

Routledge
Taylor & Francis Group

Journal of Foodservice Business Research

ISSN: 1537-8020 (Print) 1537-8039 (Online) Journal homepage: https://www.tandfonline.com/loi/wfbr20

Food safety attitudes and practices of chefs in Cappadocia region, Turkey

Reha Kılıçhan, Harun Çalhan & Mehmet Umur

To cite this article: Reha Kılıçhan, Harun Çalhan & Mehmet Umur (2020): Food safety attitudes and practices of chefs in Cappadocia region, Turkey, Journal of Foodservice Business Research, DOI: 10.1080/15378020.2020.1718401

To link to this article: https://doi.org/10.1080/15378020.2020.1718401


Published online: 31 Jan 2020.


Submit your article to this journal


Article views: 5


View related articles


View Crossmark data

Full Terms & Conditions of access and use can be found at
https://www.tandfonline.com/action/journalInformation?journalCode=wfbr20

JOURNAL OF FOODSERVICE BUSINESS RESEARCH
https://doi.org/10.1080/15378020.2020.1718401

Routledge
Taylor & Francis Group

Check for updates

Food safety attitudes and practices of chefs in Cappadocia region, Turkey

Reha Kılıçhan [a], Harun Çalhan [b] and Mehmet Umur [b]

[a]Gastronomy and Culinary Arts, Erciyes University Tourism Faculty, Kayseri, Turkey; [b]Tourism Guidance, Erciyes University Tourism Faculty, Kayseri, Turkey

ABSTRACT

Chefs working at hotels, restaurants, and public institutions play a major role in food safety. The aim of this study is to explore attitudes and practices regarding food safety issues among chefs in the Cappadocia region, Turkey. The data was collected using a convenience sampling method of the non-probability sampling technique. The survey was conducted between the period of September 2018 and November 2018, and 108 chefs working at hotels, restaurants, and public institutions participated. The data were analyzed using frequencies, exploratory factor analysis, independent sample *t*-test, ANOVA, correlation, and simple linear regression analyses. Most of the chefs (79.6%) had taken a basic food safety training course. The findings reveal that there are statistically significant ($p < .05$) differences between groups: (a) demographics and attitudes, and (b) demographics and practices. The findings also show that there is a significant ($p < .05$) and positive correlation ($r = 0.48$) between the attitudes and practices of chefs. This study posits that food safety trained chefs have higher scores in terms of both attitudes and practices than those who have not received. It is recommended that all chefs should be encouraged to attend food safety training programs. Practical and academic implications are discussed in detail.

KEYWORDS

Food safety; attitude and practice; chefs; gastronomy; tourism

Introduction

People need to access and consume healthy foods in order to maintain their physical and mental development, protect their health, and survive. The safety of these foods is one of the most basic human rights. Safe food is defined as foods that do not contain any physical, chemical, or microbiological contaminants that could cause any health problems after consumption (Barjaktarović-Labović et al., 2018, p. 466). As can be seen from the definition, there are some food safety risks that are possible in the period from the production of foods to the consumption. These risks include: (a) biological risks such as bacteria, viruses, parasites, prions, algae, molds, and yeasts; (b) chemical risks such as pesticides, fertilizer residues, veterinary medicines, polyacrylic aromatic hydrocarbons, heavy metals, polychlorinated biphenyls, dioxins, traces from packaging materials, detergent or disinfectant residues, food additives, and allergens; and (c) physical risks such as glass particles, stone/wood/metal/plastic parts, bone, hair, nail, cigarette ash, flies, and insects. All these risks are discussed in three dimensions in the literature (Artık, Sanlıer, & Ceyhun Sezgin, 2017). In addition, there are studies suggesting that these risks are due to personal hygiene, physical area and equipment hygiene, and food

CONTACT Reha Kılıçhan rehakilichan@gmail.com Erciyes University Tourism Faculty, 38039, Kayseri, Turkey
© 2020 Taylor & Francis

production processes (Artık et al., 2017; Kendall et al., 2018; Omari, Frempong, & Arthur, 2018; Trafialek, Domańska, & Kolanowski, 2019; Wu, Liu, & Chen, 2018).

