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**EFFECTIVENESS OF FOOD SAFETY TRAINING ON KNOWLEDGE,  
ATTITUDE, AND PRACTICES (KAP) OF HOMEBASED FOOD  
BUSINESS (HFB) IN AI AIN, UAE**

Mariam Mohammed Al Kaabi

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**MASTER THESIS NO. 2022:15**

**College of Agriculture and Veterinary Medicine**

**Department of Food Science**

**EFFECTIVENESS OF FOOD SAFETY TRAINING ON  
KNOWLEDGE, ATTITUDE, AND PRACTICES (KAP) OF  
HOMEBASED FOOD BUSINESS (HFB) IN AI AIN, UAE**

*Mariam Mohammed Saleh Bakhit Alkaabi*



*April 2021*

United Arab Emirates University  
College of Agriculture and Veterinary Medicine  
Department of Food Science

EFFECTIVENESS OF FOOD SAFETY TRAINING ON  
KNOWLEDGE, ATTITUDE, AND PRACTICES (KAP) OF  
HOMEBASED FOOD BUSINESS (HFB) IN AI AIN, UAE

Mariam Mohammed Al Kaabi

This thesis is submitted in partial fulfilment of the requirements for the degree of  
Master of Science in Food Science

Under the Supervision of Professor Afaf Kamal Eldin

February 2021

### Declaration of Original Work

I, Mariam Mohammed Al Kaabi, the undersigned, a graduate student at the United Arab Emirates University (UAEU), and the author of this thesis entitled “*Effectiveness of Food Safety Training on Knowledge, Attitude, and Practices (KAP) of Homebased Food Business (HFB) in Al Ain, UAE*”, hereby, solemnly declare that this thesis is my own original research work that has been done and prepared by me under the supervision of Professor Afaf Kamal Eldin, in the College of Food and Agriculture at UAEU. This work has not previously been presented or published or formed the basis for the award of any academic degree, diploma or a similar title at this or any other university. Any materials borrowed from other sources (whether published or unpublished) and relied upon or included in my thesis have been properly cited and acknowledged in accordance with appropriate academic conventions. I further declare that there is no potential conflict of interest with respect to the research, data collection, authorship, presentation and/or publication of this thesis.

Student's Signature: \_\_\_\_\_

A handwritten signature in black ink, appearing to read 'Mariam', is written over a horizontal line. The signature is stylized and cursive.

Date: 03 November 2021

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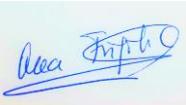
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## Abstract

This research aimed at evaluating the levels of knowledge, relevant attitudes, and food safety practices (KAP) of food handlers that have home food businesses (HFB) in Al Ain city, UAE. It examined the effectiveness of the Essential Food Safety Training Program (EFST) in providing food safety knowledge, attitude, and practices. A quantitative research method was conducted using a sample of 68 participants who responded to the questionnaires. Three research questions were used to guide the study and explore the differences of the level of Knowledge, Attitudes, and Practice (KAP) before and after training program by using paired samples t-test. This study revealed that EFST had positive effects on all subcategories of food safety practices. Most of the subcategories of attitudes showed positive impact except the cross contamination. In regard to the food safety knowledge, no positive impact found in the subcategories of cleaning and chilling. The results of this study can contribute to improve government policies and actions regarding safety of food and training program.

**Keywords:** Food handlers, Knowledge, Attitude, Practices, Essential Food Safety Training Program (EFST).

## Title and Abstract (in Arabic)

أثر فاعلية التدريب المهني على سلامة الأغذية على تحسين المعرفة والأساليب  
والممارسات الخاصة بسلامة الأغذية المنتجة في المنازل للأغراض التجارية في مدينة  
العين في الإمارات العربية المتحدة

### الملخص

هدفت هذه الدراسة إلى تقييم مستوى المعرفة والأساليب والممارسات الخاصة بسلامة الغذاء لمتدولي الأغذية المنتجة في المنازل للأغراض التجارية في مدينة العين، الإمارات العربية المتحدة. قيمت الدراسة فاعلية دور برنامج التدريب على أساسيات سلامة الغذاء (EFST) في المعرفة والأساليب والممارسات الخاصة بسلامة الأغذية. اعتمدت الدراسة على أسلوب البحث الكمي وتضمنت عينة الدراسة 68 مشتركاً أجابوا على الاستبانة. تم استخدام ثلاثة أسئلة بحثية لتوجيه الدراسة والنظر في الاختلافات في مستوى المعرفة، والأساليب، والممارسات (KAP) قبل وبعد البرنامج التدريبي باستخدام اختبار "ت" لعينتين مرتبطتين (Paired Samples T-Test). أظهرت نتائج الدراسة أن برنامج التدريب على أساسيات سلامة الغذاء (EFST) كان له آثار إيجابية على جميع الفئات الفرعية للممارسات. معظم الفئات الفرعية للأساليب كان لها آثار إيجابية باستثناء التلوث التبادلي. أما بالنسبة لفئة المعرفة، لم يكن هناك أثر إيجابي على الفئتين الفرعيتين التنظيف، والتبريد. يمكن أن تسهم نتائج هذه الدراسة في تحسين السياسات والإجراءات الحكومية المتعلقة بسلامة الغذاء والبرنامج التدريبي.

**مفاهيم البحث الرئيسية:** متدولي الغذاء، المعرفة، الأساليب، الممارسات، برنامج التدريب على أساسيات سلامة الغذاء.

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## Dedication

*To my beloved mother, the memory of my father, and to my family*

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## **List of Abbreviations**

|        |   |
|--------|---|
| ADAFSA | Abu Dhabi Agriculture and Food Safety Authority |
| ADBWC  | Abu Dhabi Businesswomen Council                 |
| ADFCA  | Abu Dhabi Food Control Authority                |
| EFST   | Essential Food Safety Training                  |
| HFB    | Home Food Business                              |
| KAP    | Knowledge, Attitude and Practices               |
| NOC    | No Objection Certificate                        |
| UAE    | United Arab Emirates                            |

## **Chapter 1: Introduction**

### **1.1 Overview**

In light of the vision of the government of the United Arab Emirates (UAE) to empower women to become active participants in the growth of the economy, businesswomen are increasingly supported. Emirati women are encouraged to play an active role in bettering the living conditions of their families. To this end, government agencies in Abu Dhabi provide families with home-based business with a trade license and encourage them to comply with applicable regulations. In line with this development, the past few years have witnessed a surge in the number of home food businesses (HFB). Monitoring and control by government authorities is important to ensure the safety of foods produced under these circumstances.

His Highness Sheikh Khalifa Bin Zayed Al Nahyan, President of the UAE and Ruler of Abu Dhabi, issued decree No. (2) establishing Abu Dhabi Food Control Authority (ADFCA) in 2005 with the purpose to ensure food safety, to guarantee the quality of food for human consumption, and to conduct necessary research and studies on food safety. In 2019, Abu Dhabi Agriculture and Food Safety Authority (ADAFSA) was established under the Law No. 7, issued by His Highness Sheikh Khalifa bin Zayed Al Nahyan, to replace ADFCA as the government entity authorized for all agriculture affairs, food safety and biosecurity in the Emirate of Abu Dhabi. As part of its mission, ADAFSA promotes food safety and supports research in all areas of food and agriculture, which would lead to the development of specifications, standards, and regulations pertinent to the latest scientific knowledge in its areas of responsibility. Moreover, some of the various tasks of ADAFSA entail coordinating with all

concerned government bodies and private sector organizations to contribute to the enforcement of rules and regulations as well as raising awareness (ADAFSA, 2019).

The Abu Dhabi Businesswomen Council (ADBWC) played an important role in supporting women-owned, home-based businesses. In 2005, ADBWC established the 'Mubdi'ah' program. The program provided licensure to Emirati home-based business owners and offered them business and marketing training and opportunities. In 2007, ADBWC conducted a country-wide survey of businesswomen. The results showed that more than 54% of the respondents own home-based business (Dubai Women's College, The Dubai Business Council, and ADBWC, 2007).

By the end of 2012, more than 6,900 businesswomen were registered at the ADBWC and about 1,500 Emirati women received Mubdi'ah Licenses. Further, the overall rate of women's involvement in the Emirati labor force is growing positively. Due to the dedication and attention given by different government institutions, women's participation in the Emirati labor force (15-24 years) grew from 16.4% in 1990 to 31.6% in 2011 (Sophia, 2013).

In 2017, the Department of Economic Development launched another initiative, "Tajir Abu Dhabi" with the aim to give Emirati families more opportunities to run HFB. Under this initiative, after an inspection visit to the facilities, ADAFSA provides HFB a 'no objection certificate' (NOC), which allows them to start their business activities including the preparation and sales of snacks, traditional foods, beverages, confectionary, pickles, spices, and feast. HFB are healthy and safe ADAFSA aims to ensure the safety of HFB products by activating the training and supervisory roles as it is done in developed countries.

## **1.2 Problem Statement**

Over the past few years, the number of HFB has increased significantly in the UAE as more people looking to boost their income, but increased risks related to food safety come with that. ADFCA (now, ADAFSA) prepared an Essential Food Safety Training (EFST) guide as a basic educational resource for all food handlers operating in the Emirate of Abu Dhabi (ADFCA, 2010). The guide includes four essential pillars of food safety, namely cross-contamination, cleaning, cooking, and chilling, that provide food handlers with understanding of good food practices and hygiene.

The evaluation of the effectiveness of EFST in providing the fundamental information on best hygiene and safety practices for food handlers has not been completed and there is lack of documentation of the exact changes or improvements that can be added to the training guide. For example, there is no specific data that compares the knowledge, attitude, and practices of food handlers before and after the training. In addition, no method or data exists to monitor the changes in the everyday practices, in relation to training.

In fact, studies have found that home-based food handlers actually lack the necessary knowledge of safety and hygiene food practices (Ayaz, Priyadarshini, & Jaiswal, 2018). Therefore, the current situation compels assessing the actual knowledge food handlers have, as well as their attitudes and practices in relation to food hygiene and safety. Any gaps in the knowledge, attitude, or practice (KAP) of food handlers can be reduced by conducting training. Yet, the effectiveness of training also needs to be assessed. Such an assessment would evaluate the effectiveness of training and how significant the changes are in gained knowledge. In addition, improvement of the

attitude is measured against the recorded level pre-training. Finally, the effectiveness of training in altering actual practices is evaluated as well. Being able to conduct a pre- and post-training evaluation of KAP of food handlers at HFB would help better concentrate efforts and draft plans by policy makers and regulators. It would identify areas where more attention is required by ADAFSA to ensure food safety of HFB.

In light of the above, the current research aims to achieve the following objectives:

- i. To evaluate the level of food hygiene and safety knowledge, attitude, and practices (KAP) by food handlers at HFB in Al Ain city, UAE.
- ii. To examine the effectiveness of the Essential Food Safety Training Program (EFST) in providing food safety knowledge and practices of HFB in Al Ain city, UAE.
- iii. To identify areas that require strengthening in relation to food safety knowledge and practices of food handlers at HFB.

### **1.3 Relevant Literature**

Food handlers' knowledge and practices of food hygiene and safety have been identified as the key link to avoiding foodborne illnesses (Farahat, El-Shafie & Waly, 2014). In fact, the bulk of research conducted on food businesses and food safety confirm that the safety of food, and hence consumers' safety, depends on food handlers (Gaungoo & Jeewon, 2013; Pilling et al., 2008; Al-Nasraween et al., 2018; Ayaz, Priyadarshini, & Jaiswal, 2018). It is essential that food handlers possess knowledge of safe practices and that their knowledge is up to date (Aluh & Aluh, 2017), as illustrated in Figure 1.

