ ለ. የለም

513. በሕጉ ውስጥ ያሉ ድንጋጌዎች ምን ምን ናቸው?

ሀ. ፈቃድን ለማደስ ፈቃደኛ አለመሆን

ለ. ማሰር/መገደብ/መከላከል/

ሐ. የፍቃድ መሰረዝ

መ. የወንጀል ድርጊት /ክስ/

ሠ. መሰብሰብ

ረ. አላውቅም

514. በክልሉ ውስጥ ተግባራዊ የተደረገው ህግ እና የህግ ማስፈጸሚያ አዋጅ እየታየ ያለውን የማህበረሰቡን ችግር ለመቅረፍ በቂ ነው ብለው ያምናሉ?

ሀ. አዎ

ለ. አይደለም

515. የምግብ ከለሳ ችግርን በዘላቂነት መፍታት ያልተቻለው ለምንድ?

ሀ. የቁጥጥር ስርአቱ ደካማ መሆኑ

ለ. የቁጥጥር አካሉ አስተማሪ የሆነ ቅጣት መውሰድ አለመቻሉ

ሐ. የፖለቲካ ጣልቃ ገብነት

516. የምግብ ክለሳ ችግርን ለመከላከል/ለማስወገድ/ ምን አይነት ዘላቂ እርምጃዎች መውሰድ አለባቸው ብለው ያምናሉ?

ሀ. የመንግስት እርምጃዎች (ህግ በአግባቡ ተፈፃሚ መሆን እና እና ለወንጀሉ ተመጣጣኝ እርምጃ መውሰድ

ለ. ለህዝብ በቂ የሆኑ የግንዛቤ መፍጠሪያ መድረኮችን ማመቻቸት

ሐ. የህብረሰቡን ግንዛቤ የሚያሳድጉ የሚዲያ ተቋማት መፍጠር

Annex III. Declaration Statement

I, the undersigned, MSc student declare that this thesis is my original work in partial fulfillment of the requirement for the degree of Master of Science in food Regulatory.

Name: Misganaw Fenta Kassa

Signature: _____

Place of submission: Department of Pharmaceutics & Social Pharmacy, College of Health Sciences, School of Pharmacy, Addis Ababa University

Date of Submission: _____

Advisors':

Name

Signature

i. Dr. Aynadis Tamene

ii. Mr. Wondafrash Abera