Unsafe food creates global health threats that endanger everyone. Over 30% of the people in developing countries are affected by foodborne diseases every year (Baser, Ture, Abubakirova, Sanlier, & Cil, 2017). Many incidences have also been reported in developed countries. For example, from 1998 to 2013 in the United States (USA), 9,788 cases of food-borne epidemics related to restaurants have been reported, corresponding to an average of 620 diseases per year (Angelo, Nisler, Hall, Brown, & Gould, 2017). In recent years, more attention has been given to the quality and safety of food, as foodborne diseases have been caused mostly by large outbreaks and unacceptable chemical hazards in foods. Also, many researches have been implemented in various areas about food safety. Most of these studies are about food safety knowledge, attitude, and practices of individuals working in different sectors (Akabanda, Hlortsi, & Owusu-Kwarteng, 2017; Al-Shabib, Mosilhey, & Husain, 2016; Asmawi et al., 2018; Baser et al., 2017; da Cunha, Stedefeldt, & de Rosso, 2014; Elobeid, Ioannis, & Vijay, 2019; Faour-Klingbeil, Kuri, & Todd, 2015; Kunadu, Ofosu, Aboagye, & Tano-Debrah, 2016; Liu, Liu, Zhang, Lu, & Huang, 2015; Sani & Siow, 2014).

Food handlers have been responsible for food-borne illnesses outbreaks by various means. Analyses of reported outbreaks have approved that most of foodborne illnesses spread result from inaccurate food handling practices among food handlers (Nik Husain, Wan Muda, Noor Jamil, Nik Hanafi, & Abdul Rahman, 2016, pp. 795–796). Because of this fact, researching attitudes and practices of chefs in food and beverage businesses are very curicial. However, it is noteworthy that there are only few studies (Baser et al., 2017; Bolton, Meally, Blair, McDowell, & Cowan, 2008; Green et al., 2005; Howells et al., 2008; Rebouças et al., 2017) related food safety attitudes and practices of executive chefs, sous chefs, chef de parties, cooks, and prep cooks. In this regard, it is possible to say that this study is important as it contributes to filling an important gap in the literature.

The foodservice industry in many countries has seen significant growth in recent times. The industry contributes about 20% of Turkey's GDP, which tends to increase yearly.

The foodservice industry in Turkey is highly patronized by tourists. This is due in part to the fact that Turkey has unique local cuisine and food and beverage is an essential part of any journey away from the home environment (Kim, Eves, & Scarles, 2009). One of the important concerns of tourist in relation to the foodservice industry in foreign countries is food safety (Cohen & Avieli, 2004). It is therefore important that chefs and managers in food and beverage businesses, which offer food and beverage to tourists, have knowledge about food safety and the use of this knowledge.

From this point of view, the aim of this study is to explore the attitudes and practices of chefs toward food safety and to examine the relationship between attitudes and practices in the context of Cappadocia region.

Literature review

Food safety attitude

Food handlers especially in the food supply chain are recognized as the heart of food safety systems in the last decade (Ovca, Jevšnik, Kavčič, & Raspor, 2018). Food handlers

have a vital role in food safety because they may transmit pathogens into foods and beverages during production, processing, distribution, and preparation processes (Angelillo, Viggiani, Rizzo, & Bianco, 2000, p. 381). Apart from adequate knowledge and strict practices, the correct attitudes of food handlers can reduce foodborne disease outbreaks (Sani & Siow, 2014, p. 211). Attitude can be defined as people's behavior reacts positively or negatively to an object, idea, or event (Moreaux, Adongo, Mensah, & Amuquandoh, 2018). According to Ramnauth, Driver, and Vial (2008), food safety attitude is a key factor besides knowledge to ensure decreasing of foodborne diseases and they claim that to enhance food safety practices; food handlers are required to adapt their behavior through knowledge and attitude. Food safety attitudes of food handlers often affect food safety practices. There is a considerable debate about relationship between food safety attitudes and practices, and reports showed that food safety attitude-practice studies significantly and substantially predict future behavior (Kraus, 1995, p. 58).

Many studies were carried out examining food safety attitudes of food handlers in scientific literature. Moreaux et al. (2018) conducted a study examining food safety attitudes of food sellers in Ghana and the results showed that sellers' food safety attitudes were high through personal hygiene, environmental hygiene, and food hygiene but they did not transform their food safety attitude into practice that personal hygiene was less practiced by the vendors. Another study was carried out by Baser et al. (2017) examining attitudes of food handlers in hotel businesses in Turkey. The study results showed that food handlers' food safety attitudes, which are hygiene, purchasing-cooking and preservation, were generally positive and mean scores were above average. Kunadu et al. (2016) made a study in Ghana and study results showed that food handlers have generally negative attitudes toward food safety. Especially, food handlers' negative attitudes were found for refreezing of defrosted foods and trying to kill pathogens in foods by freezing. Gizaw, Gebrehiwot, Haile, and Teka (2014) carried out a study related to food handlers working in food establishments in Ethiopia and the study results showed that majority of the food handlers had neutral; the rest had positive and negative attitudes respectively toward food safety. Mizanur, Arif, Bakar, and Tambi (2012) made a research in Malaysia examining street food vendors' food safety attitudes and it was found that majority of the respondents have average level of food safety attitudes. Ko (2011) also conducted a study in Taiwan examining sanitation attitudes of a university restaurant's employees and it was found that self-responsibility attitudes and food sanitation practice attitudes of restaurant employees were positive with high scores. Angelillo et al. (2000) examined food handlers' attitudes toward food safety in Italy and found positive food safety attitudes. Their study results showed that correct applications of control procedures ensure adequate protection against transmission of diseases and washing hands before preparing food decreases the risk of food poisoning. Furthermore, using gloves for touching unwrapped food decreases the risk of foodborne diseases.