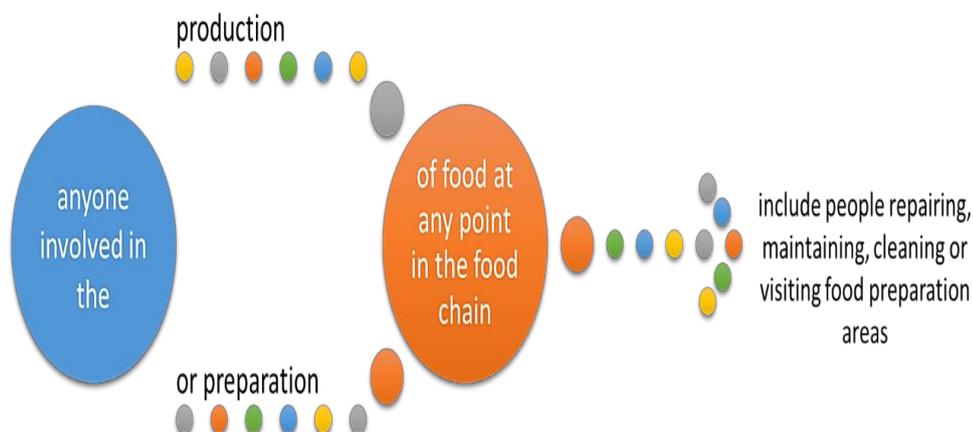


Figure 1: Food Handler Definition  
(Source: Sofos, 2013)

As indicated in the Figure 1, food handler’s main responsibility is to maintain hygienic food preparation area. Not only is it quite important for food handlers to possess the knowledge, but it is also crucial to implement all recommended practices as stipulated by applicable regulations. This is underscored by the fact that foodborne diseases make up a significant percentage of the global health risks. According to the World Health Organization, “the global burden of foodborne disease is considerable, and affects individuals of all ages” (WHO, 2015).

With a variety of food vendors and businesses all around, the convenience and feasibility of operating from home has contributed to the increase in the number of HFB projects worldwide. Unlike other food establishments where proper measures are followed and designated areas for food handling are assigned, HFB kitchens lend themselves as areas ripe for cross-contamination and they are not necessarily allocated strictly for food preparation. They can be used by various family members, eating, doing homework, conducting crafts projects, *etc.* (Wills et al., 2015; Ayaz,

Priyadarshini, & Jaiswal, 2018). Therefore, using home kitchens for commercial purposes certainly contributes to increasing the risks associated with the food production and consumption.

Nevertheless, regulators in different countries around the world have realized the importance of maintaining HFB for various reasons. For underdeveloped countries or those with high unemployment rates, HFB can be a solution in some cases for poverty and unemployment. In fact, many families are now dependent on HFB to boost their income, or even as a main source of income for the household. In some cases, HFB can employ other workers in addition to the owner (Mason, Carter & Tag, 2008). In economically rich countries, HFB provide traditional and special dishes. In addition, where women operate HFB, this enhances the level of empowerment and their contribution to the labour force, such as in the case of Abu Dhabi. All in all, HFB have become a mainstay in local economies and women empowerment.

For years, researchers have given lots of attention pinpointing causes of food-borne diseases in line with the importance of food safety (Egan et al., 2007; Redmond & Griffith, 2003). With that comes the need to identify ways to mitigate the risks associated with food safety (Egan et al., 2007; Guango & Jeewon, 2013). Studies on the topic cover a wide range of methods that belong to various scopes of research. For the purposes of this study, this section will select number relevant studies that serve the objectives of this research the most. It will review key studies related to assessing and identifying food safety and discuss a number of those that use different types of food surveys, highlighting the differences between them. It will also introduce KAP survey model their and present its significance to this research. The different methods

of surveying will also be reviewed in this part as well as the importance of staff training in relation to food hygiene practices.

### **1.3.1 Assessing and Identifying Food Safety**

According to Redmond and Griffith (2003), millions of individuals around the world require medical care due to food-borne illness each year. Although there are cases where the illness is an actual outbreak, the majority of the cases are irregular, with the domestic kitchen as an important point of origin of many of these cases (Redmond & Griffith, 2003). Understanding why foods become unsafe is a key in order to prevent food-borne illness and identify measures and procedures necessary to ensure food hygiene and safety (FAO, 2017). Studies show that the responsibility of preventing food-borne illness and observing food safety principles lie on all participants in the food provision-consumption chain (Redmond & Griffith, 2003). An important role is also that concerning legislators; both food handlers and consumers have their own role to play in the process, alongside the role legislators play.

According to Redmond and Griffith (2003), some studies identify consumers as the final line of defence. Consumers have the responsibility of purchasing ready-to-eat food from vendors in addition to purchasing food items to prepare for themselves as well others. They purchase, transport, store, and prepare food (FAO, 2017). In that sense, to a certain extent, consumers become food handlers at some point. Nevertheless, the bulk of the studies underscores the responsibility that falls upon food handlers when it comes to food safety (Redmond & Griffith, 2003; Egan et al., 2007; Gaungoo & Jeewon, 2013; Pilling et al., 2008b; Al-Nasraween et al., 2018; Ayaz, Priyadarshini, & Jaiswal, 2018). Food handlers participate in several stages where food

safety can be compromised with practices related to temperature, hygiene, and cross contamination.

### **1.3.2 Using Food Surveys**

#### **1.3.2.1 Types of Food Safety Surveys**

In the comparison review study conducted by Redmond & Griffith (2003), the researchers examined 87 studies focused on food safety. Of the studies reviewed, 75% used survey techniques, assisting in drawing responses from respondents that reflected their true level of knowledge, attitude, or practices on the issues surveyed. In examining the available literature, it has been noted that studies use different types of surveys to collect information from respondents. These surveys usually collect information mostly related to food safety knowledge; practice; knowledge and practice; and knowledge, attitude, and practice.

##### **1.3.2.1.1 Food Safety Knowledge Survey**

Al-Nasraween et al. (2018) used a structured survey to collect information from food handlers to assess their knowledge on food safety following a food poisoning outbreak connected to chicken shawarma restaurants in Amman, Jordan. The results showed a higher level of education, as well as training was positively linked to a better level of knowledge. Akonor and Akonor (2013) measured the knowledge food handlers had in relation to food safety in Accra, Ghana. They surveyed 608 domestic food handlers using a Likert-type five scale questionnaire to assess the knowledge of the respondents. The results reflected that the surveyed food handlers possessed good knowledge of potential food safety risks, proper hygiene practices, and how to manage food;

however, their level of knowledge on bacteria and cross-contamination was insufficient.

In another study assessing food safety knowledge, conducted in Istanbul, Turkey, the researchers attempted to measure the awareness of 400 employees working in over 20 different kitchens. The results showed that the level of food safety and hygiene knowledge is significantly different in regard to the job and duration of the food handler in a food organization (Ulusoy & Çolakoğlu, 2018).

#### **1.3.2.1.2 Food Safety Practice Survey**

Since surveys on food safety knowledge do not provide information on the actual behaviour and practices followed by food handlers, some studies opted to conduct surveys that measure behaviour rather than knowledge. In a study targeting farmers and market managers at farmers markets in Georgia, Virginia, and South Carolina, USA, Harrison et al. (2013) found that some practices may put consumers at risk of foodborne illness. This is despite the fact that farmers and market managers at the farmers markets did in fact use several sound practices. The practices surveyed included, among others, testing irrigation water, washing produce, sanitizing surfaces, and cleaning transport containers.

#### **1.3.2.1.3 Food Safety Knowledge and Practice Survey**

On the other hand, some researchers found that combining assessments of knowledge and behaviour provide a better picture when it comes to food safety among food handlers. For example, Roberts et al. (2008) conducted a study in USA, which included a training portion, using surveys to evaluate knowledge and practice of food handlers in relation to food safety practices: cross-contamination, poor personal hygiene, and time/temperature abuse. Results have shown that knowledge alone did not necessarily

positively affect practices. Rosmawati et al. (2015) aimed to establish the validity and reliability of a questionnaire to assess knowledge and practice of food handlers towards safe food preparation. According to them, in addition to covering key aspects related to food safety and hygiene, the knowledge and practice questionnaires were successful in measuring changes following an intervention or training.

In one of the very few studies conducted in the Gulf, a study has targeted Saudi women to assess their level of knowledge and soundness of their practices in relation to food safety. It was found that among the group of 811 Saudi women taking part in the survey, the level of education and whether or not the women were working had a significant effect on the food related knowledge and practice, with educated and working women having a better stand (Farahat, El-Shafie, & Waly, 2015). These results were confirmed by Ayaz, Priyadarshini, & Jaiswal (2018), who surveyed 979 Saudi mothers and found that in addition to the effect the level of education, Saudi mothers' knowledge, and practice in regard to food handling was poor despite having good knowledge of personal hygiene and food poisoning.

Similarly, another study surveyed multinationals, both males and females, residing in Al Ain, UAE (Afifi & Abushelaibi 2012). The survey aimed to assess the respondents' knowledge and practices when it comes to food safety at their homes. The results showed that education definitely played a role in knowledge; however, sound behaviour was still lacking even when the respondents possessed sufficient knowledge.

### **1.3.2.2 Knowledge, Attitude and Practices (KAP) Survey Model**

Fan et al. (2018) define the Knowledge, Attitude and Practices (KAP) theory as “a health behaviour change theory, proposed by western scholars in the 1960s.” The

theory is based on the premise that people’s behavioural change goes through three stages, acquiring the information, generating the positions and attitudes, and forming the observable action or behaviour. It draws on the belief that action (Practices) are driven by changes in intentions (Attitudes) that are, in turn, based on the wealth of acquired Knowledge, as illustrated in Figure 2.

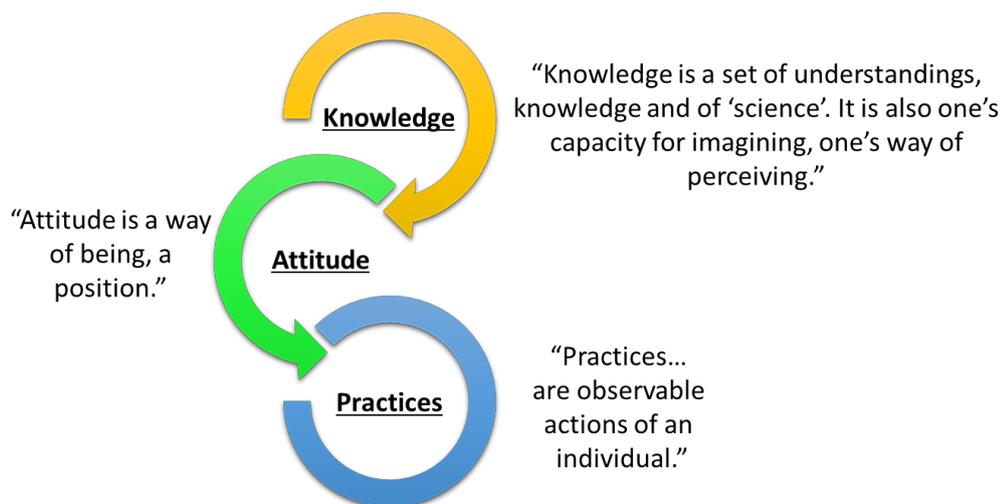


Figure 2: The KAP Survey Model Defined  
(Source: Liu et al., 2016; Fan et al., 2018)

As a method, a KAP survey model as shown in Figure 2, uses standardized questionnaires that incorporate structured, formatted questions to provide information on misconceptions the respondents of the study may possess, which would eventually hinder their attitudes and implementation of desired practices. Although identified as a quantitative method, a KAP model provides researchers with both qualitative and quantitative information (Spring, 2014). A multitude of studies in the field of food safety have relied on KAP surveys. While some introduced training as part of their studies, others opted for the survey alone. The importance of including training shall be discussed in another section (1.3.4).

In their descriptive study among street food vendors in Nigeria, Aluh and Aluh (2017) found a strong correlation between knowledge and attitude among food vendors. They also found that the presence of sufficient knowledge, unfortunately, did not translate into sound practices often enough. Another study, aiming to identify determinants of KAP among university students in Malaysia, found that the students' knowledge about food safety was fairly moderate but their attitude and perception scores were much higher. They highlighted the need to increase awareness and knowledge among that population group (Ali et al. 2018). In another study conducted in Malaysia, Lim et al. (2016) surveyed 250 respondents in the island community of Semporna, Sabah, with the aim to evaluate the KAP relationships in association with food safety. The study found that the study subjects showed average food safety knowledge in their awareness of personal and kitchenware hygiene and that their attitude positively affected their behaviour (Lim et al. 2016).

Asmawi et al. (2018) assessed food safety KAP among food handlers engaged in food courts in Malaysia, where 107 respondents answered a guided self-administered questionnaire. Like previous studies, positive correlations were found between knowledge and attitude, between attitude and practice, as well as between knowledge and practice. Khalifa et al. (2018) studied 136 respondents in Taif, Saudi Arabia. The study found that respondents showed adequate food safety knowledge but not in practices. In an intervention study incorporating training, Awad Allah et al. (2017) studied female teachers to assess KAP regarding safe food handling in Egypt. They found that most of the respondents were unsatisfactory of total KAP about safe food handling and that knowledge and attitude improved after training, but practice did not.

Al-Shabib, Mosilhey, and Husain (2016) realized the importance of KAP in managing outbreaks related to food safety, so they conducted a study focusing on food handlers in academic institutions in Saudi Arabia. Their cross-sectional study with 87 respondents, from different nationalities, found that they possessed good knowledge regarding personal hygiene, food borne diseases and cross contamination. The respondents also had excellent practices and attitudes. With the need to stress certain issues related to timing, hygiene, and temperature control, the researchers recommended continuous training for food handlers.

### **1.3.3 Methods of Surveying**

To enable the collection of more comprehensive and accurate information and data to support hypotheses and generate valid results, several of the available studies in the field of food hygiene and safety use a combination of various methods of surveying (Aluh & Aluh, 2017; Al-Shabib, Mosilhey, & Husain, 2016; Lim et al., 2016; Park, Kwak, & Chang, 2010; FAO, 2017; Ha, Shakur & Do, 2019). The methods used include questionnaires, face-to-face interviews, group discussions, and on-site observations. Some studies use two or more methods to gather survey data. It is not uncommon to use more than one method when collecting data. Using a variety of methods, allows the researcher flexibility and provides them with the opportunity to gather comprehensive data for their study.

#### **1.3.3.1 Questionnaires**

Questionnaire-based survey is frequently used by researchers for data collection in quantitative research studies (Ponto, 2015). When conducted appropriately, questionnaires provide reliable, valid data. In addition, they are less time-consuming and costly as other data collection methods. They can be conducted in-person, by mail,

or online. Further, they can provide respondents a certain level of anonymity, which can be encouraging for them to be more straightforward in their answers. The majority of the reviewed literature relied on questionnaires for data collection.

Aluh and Aluh (2017) administered semi-structured questionnaires to mobile food vendors, replaced by interviews when respondents could not read. Data collection through a questionnaire was also conducted by Auad et al. (2019), who surveyed food truck food handlers in Brazil, using a questionnaire drawing on the WHO Five Keys to Safer Food that was also used by Ali et al. (2018). In addition to using questionnaires with food handlers, researchers administered questionnaires when surveying consumers as well. Ali et al. (2018) used KAP surveys while researching food safety practices among the student population in Malaysia, while Lim et al. (2016) used them with an island community, also in Malaysia. Further, Afifi & Abushelaibi (2012) used questionnaires to collect data to evaluate personal hygiene in the UAE. FAO (2017) used questionnaires with targeted populations in the West Bank and Gaza, as well.

### **1.3.3.2 Face-to-Face Interviews**

Most of the reviewed literature used face-to-face interviews to supplement structured questionnaires (Aluh & Aluh, 2017; Al-Shabib et al., 2016; Lim et al., 2016). They performed the questionnaire (Lim et al., 2016) allowing respondents to elaborate or further clarify their answers to the questionnaire. In one case, the interviews were used in lieu of the written questionnaires for respondents who could not read (Aluh & Aluh, 2017). In a study surveying consumer with regards to food safety concerns, Ha, Shakur & Do (2019) collected all survey data via face-to-face interviews.

### **1.3.3.3 Group Discussions**

Although not usually used as a stand-alone data collection method in the literature reviewed, group discussions were used to enrich other methods and provide further insight. Ha, Shakur and Do (2019) used group discussions to integrate with the primary data collected from the interviews, to explain how consumers felt about food safety issues. Furthermore, in the survey report by FAO, focus group discussions were conducted in different locations. Participants in the groups reflected on the issues pertinent to KAP, allowing for the assessment of the attributes relevant to food safety (FAO, 2017).

### **1.3.3.4 On-site Observation**

When researching food handlers' practices, on-site observations provide effective methods of data collection (Wills et al., 2015). The researchers can see for themselves how well sound practices are applied, or not, in a food preparation setting. The main drawback for observations is that they can be time-consuming. In addition, the subjects of the study may be self-conscious knowing they are being observed, which may affect their actual practices. Nevertheless, observations can successfully supplement other methods, providing more insight into a natural setting. Wills et al. (2015) found that observations, along with the other methods used, worked well in a domestic, multi-participant setting. Roberts et al. (2008) as well as Park, Kwak, & Chang (2010) used the observation as part of the pre- and post-training assessment of hygiene practices by food handlers.

### **1.3.4 Food Safety Education and Training**

Reviewed literature highlights the importance of training for helping food handlers and consumers increase their knowledge, enhance their attitudes, and shape their practices

(Afifi & Abushelaibi, 2012). Kassa, Silverman, & Baroudi (2010) noted that training has been used as a method at foodservice establishments to help in reducing health and food safety violations, although the effectiveness of training still needs more research. In addition, several studies found that food handlers and consumers of higher education levels or have received some sort of food safety-related training possessed better knowledge, adopted more positive attitudes, and were more likely to conduct more sound practices, although not always, than those who had not.

This summarized in as illustrated in the Figure 3 (Afifi & Abushelaibi, 2012; Auad et al., 2019; Ayaz, Priyadarshini & Jaiswal, 2018; Farahat, El-Shafie & Waly, 2015). Groups targeted in training were found to vary from one study and one context to the other. While most studies using training focused on delivering training to food handlers (Auad et al., 2018; Gaungoo & Jeewon, 2013; Pilling et al., 2008a; Pilling et al., 2008b; Park, Kwak, & Chang, 2010; Yeung et al., 2019; Ayaz, Priyadarshini & Jaiswal, 2018; Asmawi et al., 2018), some studies discussed delivering training to managers (Kassa, Silverman & Baroudi, 2010; Pilling et al., 2008b). Some studies even proposed training for consumers (Afifi & Abushelaibi, 2012; Ali et al., 2018) as a tool to increase food safety awareness and promoted sound practices, as illustrated in Figure 3.

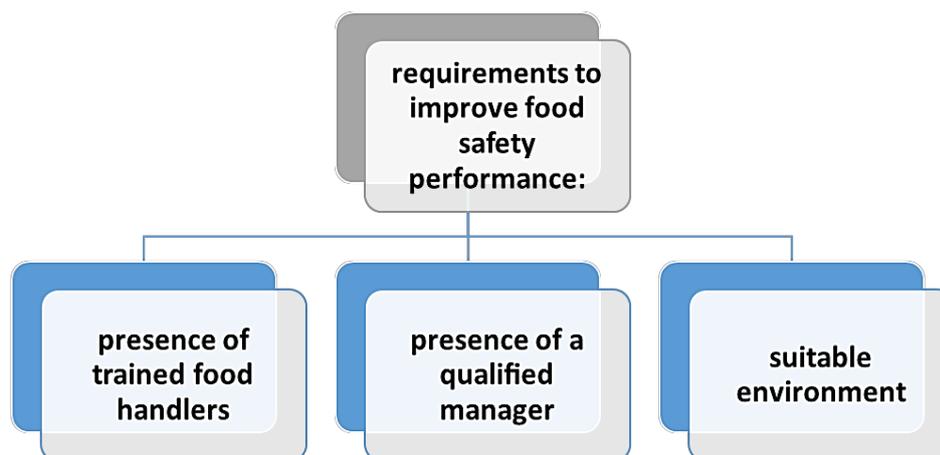


Figure 3: Improving Food Safety Performance  
(Source: Zanin et al., 2017)

Evaluating the effectiveness of training as shown in Figure 4 was also a main aspect of studies proposing training or investigating training in relation to reducing food safety violations, mitigating food hygiene risks, or improving food handlers' KAP. Guango and Jeewon (2013) found training to be essential for food handlers; nevertheless, they highlighted that it is key to assess the effectiveness of the training program, as well as tailor the training to the specific needs of the targeted group, through a pre-training assessment. Many studies investigating the effectiveness of training agreed on the importance of pre- and post-training questionnaires (Roberts et al. 2008; Park, Kwak, & Chang 2010; Awad Allah et al., 2017).

Analysis of the findings of the pre- and post-training questionnaires revealed that training increased the level of food safety knowledge among respondents (Awad-Allah et al., 2017; Guango & Jeewon, 2013). However, in some cases, the increased knowledge was not enough to sufficiently improve actual practices in the food-handling environment (Awad-Allah et al., 2017; Guango & Jeewon, 2013). Figure 4 illustrates relationship of KAP components.

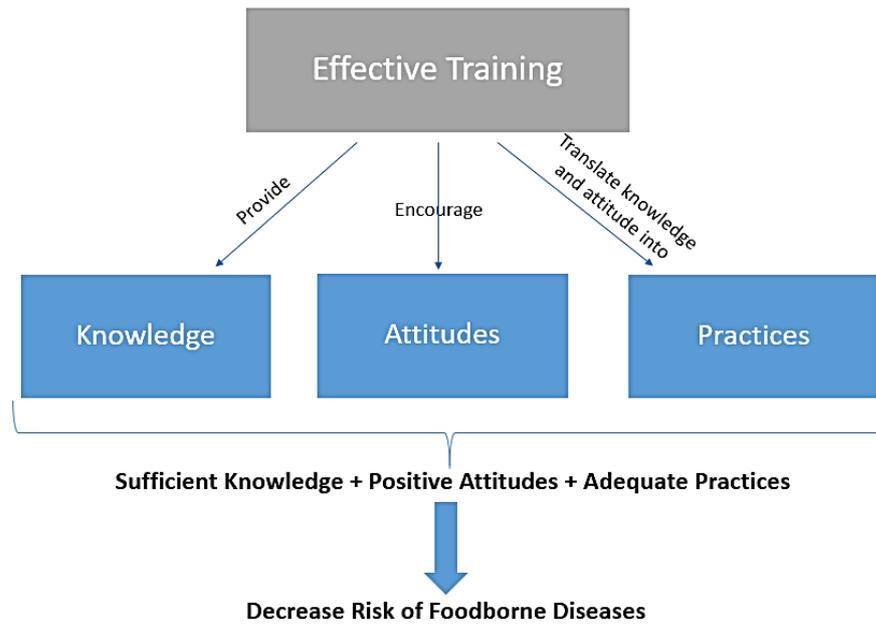


Figure 4: Components of Training Programme with Efficient KAP Applications.  
(Source: Zanin et al., 2017)

## **Chapter 2: Methods**

### **2.1 Research Design**

To achieve the objectives of this research, a retrospective pretest/posttest (RPT) design is adopted to assess the difference in the food safety KAP of the food handlers at home food businesses before and after attending of an essential food safety training program. The RPT is being used in a variety of empirical studies to measure the change. This design was adopted to measure the effectiveness of the Essential Food Safety Training Program (EFST) in providing food safety knowledge, attitude, and practices (KAP) of HFB in Al Ain City in the UAE (Appendix 3). Thus, it will explain the impact of the training program and show the difference between the pre- and post-surveys.

### **2.2 Sample and Population**

In this research, a nonprobability sampling technique is used for collecting responses. To achieve the objectives of this research, the researcher used the convenience sampling technique, which is a type of non-probability sampling where population elements are selected for inclusion in the sample based on the ease of access. In the data collection process, seventy-four participants from Al Ain City agreed to participate in the study and were involved into a pre-training survey. Of those, 68 participants completed the training program and did the post-training survey. So, a sample size 68 eligible participants were used to conduct the study from the targeted population of 250 food handlers that have home food businesses (HFB) in the Emirate of Abu Dhabi, Al Ain.

### **2.3 Training Programs**

Essential Food Safety Training (EFST) program, developed by Abu Dhabi Agriculture and Food Safety Authority (ADAFSA), targets food handlers operating in the Emirate of Abu Dhabi. It aims to allow them to acquire sufficient knowledge and understanding to ensure the food preparation chain follows sound food handling. The EFST training course design covers four basic sections relating to the most appropriate way of safe food handling: “how to avoid cross contamination, and how to cook, clean and chill safely” (EFST Program, 2019).

The programme also provides trainees with a handbook. In addition to providing trainees with an introduction to the key measures and procedures to be addressed during the program, the handbook includes the contact information of their local food inspector or ADAFSA-EFST team, whom they can contact should they have questions or queries about the safety of the food they manage or the processes they follow (EFST Program, 2019). Alongside the EFST program, ADAFSA developed *Salamt Zadna*, a practical Food Safety Management System (FSMS) for small, independent catering businesses in Abu Dhabi.

The development of *Salamt Zadna* came as a result of broad international benchmarking and detailed local research. The system provides the standards for ADAFSA minimum requirements; nevertheless, targeted catering businesses are urged to continuously improve their processes on the long term and aim for higher standards. The Safe Operating Practices (SOPs) within the *Salamt Zadna* system are divided into four sections: “cooking, chilling, cleaning, and avoiding cross contamination” (Al Khaja et al., 2015).