Food safety practice

Food borne illnesses are one of the most widespread global problems. Many factors contributing to the increase in some foodborne diseases include population growth, changes in food preparation habits, an increase in the number of restaurants, an increase in food and beverage consumption outside the home, and few food safety trainings among

food workers (Ko, 2010). The majority of foodborne illnesses especially happen at home, in restaurants, and in social facilities (Stratev et al., 2017, p. 778). It is estimated that a considerable amount of food borne illnesses occur because of improper food handling practices (Fischer & Frewer, 2008, p. 2859). The 2000 *Report of the FDA Retail Food Program Database of Foodborne Illness Risk Factors* compared key suitability for various food service practices. According to the report, fast-food restaurants had a 74% compliance rate, full-service restaurants had 60%, and retail store delicatessens had 73% compliance rate. The risk factors were presented as inappropriate temperature and low personal hygiene and had a fit of 68% and 79% respectively (Sneed, Strohbehn, & Gilmore, 2004, pp. 1678–1679).

Food handlers are an essential factor in foodborne illness outbreaks because of improper applications during the preparation, processing, and storage of food (Stratev et al., 2017, p. 778). Majority of food borne diseases can be control when food handlers follow food sanitation practices. Therefore, food handlers should diminish pathogen or toxin levels in food (Ko, 2010, pp. 450–451). In addition, food handlers have been responsible for foodborne illnesses outbreaks by various means. Analyses of reported outbreaks have corrected that most of foodborne illnesses outbreaks happen because of inappropriate food producing practices among food handlers (Nik Husain et al., 2016, pp. 795–796). It is assumed that almost 75% of foodborne disease outbreaks are related to inappropriate food processing practices by workers in food enterprises (Gizaw et al., 2014, p. 138). A report published by the Electronic Food Outbreak Reporting System (FoodNet) showed that 59% of foodborne disease outbreaks were related to restaurants in 2005. The first three factors in foodborne disease outbreaks are specified as low personal hygiene, cross-contamination, and time/temperature control in restaurants, directly related to food workers errors (Howells et al., 2008, p. 1345). Highest risks related to improper food safety practices are identified by the FDA in 2004 as improper hand washing, improper cleaning of cutting boards and cutting surfaces, improper cleaning of equipment and tools, improper bare contact with ready food, and improper gloved hand contact with ready food (Sneed & Strohbehn, 2008). Moreover, in restaurants food handlers' use of unsanitized cutting boards may cause to cross contamination. Food handlers should maintain personal hygiene to prevent the spread of foodborne diseases. Appropriate hand washing, especially after going to the toilet, is a key application to prevent the spread of microorganisms to food (Stratev et al., 2017, p. 779).

Recent studies have examined food handlers' food safety practices in many countries worldwide. A study was conducted by Nik Husain et al. (2016) testing food handlers' food safety practices in Malaysia that was found personnel hygiene and environmental sanitation practices have highest scores. Afolaranmi, Hassan, Bello, and Misari (2015) also conducted a study in Nigeria testing food handlers practices and they found that above half of the handlers have suitable food safety and hygiene practices. Choudhury, Mahanta, Goswami, Mazumder, and Pegoo (2011) conducted a research on food vendors and small food restaurant owners' food safety practices in India and they detected that especially most of the owners of restaurants procure unlabeled or unpacked fresh/semi processed eggs, fish, and meat for their restaurants. Giritlioglu, Batman, and Tetik (2011) investigated food safety practices of cookery students in Turkey and they found high practice scores about washing hand after toilet, changing uniform, washing hands after coughing or sneezing, and brushing nails. Tokuc, Ekuklu, Berberoglu, Bilge, and Dedeler (2009)

made a study in Turkey as well relating to food workers' food hygiene practices and they found that most of food workers wash their hands before and after using gloves and wear gloves before touching and distributing unwrapped foods. Howells et al. (2008) conducted a study in USA concerning food safety practices of restaurant employees with food production responsibilities and they determined three basic barriers to food safety practices namely cleaning and sanitizing, hand washing, and use of thermometer. Their study results showed that inadequate and unqualified training, time limitations, insufficient resources, and lack of implementation were barriers for food safety practices. Another study was conducted by Omemu and Aderoju (2007) analyzing food vendors' food safety knowledge and practices in Nigeria and they found that most of the participants did not see washing hands as a requirement after a scratch or while preparing foods. Green et al. (2005) made a research on food service workers' food safety practices that work in chain and independent restaurants in USA and their study results showed that most of the food service workers handled both ready-to-eat food and raw meat or poultry at work, wash their hands and renew gloves while contact with raw meat and ready-to-eat food.