To ensure the clear and accurate communication of the information to all users from all educational and cultural backgrounds, the key steps of each of the practices are clearly illustrated on colour coded pages. In addition, the essential information is written in both Arabic and English. A Food Safety Diary, designed with the aim of minimizing written records in mind, makes logging essential food safety information straight-forward and less time-consuming (Salamt Zadna, 2014).

As a result of the COVID-19 pandemic, online training was implemented using the Zoom platform as shown in Table 1. The food safety training program and all procedures about cleaning and avoiding dangers and risks were conducted online in 3 days and one hour in each day for 20-25 participants using methods of discussion and presentation. The training was conducted in Arabic to avoid language barrier (Appendix 4). The training session was based upon two main resources: EFST programme combined with Salamt Zadna, as shown in Table 1.

Table 1: Training Timetable

| <b>Date</b>             | <b>Training Time</b> | <b>Training Period</b> | <b>No. of Attendances</b> |
|-------------------------|----------------------|------------------------|---------------------------|
| 30-8-2020 to 01-09-2020 | 10:30 – 11:30 am     | 3 days                 | 25                        |
| 30-8-2020 to 01-09-2020 | 07:00 – 08:00 pm     | 3 days                 | 20                        |
| 03-9-2020 to 05-09-2020 | 4:00 – 05:00 pm      | 3 days                 | 23                        |

## 2.4 The Food Safety KAP Questionnaire

The questionnaire (Appendix 1) was developed after reviewing the literature and previous studies. It includes questions categorized into four sections and was answered by the participants before and after the training.

Section 1 comprises of ten questions about demographic data such as age, education, having separate/ special kitchen for commercial purposes, the ownership of business, working timing, number of food handlers, number of those who completed EFST training, number of successful EFST trainees, type of business licenses, and type of commercial activity.

Section 2 tackles the concept of Food Safety Knowledge (20 questions) followed by Likert-type options 5-1.

- 5 Yes
- 4 Mostly
- 3 To some extent
- 2 Rarely
- 1 No

The section is divided into 4 subcategories: Cross-Contamination (12 questions), Cleaning (3 questions), Cooking (3 questions), and Chilling (2 questions).

Section 3 tackles Food Safety Attitudes (20 questions)

- 5 Strongly Agree
- 4 Agree
- 3 To some extent
- 2 Disagree
- 1 Strongly Disagree

The section is divided into 4 subcategories: Cross-contamination (8 questions), Cleaning (4 questions), Cooking (4 questions), and Chilling (4 questions).

Section 4 tackles Food Safety Practices (21 questions) through the answers

- 5 Always
- 4 Usually
- 3 Sometimes
- 2 Rarely
- 1 Never

The section is divided into 4 subcategories: Cross-Contamination (10 questions), Cleaning (4 questions), Cooking (2 questions), and Chilling (5 questions).

The questionnaire was translated into Arabic since all the participants were Arabic speakers and it might be difficult to respond to the survey in English. The two versions of the survey were attached in Appendix 1 and 2. The questionnaire was created in order to be digital on Google Sheet Forms and the link would be sent to the participants.

## **2.5 Data Collection**

The study targeted the topic of food safety KAP with EFST combined with Salamt Zadna program through the involvement of 68 families from Al Ain. The selection of HFB considered licensed families who have an ADAFSA Non-Objection Certificate (NOC) and accepted to participate in the surveys and training. All participants went through three stages; the first stage was the agreement and approval to participate in the study (consent form) and the survey was conducted prior to the training. The second stage was the training, and the third stage was conducting the survey after training.

The questionnaire (Appendix 2) was then created in the Google Survey Form and sent to participants in July and August 2020. The link was sent to participants who agreed to participate in the study and the survey was conducted before and 4 weeks after the training program. For the pre-training survey, the knowledge and attitude parts were conducted by the participants themselves, but the Practices part was conducted by the researcher by phone to guarantee that they understood the practice questions and to ensure the accuracy of the results. In the post-training survey, the participants did all the parts on their own.

## **2.6 Validity of the Research Instrument**

Construction and content of the questionnaire were revised by the advisors, who provided comments and suggestions that helped to improve the questionnaire and added comments to simplify some of the items and on the translation into Arabic in order to avoid language barrier. Furthermore, the survey was given to 10 samples of the population, who did not participate in the study; to ensure that it was a clear and easy to understand.

## **2.7 Ethical Considerations**

Formal permission and approval have been obtained from the Research Ethics Committee REC at the United Arab Emirates University (ERS\_2019\_5993). This approval is necessary to ensure that the study meets the essential ethical requirements. Participants were informed that the information collected during the study would be for research purposes only and would not be available to unauthorized parties. Participants were also informed that their participation was voluntary and not mandatory, and they had the right to withdraw at any time and that their identity would not be revealed under any circumstances.

## **2.8 Statistical Analysis**

Primary data that been collected from the respondents are coded and analysed using the Statistical Package for Social Sciences (SPSS 25) (Appendix 5). Cronbach alpha which is a measure of reliability was used to assess the internal consistency of the instrument and was calculated for each one of the three categories presented in this research. For demographic analysis purpose various statistical tools like percentages, means, and standard deviations were used. Furthermore, paired samples t-test was used to evaluate the significance of the KAP of food handlers before and after training.

## Chapter 3: Results

### 3.1 Overview

This chapter presents the results of the study which are important for the scientific research. It will present a description of the demographic data of the participants, and then the results of the three research questions investigated in this research. After that, a summary of the results will conclude the chapter.

To achieve the objectives, this research attempted to answer the following questions:

1. What is the difference in the food safety knowledge of the food handlers at home food businesses before and after attending an essential food safety training program?
2. What is the difference in the food safety attitudes of the food handlers at home food businesses before and after attending an essential food safety training programme?
3. What is the difference in the food safety practices of the food handlers at home food businesses before and after attending an essential food safety training program?

### 3.2 Reliability

To evaluate the reliability, the Cronbach's Alpha coefficients were found to be acceptable. The data collection instrument was reliable in all the categories, as shown in Table 2, and Cronbach's Alpha ranged between 0.76 and 0.87 with an average of 0.87. The Cronbach's Alpha for attitude was higher (0.87) than knowledge (0.76) and practice (0.75).

Table 2: Reliability Coefficients

| <b>Variable</b> | <b>Cronbach's Alpha<br/>(Final survey)</b> | <b>Number of<br/>Items</b> |
|-----------------|--|----------------------------|
| Knowledge       | 0.76                                       | 20                         |
| Attitude        | 0.87                                       | 20                         |
| Practice        | 0.75                                       | 21                         |
| Total           | 0.79                                       | 61                         |

### 3.3 Demographic Information

The number of respondents who participated in the study in all parts, Demographic Information, Knowledge, Attitudes and Practices, was 68 before and after training. Table 3 shows that the highest percentage of the respondents (44.1%) aged between 36 and 45 years followed by respondents aged from 26 to 35 years and from 46-55 years, which had a 25.3%, and 17.6 %, respectively. The lowest percentage of 2.9% was found for the respondents aged above 55 years.

Table 3: Respondents' Age (n=68)

| <b>Age</b> | <b>Frequency</b> | <b>Percentage</b> |
|------------|------------------|-------------------|
| 18-25      | 7                | 10.3              |
| 26-35      | 17               | 25.3              |
| 36-45      | 30               | 44.1              |
| 46-55      | 12               | 17.6              |
| 56-66      | 2                | 2.9               |
| Total      | 68               | 100               |

Table 4 shows that the distribution of the participants according to educational level. Most of the participants (32.4 %) had high school, while (25 %) had a bachelor's degree and (22.1%) had a diploma degree. Exceptionally low percentage (8.8%) has higher levels of education (Master/Doctorate).

Table 4: Respondents' Academic Qualification (n=68)

| <b>Education</b>                  | <b>Frequency</b> | <b>Percentage</b> |
|-----------------------------------|------------------|-------------------|
| Below High School                 | 8                | 11.8              |
| High School                       | 22               | 32.4              |
| Diploma                           | 15               | 22.1              |
| Bachelor                          | 17               | 25.0              |
| Higher Degrees (Doctorate/Master) | 6                | 8.8               |
| Total                             | 68               | 100               |

Table 5 shows that 44% of respondents had a separate/ special kitchen for commercial purposes, while 56% of respondents did not have a separate/ special kitchen for commercial purposes.

Table 5: Respondents' Private Kitchen Business

| <b>Variable</b>   | <b>Frequency</b> | <b>Percentage</b> |
|---|------------------|-------------------|
| Respondents have a separate/ special kitchen for commercial purposes        | 30               | 44                |
| Respondents do not have a separate/ special kitchen for commercial purposes | 38               | 56                |
| Total   | 68               | 100               |

Table 6 shows that 81% of the owners of business are the people in charge in the kitchen, while 19% of the owners of business are not the people in charge in kitchen.

Table 6: Respondents' Kitchen Business (Ownership)

| Variable   | Frequency | Percentage |
|--|-----------|------------|
| The owner of business is the person in charge in kitchen     | 55        | 81         |
| The owner of business is not the person in charge in kitchen | 13        | 19         |
| Total  | 68        | 100        |

As shown in Table 7, 53% of the respondents were present at irregular intervals of the day and about 40% were available on a continuous basis during working hours.

Table 7: Time Spent by Kitchen Owners in their Kitchen Business

| Variable                                      | Frequency | Percentage |
|---|-----------|------------|
| In the daytime only                           | 1         | 1.5        |
| In the evening time only                      | 4         | 5.9        |
| Present at irregular intervals of the day     | 36        | 52.9       |
| available constantly throughout working hours | 27        | 39.7       |
| Total   | 68        | 100        |

As shown in Table 8, about 44% of respondents had no food handlers, while 44% had 2-4 food handlers in business. Incredibly low percentage (2.9%) had more than 8 food handlers.

Table 8: Food Handlers in Kitchen Business (n=68)

| <b>Food Handlers in Business</b> | <b>Frequency</b> | <b>Percentage</b> |
|----------------------------------|------------------|-------------------|
| None                             | 30               | 44.1              |
| 2-4                              | 30               | 44.1              |
| 5-7                              | 4                | 5.9               |
| 8-10                             | 2                | 2.9               |
| > 10                             | 2                | 2.9               |
| Total                            | 68               | 100               |

Table 9 shows that about 85% of respondents completed EFST training in the approved companies, while about 15% did not complete EFST training in the approved companies.

Table 9: Respondents have Completed EFST Training in the Approved Companies

| <b>Variable</b>  | <b>Frequency</b> | <b>Percentage</b> |
|--|------------------|-------------------|
| Respondents completed EFST training in the approved companies        | 54               | 85.2              |
| Respondents did not complete EFST training in the approved companies | 10               | 14.8              |
| Total  | 68               | 100               |

As shown in Table 10, about 25% of respondents successfully passed the EFST test in the approved company, while 75% did not pass EFST test.

Table 10: Respondents have Passed EFST Test in the Approved Companies

| <b>Variable</b>   | <b>Frequency</b> | <b>Percentage</b> |
|---|------------------|-------------------|
| Respondents successfully passed EFST test in the approved company | 17               | 25                |
| Respondents did not pass EFST test in the approved company        | 51               | 75                |
| Total   | 74               | 100               |

As shown in Table 11, about 65% of respondents' Business Licenses Type was Tajir Abu Dhabi, while 35% had Mubda'a license.

Table 11: Types of the Respondents' Business Licenses

| <b>Variable</b> | <b>Frequency Percentage</b> |     |
|-----------------|-----------------------------|-----|
| Mubda'a         | 24                          | 35  |
| Tajir Abu Dhabi | 44                          | 65  |
| Total           | 68                          | 100 |

Table 12 shows that the majority of respondents had more than one commercial activity. The highest percentages were used to prepare and sell sweets (38%), to prepare and sell snacks and light meals (19%), and to prepare and sell traditional food (12%).