The relation of food safety attitude and practice

Many studies have been conducted worldwide investigating the attitudes and practices of food handlers food safety (Akabanda et al., 2017; Al-Shabib et al., 2016; Annor & Baiden, 2011; Ansari-Lari, Soodbakhsh, & Lakzadeh, 2010; Askarian, Gholamhosein, Aminbaig, Memish, & Jafari, 2004; Asmawi et al., 2018; Bas, Ersun, & Kıvanc, 2006; da Cunha et al., 2014; Elobeid et al., 2019; Faour-Klingbeil et al., 2015; Ko, 2013; Kunadu et al., 2016; Liu et al., 2015; Manning & Snider, 1993; McIntyre, Vallaster, Wilcott, Henderson, & Kosatsky, 2013; Mortlock, Peters, & Griffith, 1999; Nee & Sani, 2011; Sani & Siow, 2014; Tokuc et al., 2009). When studies conducted on managers, employees, and customers' food safety attitudes and practices are examined, it is observed that the studies have intensified on food and beverage businesses. This is especially true in regards to Ghana, Vietnam, Saudi Arabia, Lebanon, Malaysia, China, Brazil, Slovenia, and Turkey in the last two decades (Al-Shabib et al., 2016; Bas, Yuksel, & Cavusoglu, 2007; Baser et al., 2017; da Cunha et al., 2014; Faour-Klingbeil et al., 2015; Jevšnik, Hlebec, & Raspor, 2008; Kunadu et al., 2016; Liu et al., 2015; Samapundo, Thanh, Xhaferi, & Devlieghere, 2016; Sani & Siow, 2014). Some of these studies supported the positive relationship between attitudes and practices related to food safety. For example, Elobeid et al. (2019) made a study to investigate food safety knowledge, attitudes and practices of fast food workers in Qatar, and they found positive correlation between food safety attitudes and practices of workers.

Asmawi et al. (2018) carried out a study to examine the aspects of attitude and practices about food hygiene and safety issues among food handlers working in food courts in Malaysia and they found a positive and strong relation between food safety attitudes and practices. Similarly, Baser et al. (2017) conducted a study in order to search the food safety attitudes and behaviors of hotel personnel in Turkey, and their study results showed that a high correlation between food safety attitudes and behaviors is determined.

Sani and Siow (2014) held a study to specify attitudes and practices level of food workers in food operations regarding food safety in Malaysia, and they determined significantly positive correlation between food safety attitudes and practices. However, some studies found no relation between variables. Such as, Ko (2013) made a study in

Taiwan to investigate relationship between knowledge, attitudes, and hazard analysis critical control points (HACCP) practices of restaurant employees and study results showed that there are relations among knowledge, attitudes, and practices; but could not find a relation between food safety attitudes and practices. Rebouças et al. (2017) also made a study to assess knowledge, attitudes and practices of food workers, executive chefs and restaurant managers working at hotel in Salvador, Brazil, and they did not find any relation between knowledge, attitude and practice among groups.

Although there are many studies in the scientific literature examining food safety attitudes and practices, there are limited studies which examined food safety attitudes and practices among chefs in the hospitality industry worldwide and especially in Turkey which hosted over 40 million tourists in 2018. This situation enhances the importance and probability of contribution to the scientific literature of this study. Studies investigating food safety attitude and practice among food handlers in the scientific literature are summarized in detail in Table 1.

Methodology

This study, which was conducted to explore the food safety attitudes and practices of the chefs, has the characteristic of descriptive research and the quantitative research method has been used within the scope of the research. In this context, the deductive approach has been adopted as a research method and in the following subtitles; detailed information about the research method is given.

Sample

The Cappadocia region, one of the most important tourist destinations in Turkey, hosts more than two million international tourists every year. Naturally, there are many accommodation and food and beverage businesses operating in the region. This situation increases the rate of service need in the local food and beverage sector for tourists and local people living in the Cappadocia region. Because of this demand rise, food safety concerns have also risen.

A field study was conducted to explore the attitudes and practices of chefs toward food safety in this study. The population of the study consists of all chefs working in the Cappadocia region. In this context, in order to reach the chefs working in the Cappadocia region, assistance was needed and received from cook associations in the Cappadocia region affiliated with the Cooks Federation of Turkey (TAFED). Although needed assistance was provided, totally 108 chefs from 21 food and beverage establishments (hotels, restaurants, and public institutions) participated in the study on a voluntary basis.

Questionnaire

The questionnaire used in the study consisted of demographic questions and scale items of attitudes and practices related to food safety which was developed by Bas et al. (2006). The questionnaire is divided into three parts: demographics (9 questions), attitudes (10 items), and practices (10 items). A five-point Likert-type scale was used for the evaluation of the items. In this context, chefs were asked to score 1 = *strongly disagree* and 5 = *strongly agree* for attitudes and 1 = *never* and 5 = *always for practices*.

Table 1. Studies related to food safety attitudes and practices.

Reference	Study	Country and Year of Publication	Aim	Methodology	Findings
Elobeid et al.	Impact of food safety training on the knowledge, practice, and attitudes of food handlers working in fast-food restaurants	Qatar, 2019	To investigate the food safety knowledge, attitudes and practices (KAP) of fast food handlers in Qatar.	102 fast-food handlers through a structured survey	An important direct relationship was found with regard to food safety knowledge, attitudes and practices. The results showed that participants did not know the proper procedures for proper cleaning of equipment, cross-contamination, foodborne diseases, food hazard zone and thawing of frozen foods.
Asmawi et al.	An assessment of knowledge, attitudes and practices in food safety among food handlers engaged in food courts	Malaysia, 2018	To evaluate the aspects of knowledge, attitude, and practices about food hygiene and safety issues among food handlers who are working in food courts.	108 food handlers who are working food courts in Petaling Jaya, Malaysia during June and July 2017	Positive correlations were observed between knowledge and attitudes, between attitudes and practices, and between knowledge and practices. There is the strongest relationship between average attitude score and average practice score.
Akabanda et al.	Food safety knowledge, attitudes and practices of institutional food-handlers in Ghana	Ghana, 2017	To evaluate the food safety knowledge, attitudes, and practices among institutional food- handlers in Ghana.	235 institutional food handlers who are working in 29 different institutions in Ghana by conducting face to face interview and administration of questionnaire	The results show that food processors are knowledgeable about hygienic practices, cleaning and sanitation procedures. Almost all food processors, general sanitary applications in the workplace, hand washing (98.7%), the use of gloves (77.9%), the proper cleaning of tools/equipment (86.4%) and the use of detergents (72.8%).

(*Continued*)

Table 1. (Continued).

Reference	Study	Country and Year of Publication	Aim	Methodology	Findings
Rebouças et al.	Food safety knowledge and practices of food handlers, head chefs and managers in hotels' restaurants of Salvador, Brazil	Brazil, 2017	To assess the knowledge level, attitudes and practices of food handlers, and knowledge and practices of head chefs and managers in hotels' restaurants of Salvador, Brazil.	Interviews with 265 food handlers and with 32 head chefs and managers	Statistical analysis showed that there was not any significant relationship between knowledge, attitudes and self-reported practices of food handlers. Concerning chefs and managers, the results show that the knowledge is insufficient, even that 75% of the participants have a training certificate on food safety.
Baser et al.	Structural modeling of the relationship among food safety knowledge, attitude and behavior of hotel staff in Turkey	Turkey, 2017	To examine the food safety knowledge, attitude and behavior of staff working in hotels in Turkey, and to investigate the effects of these determinants on each other.	A survey is performed with 498 staff who work for different positions in the hotels.	As a result, it is determined that food safety knowledge has not a significant influence on food safety behavior. However, there is a high correlation between food safety attitude and behavior, and a medium correlation between food safety knowledge and attitude.
Kunadu et al.	Food safety knowledge, attitudes and self-reported practices of food handlers in institutional foodservice in Accra, Ghana	Ghana, 2016	To evaluate the food safety knowledge, attitude and practices of food handlers from institutional food service establishments that serve hospitals, boarding senior high schools and prisons in Accra, Ghana.	A total of 278 food handlers (56.8% of hospital, 30.9% of schools and 12.3% of prison food service) participated in the cross-sectional study. Data was collected by face-to-face interviews	Results showed that respondents generally had insufficient food safety knowledge and practices. Attitudes toward food safety were generally negative.
Al-Shabib et al.	Cross-sectional study on food safety knowledge, attitude and practices of male food handlers employed in restaurants of King Saud University, Saudi Arabia	Saudi Arabia, 2016	To evaluate their food safety knowledge, attitude and practices.	87 food handlers employed in the King Saud University, Riyadh, SA	Present data high-lights that most of the workers have good knowledge regarding personal hygiene, food borne diseases and cross contamination related to food safety. The results show that the food handlers had excellent practices toward food and personal hygiene. Attitude is also a crucial factor that influences food safety; food handlers' attitudes were favorable.