Table 12: Types of Respondents' Commercial Activities

| <b>Variable</b>                                   | <b>Frequency</b> | <b>Percentage</b> |
|---|------------------|-------------------|
| Preparing and selling sweets                      | 93               | 38.8              |
| Retail Sale of dates                              | 9                | 3.8               |
| Preparing and selling spices                      | 8                | 3.3               |
| Stuffed grape leaves                              | 5                | 2.1               |
| Preparing and selling traditional food            | 29               | 12.1              |
| Preparing banquets                                | 3                | 1.3               |
| Sale and preparation of pies and pastries         | 11               | 4.6               |
| Sale and preparation of animal ghee               | 7                | 2.9               |
| Preparing and selling snacks and light meals      | 45               | 18.8              |
| Sale and preparation of bread and baking products | 5                | 2.1               |
| Preparing and selling cold and hot beverages      | 20               | 8.3               |
| Preparing and selling pickles                     | 5                | 2.1               |

### 3.4 Results of Research Question One

This section presents the results of the first research question, “*What is the difference in the food safety knowledge of the food handlers at home food businesses before and after attending an essential food safety training program?*”. The results will be shown in a table of subcategories of cross- contamination, cleaning, cooking, and chilling. Paired samples t-test was conducted to measure the differences between the two groups before and after attending the essential food safety training program. As shown in Table 13, there were significant differences between the pre-training (M = 4.31, SD = 0.280) and post-training (M= 4.55, SD = 0.223), in the cross-contamination knowledge subcategory whereas  $t = (5.171)$  in favour of post-training group.

Table 13: Paired t-Test of Food Safety Knowledge before and after Attending EFST

|        |      | Subcategory             | Mean | N  | SD    | t     | df | Sig.<br>(2-tailed) |
|--------|------|-------------------------|------|----|-------|-------|----|--------------------|
| Pair 1 | Pre  | Cross-<br>Contamination | 4.31 | 68 | 0.280 | 5.171 | 67 | 0                  |
|        | Post |                         | 4.55 | 68 | 0.223 |       |    |                    |
| Pair 2 | Pre  | Cleaning                | 4.50 | 68 | 0.448 | 1.381 | 67 | 0.172              |
|        | Post |                         | 4.61 | 68 | 0.480 |       |    |                    |
| Pair 3 | Pre  | Cooking                 | 4.15 | 68 | 0.437 | 5.001 | 67 | 0                  |
|        | Post |                         | 4.61 | 68 | 0.608 |       |    |                    |
| Pair 4 | Pre  | Chilling                | 4.18 | 68 | 0.747 | 1.328 | 67 | 0.189              |
|        | Post |                         | 4.32 | 68 | 0.592 |       |    |                    |
| Pair 5 | Pre  | Total                   | 4.29 | 68 | 0.338 | 3.816 | 67 | 0                  |
|        | Post |                         | 4.52 | 68 | 0.365 |       |    |                    |

The same trend was observed with regard to the knowledge of the subcategory of cooking, there was a significant difference between the pre-training (M = 4.15, SD =

0.437) and post-training (M = 4.61, SD = 0.608) scores; whereas t value= 5.001, p = 0.000 in favour of post-training group. For the knowledge subcategory of cleaning, no significant difference was found between the mean scores of pre-trainings (M = 4.50 SD = 0.488) and post-training (M = 4.61, SD = 0.480);  $t(67) = 1.381$ ,  $p = 0.172$ . In addition, in the subcategory of chilling, no significant difference was found between the mean scores of pre-trainings (M = 4.18, SD = 0.747) and post-training (M = 4.32, SD = 0.338);  $t(67) = 1.328$ ,  $p = 0.189$ . For the total average of all the categories of food safety knowledge, there was a significant difference between the scores of pre-trainings (M = 4.29, SD = 0.338) and post-training (M = 4.52, SD = 0.365) conditions;  $t = 3.816$  in favour of post-training group.

To sum up the result of the first research question, the overall average of the whole category of food safety knowledge and the cross-contamination and cooking subcategories were identified as significant differences in favour of the post-training group. In contrast, there were no significant differences in favour of the post-training group for cleaning and chilling subcategories.

### **3.5 Results of Research Question Two**

This section presents the results of the second research question “*What is the difference in the food safety attitude of the food handlers at home food businesses before and after attending an essential food safety training program?*”. The results will be shown in a table for of cross- contamination, cleaning, cooking, and chilling subcategories. Paired samples t-test was conducted to measure the differences between the two groups before and after attending of an essential food safety training program.

Table 14: Paired t-Test of Food Safety Attitude before and after Attending EFST

|        |      | Subcategory             | Mean | N  | SD    | t      | df | Sig.<br>(2-tailed) |
|--------|------|-------------------------|------|----|-------|--------|----|--------------------|
| Pair 1 | Pre  | Cross-<br>Contamination | 4.83 | 68 | 0.198 | 1.058  | 67 | 0.294              |
|        | Post |                         | 4.80 | 68 | 0.228 |        |    |                    |
| Pair 2 | Pre  | Cleaning                | 4.32 | 68 | 0.503 | -2.539 | 67 | 0.013              |
|        | Post |                         | 4.52 | 68 | 0.455 |        |    |                    |
| Pair 3 | Pre  | Cooking                 | 4.26 | 68 | 0.488 | -2.290 | 67 | 0.025              |
|        | Post |                         | 4.45 | 68 | 0.483 |        |    |                    |
| Pair 4 | Pre  | Chilling                | 4.18 | 68 | 0.321 | 4.644  | 67 | 0                  |
|        | Post |                         | 4.45 | 68 | 0.549 |        |    |                    |
| Pair 5 | Pre  | Total                   | 4.56 | 68 | 0.305 | -0.180 | 67 | 1.000              |
|        | Post |                         | 4.56 | 68 | 0.365 |        |    |                    |

As shown in Table 14, in the subcategory of cross contamination of food safety attitude, there was no significant difference in the scores for pre-training (M=4.83, SD= 0.198) and post-training (M=4.80, SD=0.228);  $t(67) = 1.058$ ,  $p = 0.294$ . In addition, for the subcategory of cleaning, significant difference was found between the mean scores of pre-trainings (M=4.32, SD= 0.503) and post-training (M=4.52, SD=0.455);  $t(67) = -2.539$ ,  $p = 0.013$  in favour of post-training group. In regard to the subcategory of cooking, there was a significant difference between the scores of pre-trainings (M= 4.26, SD= 0.488) and post-training (M=4.45, SD=0.483);  $t(67) = 2.290$ ,  $p = 0.025$  in favour of post-training group. Similarly, in the subcategory of chilling, there was a significant difference between the mean scores of pre-trainings (M=4.18, SD= 0.321) and post-training (M=4.45, SD=0.549);  $t(67) = 4.644$ ,  $p = 0.000$  in favour of post-training group. For the total average of the whole category of food safety attitude, there was no significant difference between the scores of pre-trainings (M= 4.56, SD= 0.305) and post-training (M=4.56, SD=0.360);  $t(67) = -0.180$ ,  $p = 1.000$ .

To sum up the result of the second research question, the overall average of the whole category of food safety attitude and the subcategory of cross-contamination, no significant differences were found between the two groups. In contrast, in the subcategories of cleaning, cooking, and chilling, significant differences were found between the two in favour of post-training group.

### 3.6 Results of Research Question Three

This section presents the results of the first research question “*What is the difference in the food safety practice of the food handlers at home food businesses before and after attending of an essential food safety training program?*”. The results will be shown in tables for subcategories of cross- contamination, cleaning, cooking, and chilling. Paired samples t-test was conducted to measure the differences between the two groups before and after attending of an essential food safety training programme.

Table 15: Paired t-Test of Food Safety Practices before and after Attending EFST

|        |      | Subcategory             | Mean | N  | SD    | t       | df | Sig.<br>(2-tailed) |
|--------|------|-------------------------|------|----|-------|---------|----|--------------------|
| Pair 1 | Pre  | Cross-<br>Contamination | 3.29 | 68 | 0.293 | -10.579 | 67 | 0                  |
|        | Post |                         | 3.90 | 68 | 0.348 |         |    |                    |
| Pair 2 | Pre  | Cleaning                | 3.37 | 68 | 0.388 | -5.751  | 67 | 0                  |
|        | Post |                         | 3.85 | 68 | 0.536 |         |    |                    |
| Pair 3 | Pre  | Cooking                 | 3.01 | 68 | 1.018 | -14.737 | 67 | 0                  |
|        | Post |                         | 4.95 | 68 | 0.214 |         |    |                    |
| Pair 4 | Pre  | Chilling                | 2.44 | 68 | 0.452 | -7.009  | 67 | 0                  |
|        | Post |                         | 3.02 | 68 | 0.449 |         |    |                    |
| Pair 5 | Pre  | Total                   | 3.03 | 68 | 0.278 | -19.531 | 67 | 0                  |
|        | Post |                         | 3.93 | 68 | 0.240 |         |    |                    |

As shown in Table 15, there were significant differences between the two groups in the category of practices and its subcategories. In the subcategory of cross

contamination of food safety Practices, there was significant difference in the scores for pre-training (M=3.29, SD= 0.293) and post-training (M= 3.90, SD=0.348);  $t(67) = -10.579$   $p = 0.000$  in favour of post-training group. In addition, for the subcategory of cleaning, a significant difference was found between the mean scores of pre-trainings (M=3.37, SD= 0.388) and post-training (M= 3.85, SD=0.536);  $t(67) = -5.751$ ,  $p = 0.000$  in favour of post-training group. In regard to the subcategory of cooking, there was a significant difference between the scores of pre-trainings (M= 3.01, SD= 0.536) and post-training (M=4.95, SD=0.214) conditions;  $t(67) = -14.737$ ,  $p = 0.000$  in favour of post-training group.

Similarly, in the subcategory of chilling, there was a significant difference between the mean scores of pre-trainings (M = 2.44, SD= 0.452) and post-training (M =3.02, SD=0.449) conditions;  $t(67) = -7.009$ ,  $p = 0.000$  in favour of post-training group. For the total average of the whole category of food safety Practices, there were significant differences between the scores of pre-trainings (M = 3.03 SD=0.278) and post-training (M = 3.93, SD=0.240) conditions;  $t(67) = -19.531$ ,  $p = 0.857$  in favour of post-training group. To sum up the result of the third research question, in the overall average of the whole category of food safety practices and its four subcategories of cross-contamination, cleaning, cooking, and chilling were significant differences.

## Chapter 4: Discussion

### 4.1 Overall Summary

The purpose of this chapter is to go over the results and findings relation to the theoretical knowledge, attitude, and practices of food handlers under the home food business (HFB) category in Al Ain, UAE.

All participants considered were female since this profession is more adapted to the culture and context of females than males. The Emirate of Abu Dhabi has tried to increase the involvement of women in the labour force of the Emirate. Sophia (2013) stated that women's participation in the Emirati labour force increased from 16 % in 1990 to 32 % in 2011 due to the dedication and attention of government institutions. This study is therefore consistent with the role of the Abu Dhabi Businesswomen Council (ADBWC) in supporting women-owned, home-based businesses (Dubai Women's College, The Dubai Business Council, & Abu Dhabi Businesswomen Council, 2007) .With respect to the type of business licenses, two thirds of the respondents had a Tajir Abu Dhabi license, which allows Emirati families more opportunities to run the HFB (NSW Food Authority, 2016; Alberta Health Services, 2018).

Regarding ownership of home-based businesses, the results of this study showed that more than half of the participants had a separate/special kitchen for commercial purposes. This result is similar to the findings of the UAE-wide survey of businesswomen conducted by the Abu Dhabi Businesswomen Council (ADBWC). The majority of respondents had more than one commercial activity; the most common types included the preparation and sale of sweets, snacks, light meals, and traditional

foods. These results agree with the business activities recommended by ADAFSA, which include the preparation and sale of snacks, traditional foods, beverages, confectionary, pickles, spices, and feasts (Alberta Health Services, 2018).

Ayaz, Priyadarshini and Jaiswal (2018) stated that any gaps in key performance indicators of food handlers could be reduced by training. Participants were trained on the basis on four essential pillars of food safety in EFST, namely cross-contamination, cleaning, cooking, and chilling, with the aim of enabling food handlers to gain knowledge and understanding of good food practices and hygiene (ADFCA, 2010).

#### **4.2 Effects of Training on Knowledge**

The comparison of the participants' pre- and post-training knowledge showed that the training did not improve the participants' knowledge with respect to cleaning and chilling. This is an indication of the need for more effective training in these principles. There is, however, an improvement regarding the knowledge and subcategories of cross-contamination and cooking. This category of knowledge; in particular, cleaning, and chilling needs to be effectively addressed in the quality and quantity training program or evening in delivery in order to enhance the food handlers' knowledge of food safety.

As per the demographic information, about most of the participants hold high school certificate. These results suggest that education definitely plays an important role in knowledge in agreement with Afifi & AbuShelaibi (2012). The results also agree with those of Ayaz, Priyadarshini, and Jaiswal (2018), who surveyed 979 Saudi mothers and found that the level of education had direct effect on knowledge and practices. Similarly, Khalifa et al. (2018) found that respondents had adequate food safety

knowledge, but perceived knowledge failed to be translated into practices' in Taif. Another study had similar results; Awad Allah et al. (2017) found that most respondents had unsatisfactory levels of total KAP about safe food handling and while knowledge and attitude improved after training, practice did not.