Faour-Klingbeil et al.	Investigating a link of two different types of food business management to the food safety knowledge, attitudes and practices of food handlers in Beirut, Lebanon	Lebanon, 2015	To evaluate the knowledge, attitudes and practices related to food safety of food handlers who are working in traditional and modern food businesses.	A survey was conducted in Beirut to 80 food handlers in 50 food service establishments	Results shows that while respondents have limited knowledge of some aspects of food safety, substantial gaps in their knowledge and self-reported practices associated with critical temperature of foods and cross contamination remain, therefore posing health risks to consumer health. Food handlers in corporate managed food outlets showed a significantly higher awareness on food safe practices.
Liu et al.	Knowledge, attitude and practices of food safety amongst food handlers in the coastal resort of Guangdong, China	China, 2015	To evaluate the knowledge, attitudes and practices of food safety among food handlers.	A survey was conducted to 171 food handlers from 22 food establishments	The majority of respondents didn't know the maximum stored time at room temperature and the most common agent of food borne disease in seafood. Most of the respondents' attitudes about food safety and training were positive. When asked about the practices undertaken, about one-fifth of the respondents admitted they had mixed food (raw and cooked) containers in varying degrees.
Sani & Siow	Knowledge, attitudes and practices of food handlers on food safety in food service operations at the University Kebangsaan Malaysia	Malaysia, 2014	To determine the level of knowledge, attitudes and practices of food handlers in food service operation at the main campus of University Kebangsaan, Malaysia regarding food safety.	A survey was conducted to 112 food handlers	The results showed that there was significantly positive correlation among the three levels and respondents possess good scores for knowledge about personal hygiene, food borne diseases and temperature control of food; for attitudes on safe food handling, and for practices, specifically for appropriate hand washing, use of gloves in food preparation and prevention of food hazards.

(*Continued*)

Table 1. (Continued).

Reference	Study	Country and Year of Publication	Aim	Methodology	Findings
da Cunha et al.	The role of theoretical food safety training on Brazilian food handlers' knowledge, attitude and practice	Brazil, 2014	To identify the relationship of theoretical training with knowledge, attitudes, self-reported practices and observed practices and to identify variables that influence observed practices.	A survey was conducted to 183 randomly selected food handlers from different food businesses in Santos City, Brazil	This study showed that training based on theoretical aspects is not related to the attitudes, self-reported practices and observed practices of Brazilian food handlers from different food services. However, training seems to be an effective tool for improving knowledge.
McIntyre et al.	Evaluation of food safety knowledge, attitudes and self-reported hand washing practices in *FOODSAFE* trained and untrained food handlers in British Columbia, Canada	Canada, 2013	To examine food safety knowledge of trained food handlers certified under the *FOODSAFE* training program in British Columbia, Canada and to evaluate food safety knowledge, attitudes and self-reported hand washing practices in trained and untrained food handler groups.	A telephone survey was conducted to 499 *FOODSAFE* trained and 199 untrained food handlers	Knowledge scores were significantly higher in trained compared with untrained food handlers. *FOODSAFE* trained food handlers' reported significantly better hand washing practices and attitudes compared with the untrained food handler group.
Ko	The relationship among food safety knowledge, attitudes and self-reported *HACCP* practices in restaurant employees	Taiwan, 2013	To investigate relationships among food safety knowledge, attitudes and HACCP practices in restaurant employees in Taiwan.	A survey was conducted to 542 restaurant employees	This study found correlations among knowledge, attitude, and HACCP practices, with attitude mediating the relationship between knowledge and HACCP practices.
Nee & Sani	Assessment of knowledge, attitudes and practices (KAP) among food handlers at residential colleges and canteen regarding food safety	Malaysia, 2011	To evaluate the level of knowledge, attitudes and practices among food handlers at residential colleges and canteen in the main campus of University Kebangsaan, Malaysia regarding the aspect of food hygiene and safety.	A survey was conducted to 65 food handlers from two residential colleges' cafeterias and one Faculty of Science and Technology's canteen	Analysis tests showed significant difference ($p < .05$) between the relationship of respondents' knowledge with their working experiences ($p = .008$), attitudes with training attended ($p = .006$) and practices with gender ($p = .032$).

Annor & Baiden	Evaluation of food hygiene knowledge attitudes and practices of food handlers in food businesses in Accra, Ghana	Ghana, 2011	To document the food hygiene knowledge, attitudes and practices of some food handlers, in food businesses in Accra, Ghana and to determine the microbiological load of the foods sold by the food businesses.	A survey was conducted 42 food handlers in the hotel industry	The results showed that the food hygiene knowledge and attitudes of the food handlers did not result in efficient food hygiene practices.
Ansari-Lari et al.	Knowledge, attitudes and practices of workers on food hygienic practices in meat processing plants in Fars, Iran	Iran, 2010	To evaluate the knowledge, attitudes and practices of food workers in four meat processing plants in the Fars province, southern Iran.	A self-administered, structured questionnaire was designed and completed by 97 food workers during November 2006–January 2007.	Results indicated that the respondents had acceptable level of knowledge, excellent attitudes and poor practices toward food hygiene measures.
Tokuç et al.	Knowledge, attitudes and self-reported practices of food service staff regarding food hygiene in Edirne, Turkey	Turkey, 2009	To evaluate the knowledge, attitudes and practices among food service staff with regards to food hygiene in hospitals in Edirne, Turkey, and to provide baseline data for implementing HACCP in hospital food service.	73 food handlers by conducting face to face interview and administration of questionnaire	The study showed that food service staffs in Edirne hospitals have insufficient knowledge regarding the basics of food hygiene. And also revealed a discrepancy between attitudes and practices toward food hygiene.
Bolton et al.	Food safety knowledge of head chefs and catering managers in Ireland	Ireland, 2008	To establish head chefs and catering managers' knowledge of food safety management and practice	200 head chefs and catering managers by conducting face to face interview	The results of this study show that although most Irish restaurant head chefs/chefs have a basic knowledge of some aspects of food safety and food safety practices, significant gaps remain that pose real risks to consumer health.
Baş et al.	The evaluation of food hygiene knowledge, attitudes, and practices of food handlers' in food businesses in Turkey	Turkey, 2006	To evaluate knowledge, attitudes, and practices concerning food safety issues among food handlers in Turkey	764 food handlers by conducting face to face interview and administration of questionnaire	The study of food handlers in food business in Turkey generally has shown that lack of knowledge about basic food hygiene.

(*Continued*)

Table 1. (Continued).

Reference	Study	Country and Year of Publication	Aim	Methodology	Findings
Askarian et al.	Knowledge, attitudes, and practices of food service staff regarding food hygiene in Shiraz, Iran	Iran, 2004	To evaluate the knowledge, attitudes, and practices of food service staff regarding food hygiene in government and private hospitals in Shiraz, Iran.	This survey was conducted from October to December 2001 involving all food service staff and their supervisors (in total 223) in all 31 government and private hospitals in Shiraz, Iran.	This study showed that staff had little knowledge of pathogens causing foodborne diseases and the correct temperature for the storage of food ready for hot or cold consumption. Most of the staff had positive attitudes, but there was inconsistency between attitude and practice.
Mortlock et al.	Food hygiene and hazard analysis critical control point in the United Kingdom food industry: practices, perceptions, and attitudes	United Kingdom, 1999	To evaluate food hygiene and HACCP practices, perceptions and attitudes in food industry in UK.	A mail survey was designed and distributed to 1,650 managers returned 254 managers.	The results showed that 69% of the producers use HACCP systems and occupational hygiene qualities are higher among business managers, and higher perceptions among food safety risk managers are significantly associated with HACCP use in all sectors. .
Manning et al.	Temporary public eating places: food safety knowledge, attitudes and practices	USA, 1993	To assess food safety knowledge, attitudes and practices of workers in temporary public eating places.	A survey conducted to 64 workers in 11 temporary establishments during three days at the Delaware State Fair.	In this study, it has been seen that some practices support defined knowledge and attitudes about temperature control and cross contamination, but other knowledge and attitudes related to personal hygiene and cross contamination have not been explained in the applications.

Data collection

Research data was collected through a questionnaire. The questionnaires were administered between the dates of September 15 and November 26 2018 by the researchers themselves, to the volunteer chefs. In this context, convenience sampling was used. This method involves getting participants wherever you can find them and normally wherever is convenient (Jackson, 2011, p. 119) and was preferred to obtain data quickly and economically. A total of 108 kitchen chefs, who were willing to fill out the questionnaire were included in the study.

Data analysis

The data was analyzed and evaluated using the statistic program for social sciences. A reliability analysis was also utilized to test the internal consistency. The results showed that the Cronbach's alpha coefficients for the 20 item-scale were quite high (0.922), and it was internally consistent and reliable. The alpha coefficient was calculated to be 0.867 for the first part of the scale and 0.945 for the second part with the split-half method. These results show that the scale used is highly reliable. In order to assess the distribution of the data, a normality test using skewness and kurtosis was applied. It was found that the scores were between −1.5 and +1.5 values of skewness (−0.767) and kurtosis (0.449), so the data was accepted as having normal distribution (George & Mallery, 2010; Tabachnick & Fidell, 2013) and it is suitable for performing parametric tests. The data was analyzed by using exploratory factor analysis, *t*-test, ANOVA, correlation, and regression. In the study, $p < .05$ was considered statistically significant.