Some insights could be inferred from the results of the first research question about food safety knowledge. For example, all the mean score average of the subcategories before training was found to be more than 4.00 (which ranged between Mostly and Yes) which indicates good knowledge level in all subcategories. Also, there was a significant improvement in both Cross-contamination and cooking after training. In addition, no significance difference was found in the subcategory of cleaning before and after training though cleaning mean score was high (M=4.5) before training and it was higher after training. Similarly, in the subcategory of chilling, there was an improvement after training, but it was not a significance difference between pre- and post-training. This may be due to the food handlers' understanding that cross-contamination, and improper temperatures during cooking are among the most important reasons that cause foodborne diseases.

#### **4.3 Effect of Training on Attitude**

The results of the research question on the difference in the food safety attitude of food handlers at HFB before and after attending the EFST training program showed that there was no impact of the training on one of the subcategories of attitude related to cross-contamination. There were, however, obvious effects on the three subcategories of cleaning, cooking, and chilling. The EFST training program needs to be reviewed in the area of cleaning, cooking, and chilling in order to enhance the competencies of food handlers. It has been acknowledged so far that the food handlers' attitude had

positive effects on safe food handling. It is also beneficial for food handling certification programs to reveal behavioural changes to better quality training (Abdul-Aziza, & Dahan, 2013).

Knowledge, Attitude and Practices (KAP) theory states that a health behaviour change theory is based on the premise that people's behavioural change goes through three stages—acquiring the information, generating the positions and attitudes, and forming the observable action or behaviour. It draws on the belief that actions (Practices) are driven by changes in intentions (Attitudes) that are, in turn, based on the wealth of acquired knowledge (Liu et al., 2016; Fan et al., 2018). Thus, it is beneficial to compare attitude with knowledge.

Such results agreed with a Nigerian study conducted by Aluh and Aluh (2017) who found a strong correlation between knowledge and attitude among food vendors. They also found that the presence of sufficient knowledge, unfortunately, did not translate into sound practices often enough. Additionally, it agreed with another study conducted in Malaysia by Lim et al. (2016) where they evaluated the relationship between knowledge, attitude, and practice in association with food safety. The study found that the study subjects “exhibited an average food safety knowledge level especially in their awareness of personal hygiene and kitchenware hygiene”. In addition, their attitude positively affected their behaviour (Lim et al. 2016). Similar to previous studies, Asmawi et al. (2018) found positive correlations between knowledge and attitude.

In contrast, the results of Knowledge and Attitude were not congruent with the Malaysian Study conducted by Ali et al. (2018) who found that in relation to food safety, although the students' knowledge was fairly moderate, their attitude and

perception scores were much higher. They also highlighted the need to increase awareness and knowledge among that population group.

Some insightful ideas could be inferred from the results of the second research question about food safety attitude. For instance, the results showed that all mean scores average of all subcategories of attitude were found more higher than 4.00 (ranged between Agree to Strongly Agree) which indicated a high level of Attitude. Though, there no significant difference between pre- and post-training was found in cross contamination, but the mean score was at a high level ( $M=4.8$ ) in pre- training. Another point is that the EFST training program needs to be reviewed in the area of cross contamination in order to enhance the competencies of food handlers

#### **4.4 Effect of Training on Practices**

Paired samples t-test was conducted to compare the pre-training group and post-training group. It is insightful to discuss each subcategory' results separately. In fact, the category of practices is the most important one since it could reflect the categories of knowledge and attitudes. What was noticeable about the practice category was that there were statistically significant differences between the pre-training group and post-training group in favour of the last group in all the four subcategories: cross-contamination, cleaning, cooking, and chilling as well as the whole category of practices.

What can be inferred from the results was that the safety practice of the food handlers was better than their food safety knowledge and attitude. This can be interpreted that training focused on the practical side and practices more. Another reason that might have affected the results was that the researcher herself supervised the participants in this part of survey.

Another study that agreed with the current study results in American context was conducted by Roberts et al. (2008) to evaluate knowledge and practice of food handlers in relation to “three key food safety practices: cross-contamination, poor personal hygiene, and time/temperature abuse.” The results showed that knowledge alone did not necessarily positively affect practices.

Farahat, El-Shafie, and Waly (2015) had a study to assess Saudi women’s level of knowledge and soundness of practices in relation to food safety. They found that the level of education and whether or not the woman was a working woman had a significant effect on the food related knowledge and practice, with a higher mean knowledge and practice for educated and working women. Similarly, in the UAE, Afifi and Abushelaibi (2012) found out that the education played a role in knowledge; however, sound behaviour was still lacking even when the respondents possessed sufficient knowledge.

On the other hand, some studies’ results partially agreed with this study results in some of its knowledge’s subcategories; cross-contamination and cooking. Also, in the Attitude’s subcategories of cleaning, cooking, and chilling, significant differences were found between the two in favour of post-training group. For example, Lim et al. (2016) found that the study subjects “exhibited average food safety knowledge level especially in their awareness of personal hygiene and kitchenware hygiene” (Lim et al. 2016). In addition, their attitude positively affected their behaviour and their practices. Moreover, Asmawi et al. (2018) found positive correlations between knowledge and attitude.

Unlike the results of this study Khalifa et al. (2018) found that respondents “had adequate food safety knowledge, but perceived knowledge failed to be translated into

practices.” Also, Awad-Allah et al. (2017) found that “the majority of respondents had unsatisfactory level of total KAP about safe food handling”. While knowledge and attitude improved after training, practice did not.

To sum up the main themes, training and the assessments of training need to be reviewed and evaluated again especially in safe food handlers Knowledge and Attitudes as well as practices. There is a need to ensure that the effectiveness of professional development training is measured in relation to safe food handlers’ performance. The training program should be simplified to meet the food handlers’ needs and abilities. It should also be continuous, regular, and mandatory. Additionally, assessments should be done by all participants to assess the effects of training.

In the subcategory of practice that tackled the third research question, statistically significant differences in all the four subcategories were found in favour of post training group. The mean score average ranged between 3-4 (Sometimes-Usually) in the cross-contamination, cleaning and cooking while chilling mean score average ranged between 2-3 (Rarely-Sometimes). It is also noticeable that high standard deviation values specially for pre- training in cooking subcategory ( $SD=1.018$ ), which indicates more variations. After training, there was an obvious improvement of participants’ practices with low standard deviation values.

It is shown clearly that significant differences were found between pre and post training groups in favour of the latest one, but the mean scores were lower than the mean scores of the category of Knowledge and Attitude. This might be due to the researcher supervision of the participants in this part of survey (survey before training). Thus, more attention should be considered in the training for this part.

## **Chapter 5: Conclusions and Recommendations**

This research study aimed to evaluate the level of knowledge, relevant attitudes and food hygiene and safety practices of food handlers. It also examined the effectiveness of the Essential Food Safety Training Program (EFST) in providing food safety knowledge and practices of HFB in Al Ain city, UAE. To achieve the objective of this research, three questions were used to guide the study and explore the differences of the level of knowledge, relevant attitudes, and safety practices of food handlers after training at Essential Food Safety Training Program (EFST) Guide. Besides that, the paired sample t- test was used to evaluate the impact of the food handlers KAP before and after training.

Some insights were concluded from the results and discussion. For example, most participants completed EFST training in the approved companies but only one quarter of them successfully passed EFST test in the approved company. In the category of food safety knowledge, the food handlers' knowledge improved after training in the subcategories of, cross contamination and cooking while no positive effects were found in the subcategories of cleaning and chilling. In regard to the food safety attitude of the food handlers, no positive impact was shown after training in the subcategories of cross contamination whereas the food handlers' attitude improved after training in the subcategories of cleaning, cooking, and chilling. For the food safety practice of the food handlers, their practices demonstrated positive improvement in all subcategories of cross contamination, cleaning, cooking, and chilling.

In light of results, some suggestions and recommendations can be drawn. First, food handlers' food safety knowledge in the field of chilling needs to be improved. Secondly, food handlers' food safety knowledge needs to be improved and enhanced

in the training program. Thirdly, food handlers' food safety attitude in the field of cross contamination needs to be improved. Fourthly, Essential Food Safety Training Program (EFST) needs to be improved to address the food handlers in field of chilling. Fifthly, all the food handlers should attend the training and sit for the assessment to ensure the effectiveness of training that is measured by its positive effects on performance.

### **5.1 Managerial Implications**

It is also recommended to conduct professional development program that enhance food handlers' food safety knowledge, attitudes that will be certainly impacted their practices. It is suggested making training and passing the test after training mandatory for all the food handlers, e.g., it could be enforcing training by making the renewal of the license cannot be done without training.

Another recommendation, training program should be updated and modified according to participants' feedback. Also, it is recommended to conduct continuous professional development program in the field. Technology integration is required to improve continuous professional development program. Besides that, a network is recommended to connect and link all food handlers together to exchange expertise and experiences as well as the best practices. Moreover, they can solve problems and challenges that they may find. They can build professional learning community. Other suggestions are that a variety of training should be conducted in a simple way that appropriate to the educational level of food handlers. A campaign of raising awareness of all the people dealing with food safety in terms of knowledge, attitude and practices is suggested. This can be done via media and social media sites to enable food safety handlers deepen their understanding.

Policy makers may arrange a process of exchange visits to share best practices and learn from each other's. This can be done physically or virtually due to COVID 19 recent consequences. Another practical idea to be recommended is asking the local food safety handlers to train each one another after providing them with some training materials, resources, and ideas.

## **5.2 Research Implications**

One of limitations that lies in the sampling method which was convenient which also affects the generalization of results. Ideally, the sample should be chosen randomly for the results to be unbiased and more reliable. Further research studies are suggested and recommended to explore the opinions of food handlers by randomizing the sample.

This research study is exploratory, which limited to time and place in one-year 2019-2020 and one city. Additionally, the sample included participants from Alain city only and did not include participants from Abu Dhabi and the Western Region or other emirates. Future research studies are needed to investigate the food safety knowledge, attitude and practices in a larger sample that represent other geographical areas in the UAE. Since the sample included female food safety handlers one, it is suggested to conduct other studies that include both genders.

Future research studies used mixed method approach is also needed. Additionally, sampling needs to include food safety handling supervisors and inspectors as well as food consumers and clients. It is better to conduct qualitative research since direct interactions may provide more insightful ideas and help the researchers to generate a model or a theory relevant to the theme. This study contributed to the field of food safety with some insights that support the ongoing process of food safety. The significance of the study lies in the fact that it fills a gap in research related to HFB in

the Gulf region in general, and the UAE in specific. The study was important to describe the knowledge, attitudes, and practices of food handlers in HFB, with regard to food hygiene and safety. As such, gaps in food safety knowledge and discrepancies in practices in HFB can be identified in order to further develop the EFST program in a more specifically targeted and effective way. Consequently, ADAFSA can achieve effective control of HFB, consumer confidence would increase in these businesses, and risks of foodborne diseases can be minimized.

In adopting knowledge, attitude, practices (KAP) approach, the study also draws on actual data and practices in the field, rather than being strictly theoretical. When KAP of food handlers are assessed, it can help design the suitable training. In addition, when the survey is conducted post-training, any gaps in their KAP can be spotted in order to identify loopholes in the training program and design an improvement plan. With the actual knowledge and practices of HFB food handlers, before and after training, assessed, it would facilitate the use of data by policymakers and researchers alike. They can also be used to evaluate, and hence improve, similar experiences in the region, where the whole concept of HFB is still relatively new and where regulations are sometimes lacking.

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## Appendices

### Appendix 1: Food Safety KAP Questionnaire (In English)

#### Part 1: Demographic Information

1. Age:
  - (18-25)
  - (26-35)
  - (36-45)
  - (46-55)
  - (56-660)
  - (67 or older)
  
2. Education:
  - Lower than high school
  - High school
  - Diploma
  - Bachelor's
  - Higher degree
  
3. Do you have a separate/ special kitchen for commercial purposes?
  - (Yes)
  - (No)
  
4. The owner of business is the person in charge in kitchen?
  - (Yes)
  - (No)
  
5. How long the owner of the business spends in the kitchen?
  - Present rarely in the kitchen
  - In the daytime only
  - In the evening time only
  - Present at irregular intervals of the day
  - Available constantly throughout working hours

6. No. of food handlers in the business:

-----

7. No. of those who completed EFST training in the approved companies:

-----

8. No. of those who successfully passed EFST test in the approved company:

-----

9. The business licenses type:

- Tajir Abu Dhabi
- Mubda'a

10. Type of commercial activity (you can pick more than one):

|   |  |  |
|---|--|--|
| Preparing and selling sweets                      | Preparing and selling cold and hot beverages |  |
| Preparing and selling traditional food            | Preparing and selling pickles                |  |
| Preparing banquets                                | Retail Sale of coffee                        |  |
| Sale and preparation of pies and pastries         | Retail Sale of Dates                         |  |
| Sale and preparation of animal ghee               | Preparing and selling spices                 |  |
| Preparing and selling snacks and light meals      | Other (specify):<br>.....                    |  |
| Sale and preparation of bread and baking products |  |  |

**Part 2: Food Safety Knowledge**

| Subcategory         | Item   | Yes | Mostly | To some extent | Rarely | No |
|---------------------|--|-----|--------|----------------|--------|----|
| Cross contamination | 1. Bacteria is a type of insect  |     |        |                |        |    |
|                     | 2. Pests and insects help in spreading bacteria  |     |        |                |        |    |
|                     | 3. People are a source of food contamination   |     |        |                |        |    |
|                     | 4. Chemicals like detergent could contaminate the food   |     |        |                |        |    |
|                     | 5. Hands must be washed for no less than 20 seconds  |     |        |                |        |    |
|                     | 6. Food handlers must wear long sleeves  |     |        |                |        |    |
|                     | 7. Food handlers must not wear jewellery or watches  |     |        |                |        |    |
|                     | 8. The food transportation vehicle should be clean   |     |        |                |        |    |
|                     | 9. Bacteria is passed on by contact between raw food, utensils, and equipment  |     |        |                |        |    |
|                     | 10. Bacteria is passed on by contact between raw food and cooked food  |     |        |                |        |    |
|                     | 11. Multiple-use cloth towels carry bacteria and spread it   |     |        |                |        |    |
|                     | 12. Danger zone is the temperatures between 5-63 ° C and the food should not be left at this zone more than two hours. |     |        |                |        |    |
| Cleaning            | 13. Sterilizing utensils kills/eliminates bacteria   |     |        |                |        |    |
|                     | 14. Washing tools reduces bacteria   |     |        |                |        |    |
|                     | 15. The dishwasher is a means of sterilizing tools   |     |        |                |        |    |

**Continued- Part 2: Food Safety Knowledge**

|          |  |  |  |  |  |  |
|----------|--|--|--|--|--|--|
| Cooking  | 16. Keeping hot food at a temperature of at least 63 ° C (like buffet temperature) prevents the growth of bacteria         |  |  |  |  |  |
|          | 17. The raw meat should be separated from ready-to-eat food through all food procedures like food preparation and storage. |  |  |  |  |  |
|          | 18. Steam/bubbling of food when heated is proof of safe/ideal cooking temperature  |  |  |  |  |  |
| Chilling | 19. Keeping food in the refrigerator at a temperature below 5 ° C reduces / slows the growth of bacteria                   |  |  |  |  |  |
|          | 20. Freezing below -18 ° C stops bacterial growth  |  |  |  |  |  |

### Part 3: Food safety Attitudes

| Subcategory         | Item   | Strongly agree | Agree | Not sure | Disagree | Strongly disagree |
|---------------------|--|----------------|-------|----------|----------|-------------------|
| Cross contamination | 1. Pets should not be allowed into food preparation areas  |                |       |          |          |                   |
|                     | 2. Pest control methods should be available in food preparation areas (such as insect zappers)   |                |       |          |          |                   |
|                     | 3. Hands must be washed before touching ready-to-eat foods   |                |       |          |          |                   |
|                     | 4. Hands must be washed after touching raw food  |                |       |          |          |                   |
|                     | 5. Wounds should be covered with a waterproof band aid   |                |       |          |          |                   |
|                     | 6. It must wear a head cover (hair net) while in food preparation areas  |                |       |          |          |                   |
|                     | 7. Food should be in suitable temperature while transportation.  |                |       |          |          |                   |
|                     | 8. Food items should be separated from non-food items while transportation   |                |       |          |          |                   |
| Cleaning            | 9. It is preferable to dry the tools after washing them using tissue paper or leaving them in the air instead of drying them with cloth towels |                |       |          |          |                   |
|                     | 10. Surfaces of floors, walls and ceilings in food preparation areas must be cleaned   |                |       |          |          |                   |
|                     | 11. Tools must thoroughly be washed between uses during food preparation steps   |                |       |          |          |                   |
|                     | 12. The dishwasher is more efficient in eliminating microbes than manual washing   |                |       |          |          |                   |

**Continued- Part 3: Food safety Attitudes**

|          |   |  |  |  |  |  |
|----------|---|--|--|--|--|--|
| Cooking  | 13. Steaming and bubbling of food should be ensured during cooking or heating as evidence of its safe / ideal cooking temperature |  |  |  |  |  |
|          | 14. Cooked Food and easy to spoil food should not be left at room temperature for more than two hours                             |  |  |  |  |  |
|          | 15. Cooked food to be cooled should not put directly in the refrigerator  |  |  |  |  |  |
|          | 16. Hot food to be refrigerated should not be left to cool at normal room temperature   |  |  |  |  |  |
| Chilling | 17. Vegetable and fruits should be separated from meat in the refrigerator  |  |  |  |  |  |
|          | 18. It must not to put any uncovered food in the refrigerator   |  |  |  |  |  |
|          | 19. Label should be put in the chilled food shows the preparation date  |  |  |  |  |  |
|          | 20. Foods to be frozen should be placed in airtight containers that prevent air from entering                                     |  |  |  |  |  |

**Part 4: Food safety practices part (this part will be done by researcher- before training)**

| Subcategory         | Question   | Always | Usually | Sometimes | Rarely | Never |
|---------------------|--|--------|---------|-----------|--------|-------|
| Cross contamination | 1. Is a pest control company contracted periodically?  |        |         |           |        |       |
|                     | 2. Do food handlers wash their hands with warm water and soap?                               |        |         |           |        |       |
|                     | 3. Do food handlers wear jewellery while preparing food?                                     |        |         |           |        |       |
|                     | 4. Are food handlers prevented from working in case of diarrhoea / vomiting / fever?         |        |         |           |        |       |
|                     | 5. Do food handlers wear (an apron, hair net)?   |        |         |           |        |       |
|                     | 6. Do food handlers wear clean shoes?  |        |         |           |        |       |
|                     | 7. Are special temperature control containers/bags used to store food during transportation? |        |         |           |        |       |
|                     | 8. Are multi-use cloth towels used to wipe surfaces?   |        |         |           |        |       |
|                     | 9. Are ready-to-serve foods stored on the top refrigerator shelves?                          |        |         |           |        |       |
|                     | 10. Is raw meat stored on the bottom shelves of the refrigerator?                            |        |         |           |        |       |
| Cleaning            | 11. Are tools washed with dishwashing liquid and then rinsed with warm water?                |        |         |           |        |       |
|                     | 12. After washing them, are tools dried by leaving them in the air?                          |        |         |           |        |       |
|                     | 13. After washing them, are tools dried with tissue paper?                                   |        |         |           |        |       |
|                     | 14. After washing them, are tools dried with cloth towels?                                   |        |         |           |        |       |

Continued- **Part 4: Food safety practices part (this part will be done by researcher- before training)**

|          |   |  |  |  |  |  |
|----------|---|--|--|--|--|--|
| Cooking  | 15. When cooking chicken, do you make sure that the colour inside turns from pink to white? |  |  |  |  |  |
|          | 16. When cooking red meat, do you make sure that the colour inside turns brown?             |  |  |  |  |  |
| Chilling | 17. Is a thermometer placed inside the refrigerator?  |  |  |  |  |  |
|          | 18. When chicken or frozen meat is thawed, are they placed in the freezer again?            |  |  |  |  |  |
|          | 19. Are frozen foods thawed by placing them in the refrigerator?                            |  |  |  |  |  |
|          | 20. Are frozen foods thawed by placing them in containers with non-running water?           |  |  |  |  |  |
|          | 21. Are frozen foods thawed by placing them in empty containers at room temperature?        |  |  |  |  |  |

## Appendix 2: Food Safety KAP Questionnaire (In Arabic)

### استبانة عن المعرفة والطرق والممارسات الخاصة بسلامة الغذاء المنتجة في المنازل للأغراض التجارية

الجزء الأول: المعلومات الديموغرافية

1. العمر:

(25-18)

(35-26)

(45-36)

(55-46)

(66-56)

(67 أو أكثر)

2. المستوى التعليمي:

أقل من ثانوية

ثانوية عامة

دبلوم

بكالوريوس

دراسات عليا

3. هل يوجد لديك مطبخ منفصل/خاص للغرض التجاري:

(نعم)

(لا)

4. هل صاحب/ة المشروع هو الشخص المسؤول في المطبخ؟

(نعم)

(لا)

5. أوقات تواجد صاحب/ة المشروع في المطبخ؟

لا تتواجد في المطبخ إلا نادرا

في الفترة الصباحية فقط

في الفترة المسائية فقط

تتواجد في فترات متقطعة غير منتظمة في اليوم

متواجدة باستمرار طوال ساعات العمل

6. عدد المتعاملين مع الغذاء (العاملين في المشروع الغذائي):

7. عدد الذين أتموا التدريب في برنامج أساسيات السلامة الغذائية (EFST) في الشركات المعتمدة:

8. عدد الذين اجتازوا الامتحان لبرنامج أساسيات السلامة الغذائية (EFST) في الشركات المعتمدة بنجاح:

9. النشاط التجاري:

تاجر أبو ظبي

مبدعة

10. نوع النشاط (يمكنك اختيار أكثر عن نشاط):

|                                       |  |                                       |  |
|---------------------------------------|--|---------------------------------------|--|
| بيع وتحضير المشروبات الباردة والساخنة |  | تحضير وبيع الحلويات                   |  |
| بيع وتحضير الإجار والمخللات           |  | تحضير وبيع الأكلات الشعبية            |  |
| بيع البن - بالتجزئة                   |  | تحضير وإعداد الولايم                  |  |
| بيع التمور - بالتجزئة                 |  | تحضير وبيع الفطائر والمعجنات وتجهيزها |  |
| بيع التوابل والبهارات ومواد العطارة   |  | تحضير وبيع السمن الحيواني             |  |
|                                       |  | تحضير وبيع الخبز ومنتجات المخابز      |  |

الجزء الثاني: المعرفة

| لا | نادراً | و إلى حد | غالباً | نعم | البند   | Subcategory         |
|----|--------|----------|--------|-----|---|---------------------|
|    |        |          |        |     | 1. البكتيريا نوع من أنواع الحشرات   | Cross Contamination |
|    |        |          |        |     | 2. الآفات والحشرات تساعد في انتشار البكتيريا  |                     |
|    |        |          |        |     | 3. الإنسان مصدر من مصادر التلوث   |                     |
|    |        |          |        |     | 4. المواد الكيميائية مثل المنظفات قد تتسبب في تلوث الطعام   |                     |
|    |        |          |        |     | 5. يجب غسل اليدين لمدة لا تقل عن عشرين ثانية  |                     |
|    |        |          |        |     | 6. على المتعاملين مع الغذاء أن يستخدموا رداء ذو أكمام طويلة   |                     |
|    |        |          |        |     | 7. على المتعاملين مع الغذاء عدم إرداء أي مجوهرات أو ساعات يدوية   |                     |
|    |        |          |        |     | 8. يجب التأكد من نظافة وسيلة النقل التي سيتم توصيل الغذاء فيها  |                     |
|    |        |          |        |     | 9. تنتقل البكتيريا بالتلامس بين الغذاء النيء والأواني وألواح التقطيع  |                     |
|    |        |          |        |     | 10. تنتقل البكتيريا بالتلامس بين الغذاء النيء والغذاء المطبوخ   |                     |
|    |        |          |        |     | 11. الفوط القماشية متعددة الاستخدامات تحمل البكتيريا وتعمل على نشرها  |                     |
|    |        |          |        |     | 12. "منطقة الخطر" هي درجات الحرارة بين 5-63 درجة مئوية ويجب عدم ترك الغذاء المطبوخ والقابل للتلف فيها لمدة تزيد عن ساعتين |                     |

مواصلة- الجزء الثاني: المعرفة

| الرقم | نوعاً | أى | غالباً | نوع | البند   | Subcategory |
|-------|-------|----|--------|-----|---|-------------|
|       |       |    |        |     | 13. البند   |             |
|       |       |    |        |     | 14. تعقيم الأدوات يقتل/يقضي على البكتيريا   | cleaning    |
|       |       |    |        |     | 15. غسل الأدوات يقلل من البكتيريا   |             |
|       |       |    |        |     | 16. تعتبر ماكينة غسل الأطباق وسيلة من وسائل تعقيم الأدوات   |             |
|       |       |    |        |     | 17. حفظ الغذاء الساخن على درجة حرارة لا تقل عن 63 درجة مئوية (مثل درجة حرارة البوفيه)<br>يمنع نمو البكتيريا | Cooking     |
|       |       |    |        |     | 18. يجب فصل اللحم النيئ عن الغذاء الجاهز للتقديم مثل السلطات خلال مختلف عمليات إعداد وتخزين الغذاء          |             |
|       |       |    |        |     | 19. تساعد البخار/الفقاعات من المادة الغذائية عند تسخينها دليل على الوصول لدرجة حرارة الطبخ الآمن/المثالي    |             |
|       |       |    |        |     | 20. حفظ الغذاء في الثلاجة على درجة أقل من 5 درجة مئوية يقلل/يبطئ من نمو البكتيريا                           | Chilling    |
|       |       |    |        |     | 21. التجميد لأقل عن 18 درجة مئوية تحت الصفر يوقف نمو البكتيريا  |             |

الجزء الثالث: الطرق

| لا أوافق بشدة | لا أوافق | غير متأكد | أوافق | أوافق بشدة | البند  | Subcategory         |
|---------------|----------|-----------|-------|------------|--|---------------------|
|               |          |           |       |            | 1. يجب منع دخول الحيوانات الأليفة لمناطق تحضير الغذاء  | Cross Contamination |
|               |          |           |       |            | 2. يجب أن تتوفر وسائل مكافحة الحشرات (مثل مصيدة الحشرات) في مناطق تحضير الغذاء                               |                     |
|               |          |           |       |            | 3. يجب غسل اليدين قبل ملامسة الغذاء الجاهز للتقديم   |                     |
|               |          |           |       |            | 4. يجب غسل اليدين بعد ملامسة الغذاء النيئ  |                     |
|               |          |           |       |            | 5. يجب تغطية الجروح بملصق مقاوم للماء  |                     |
|               |          |           |       |            | 6. يجب ارتداء غطاء للرأس أثناء التواجد في مناطق تحضير الغذاء   |                     |
|               |          |           |       |            | 7. يجب نقل الغذاء على درجات حرارة ملائمة خلال عملية النقل  |                     |
|               |          |           |       |            | 8. يجب فصل الغذاء عن المواد غير الغذائية أثناء عملية النقل   |                     |
|               |          |           |       |            | 9. يفضل تجفيف الأدوات بعد غسلها باستخدام المحارم الورقية أو تركها في الهواء بدلاً عن تجفيفها بالفوط القماشية | cleaning            |
|               |          |           |       |            | 10. يجب تنظيف أسطح الأرضيات والجدران والأسقف في مناطق تحضير الغذاء   |                     |

|  |  |  |  |  |          |
|--|--|--|--|--|----------|
|  |  |  |  | 11. يجب غسل الأدوات بشكل جيد بين كل استخدام وآخر خلال مراحل إعداد الغذاء                                       |          |
|  |  |  |  | 12. ماكينة غسل الأطباق أكثر كفاءة في القضاء على الميكروبات من الغسيل اليدوي                                    |          |
|  |  |  |  | 13. يجب الحرص على ظهور البخار من الغذاء أثناء الطبخ أو التسخين كدليل على وصولها درجة حرارة الطبخ الآمن/المثالي | Cooking  |
|  |  |  |  | 14. يجب عدم ترك الغذاء المطبوخ والقابل للتلف في درجة حرارة الغرفة لمدة زمنية تزيد عن ساعتين                    |          |
|  |  |  |  | 15. يجب عدم وضع الغذاء الساخن لغرض تبريده في الثلاجة مباشرة  |          |
|  |  |  |  | 16. يجب عدم ترك الغذاء الساخن المعد للتبريد في درجة حرارة الغرفة العادية                                       |          |
|  |  |  |  | 17. يجب فصل الخضروات والفواكه عن اللحوم في الثلاجة   | Chilling |
|  |  |  |  | 18. يجب الحرص على عدم وضع أي أغذية مكشوفة في الثلاجة   |          |
|  |  |  |  | 19. يجب وضع ملصق على المواد الغذائية المبردة يوضح تاريخ التحضير  |          |
|  |  |  |  | 20. يجب وضع الغذاء المراد تجميده في عبوات محكمة الإغلاق تمنع دخول الهواء قبل وضعها في الفريزر                  |          |

الجزء الرابع: الممارسات: (سيتم تعبئة هذا الجزء من قبل الباحث- قبل التدريب)

| أبداً | نادراً | أحياناً | غالباً | دائماً | السؤال   | Subcategory         |
|-------|--------|---------|--------|--------|--|---------------------|
|       |        |         |        |        | 1. هل يتم التعاقد مع شركة مكافحة حشرات بشكل دوري؟                                  | Cross Contamination |
|       |        |         |        |        | 2. هل يتم غسل اليدين بالماء الدافئ والصابون؟                                       |                     |
|       |        |         |        |        | 3. هل يرتدي المتعاملين مع الغذاء المجوهرات وساعات الأيدي أثناء تحضير الغذاء؟       |                     |
|       |        |         |        |        | 4. هل يتم منع المتعاملين مع الغذاء من العمل في حال الإسهال/القيء/الحمى؟            |                     |
|       |        |         |        |        | 5. هل يرتدي المتعاملين مع الغذاء ملابس واقية (المريول، غطاء الرأس)؟                |                     |
|       |        |         |        |        | 6. هل يرتدي المتعاملين مع الغذاء أحذية نظيفة؟                                      |                     |
|       |        |         |        |        | 7. هل يتم استخدام حاويات خاصة للتحكم بدرجات الحرارة لحفظ الغذاء أثناء عملية النقل؟ |                     |
|       |        |         |        |        | 8. هل يتم استخدام الفوط القماشية متعددة الاستخدامات لتنظيف الأسطح؟                 |                     |
|       |        |         |        |        | 9. هل يتم تخزين الغذاء الجاهز للتقديم في الأرفف العليا للثلاجة؟                    |                     |
|       |        |         |        |        | 10. هل يتم تخزين اللحوم النيئة في الأرفف السفلية للثلاجة؟                          |                     |
|       |        |         |        |        | 11. هل يتم غسل الأدوات بسائل الجلي ثم شطفها بالماء الدافئ؟                         | cleaning            |
|       |        |         |        |        | 12. هل يتم تجفيف الأدوات بعد غسلها بتركها في الهواء؟                               |                     |
|       |        |         |        |        | 13. هل يتم تجفيف الأدوات بعد غسلها بالمحارم الورقية؟                               |                     |
|       |        |         |        |        | 14. هل يتم تجفيف الأدوات بعد غسلها بالفوط القماشية؟                                |                     |

|  |  |  |  |  |   |          |
|--|--|--|--|--|---|----------|
|  |  |  |  |  | 15. هل يتم التأكد من تغير لون الدجاج من اللون الوردي إلى الأبيض من الداخل بعد انتهاء الطبخ؟ | Cooking  |
|  |  |  |  |  | 16. هل يتم التأكد من تغير لون اللحوم الحمراء إلى اللون البني من الداخل بعد انتهاء الطبخ؟    |          |
|  |  |  |  |  | 17. هل يتم وضع مقياس درجة حرارة داخل الثلاجة؟   | Chilling |
|  |  |  |  |  | 18. هل يتم إذابة الدجاج أو اللحوم المجمدة ثم وضعها في الفريزر مجدداً؟                       |          |
|  |  |  |  |  | 19. هل يتم إذابة الغذاء المجمد عن طريق وضعه في الثلاجة؟                                     |          |
|  |  |  |  |  | 20. هل يتم إذابة الغذاء المجمد عن طريق وضعه في أوعية بها ماء غير جاري؟                      |          |
|  |  |  |  |  | 21. هل يتم إذابة الغذاء المجمد عن طريق وضعه في أواني فارغة على درجة حرارة الغرفة؟           |          |

### Appendix 3: EFST Guidelines



EFST-en.pdf

### Appendix 4: Training Programme



المادة التدريبية للأسر  
المنتجة-Three parts.pdf

## Appendix 5: Questions Coding

### 1-Demographic Data Part

|   |   |   |                        |
|---|---|---|------------------------|
| 1 | Age   | 1 | (25-18)                |
|   |   | 2 | (35-26)                |
|   |   | 3 | (45-36)                |
|   |   | 4 | (55-46)                |
|   |   | 5 | (66-56)                |
|   |   | 6 | (67 or more)           |
| 2 | Education   | 1 | Illiterate             |
|   |   | 2 | Lower than high school |
|   |   | 3 | High school            |
|   |   | 4 | Diploma                |
|   |   | 5 | Bachelor's             |
|   |   | 6 | Higher degree          |
| 3 | Having a separate/ special kitchen for commercial purposes. | 1 | Yes                    |
|   |   | 2 | No                     |

|   |   |   |   |
|---|---|---|---|
| 4 | The owner of business is the person in charge in kitchen? | 1 | Yes   |
|   |   | 2 | No  |
| 5 | How long the owner of the business spends in the kitchen? | 1 | Present rarely in the kitchen                 |
|   |   | 2 | In the daytime only                           |
|   |   | 3 | In the evening time only                      |
|   |   | 4 | Present at irregular intervals of the day     |
|   |   | 5 | Available constantly throughout working hours |
|   |   | 6 | Present rarely in the kitchen                 |
|   |   | 7 | In the daytime only                           |
| 6 | No. of food handlers:                                     | 1 | None  |
|   |   | 2 | 2-4   |
|   |   | 3 | 5-7   |
|   |   | 4 | 8- 10   |
|   |   | 5 | Above 10                                      |
| 7 | No. of those who completed EFST training:                 | 1 | Yes   |
|   |   | 2 | No  |
| 8 | No. of those who successfully passed EFST test:           | 1 | Yes   |
|   |   | 2 | No  |
| 9 | The business licenses type:                               | 1 | Mubda'a                                       |
|   |   | 2 | Tajir Abu Dhabi                               |

|    |  |    |   |
|----|--|----|---|
| 10 | Type of commercial activity<br>(you can pick more than one): | 1  | Preparing and selling sweets                      |
|    |  | 2  | Preparing and selling traditional food            |
|    |  | 3  | Preparing banquets                                |
|    |  | 4  | Sale and preparation of pies and pastries         |
|    |  | 5  | Sale and preparation of animal ghee               |
|    |  | 6  | Preparing and selling snacks and light meals      |
|    |  | 7  | Sale and preparation of bread and baking products |
|    |  | 8  | Preparing and selling cold and hot beverages      |
|    |  | 9  | Preparing and selling pickles                     |
|    |  | 10 | Retail Sale of coffee                             |
|    |  | 11 | Retail Sale of dates                              |
|    |  | 12 | Preparing and selling spices                      |
|    |  | 13 | Other (specify):                                  |

## 2- Food Safety Knowledge Part

|   |  |   |                |
|---|--|---|----------------|
| 2 | Food Safety Knowledge Part<br>Items 1-20 | 5 | Yes            |
|   |  | 4 | Mostly         |
|   |  | 3 | To some extent |
|   |  | 2 | Rarely         |
|   |  | 1 | No             |

## 3-Food Safety Attitudes Part

|   |  |   |                   |
|---|--|---|-------------------|
| 3 | Food Safety Attitudes Part<br>Items 1-20 | 5 | Strongly agree    |
|   |  | 4 | Agree             |
|   |  | 3 | To some extent    |
|   |  | 2 | Disagree          |
|   |  | 1 | Strongly disagree |

## 4- Food Safety Practices Part

|   |  |   |           |
|---|--|---|-----------|
| 4 | Food Safety Practices Part<br>Items 1-21 | 5 | Always    |
|   |  | 4 | Usually   |
|   |  | 3 | Sometimes |
|   |  | 2 | Rarely    |
|   |  | 1 | Never     |

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United Arab Emirates University



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Targeting the Home Food Businesses (HFB), this investigation is evaluating the levels of knowledge, relevant attitudes, and food safety practices (KAP) of food handlers in Al Ain City, UAE. Effectiveness of the Essential Food Safety Training Program (EFST) is examined through a quantitative approach with 68 participants as designated sample. This research contributes towards enhancement of government policies and measures taken for food safety and training programs.

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