Results

Profile of the respondents

Table 2 shows the demographics of the chefs participating in this study. Most of the chefs are male (88.9%), between the ages of 18 and 39 (74.1%) and high school graduates (40.7%). In addition, the majority of them are working in the position of chef (44.4%), working daily for 12 hours and more (38.9), have 10 years or less professional experience (61.1%), and working in restaurants (66.7%).

Dimension of food safety attitudes and practices

In order to reveal the factor structure of food safety attitudes and practices, exploratory factor analysis was conducted. In this context, firstly, KMO and Bartlett's tests were used to assess whether the data set was suitable. Since the KMO coefficient of the scale was greater than 0.80 (KMO = 0.893), the sample adequacy was evaluated as "very good" (Gray & Kinnear, 2012, p. 606). According to Bartlett's sphericity test, which is another conformity test, the test value of the scale ($p \leq 0.000$) was found to be 1521,306. In this context, factor analysis was performed because of the positive results obtained for the data analysis.

In factor analysis, in order to determine factor structure and to obtain significant factors, basic component analysis was selected. The varimax technique was used so that one of the vertical rotation techniques and the data with a factor load above 0.50 was accepted (Gray & Kinnear, 2012, pp. 608–610). In addition, it was found that an analytical factor consisted of at least three items. Factor analysis was performed within the stated rules and as a result of the

Table 2. Demographics and work related characteristics of the chefs.

	(*n*)	(%)		(*n*)	(%)
Gender			**Working position**		
Female	12	11,1	Executive chef	7	6,5
Male	96	88,9	Sous chef	14	13,0
Total	108	100	Chef de partie	20	18,5
Age			Chef	48	44,4
18–29	43	39,8	Prep-cook	17	15,7
30–39	37	34,3	*Total*	106	100
40–49	20	18,5	**Daily working hours**		
50 and above	7	6,5	8–9 hours	34	31,5
Total	108	100,0	10–11 hours	29	26,9
Marital status			12 hours and more	42	38,9
Married	54	50,0	*Total*	105	100
Single	54	50,0			
Total	108	100	**Working period in profession**		
Education			10 years and less	66	61,1
Primary school	17	15,7	11 years and more	42	38,9
Middle school	34	31,5	*Total*	108	100
High school	44	40,7	**Type of business**		
Bachelor's degree	12	11,1	Hotel	22	20,4
Postgraduate	1	0,9	Restaurant	72	66,7
Total	108	100	Public Institution	9	8,3
Food safety training status			Other	5	4,6
Yes	86	79,6	*Total*	108	100
No	22	20,4			
Total	108	100			

removal of the item "defrosted foods may be refrozen only once", factor analysis was applied to the last 19 items. The results of factor analysis are shown in Table 3.

The first factor "practice" which is the result of factor analysis includes 10 items. The first factor has an eigenvalue of 9.002 and explains 35.735% of the total variance. The reliability coefficients of the first factor were 0.945. The second factor "attitude" consists of nine items, with an eigenvalue of 3.010. The second factor explained 27.487% of the total variance and the reliability coefficient was determined to be 0.906.

ANOVA and t-test results

The ANOVA and *t*-test were used in order to determine whether chefs' attitudes and practices toward food safety differ according to demographics and work related characteristics. An independent-groups *t*-test is used when there is an interval-ratio data, a between-participants design, and one independent variable with two levels (Jackson, 2011, p. 366). ANOVA, also referred to as variance analysis, was used to investigate whether the arithmetic mean values of three or more independent variables were different (Jackson, 2011, p. 298).

The *t*-test was applied to determine whether food safety attitudes and practices of the chefs differ according to gender, marital status, working period in the profession, and food safety training status. In order to test the homogeneity of variance, the results of the Levene test were examined and it was observed that the variance of the attitudes and practices toward food safety was homogeneous ($p > .05$). The *t*-test results are shown in Table 4.

It was determined that chefs' attitudes toward food safety did not show significant differences according to gender or occupational experience ($p > .05$), whereas there were significant differences according to marital status ($p = .048$) and food safety education

Table 3. Results of exploratory factor analysis.

Items	Factor Loadings 1	2	Communalities	Eigenvalue	% of Variance	Mean	Alpha
Practice							
Do you use gloves when you touch or distribute unwrapped foods?	,811		,707	9,002	35,735	4,05	0,945
Do you wash your hands before using gloves?	,825		,721			3,98	
Do you wash your hands after using gloves?	,788		,685			4,15	
Do you use protective clothing when you touch or distribute unwrapped foods?	,789		,658			4,00	
Do you use a mask when you touch or distribute unwrapped foods?	,744		,557			3,92	
Do you wear a cap when you touch or distribute unwrapped foods?	,759		,591			4,25	
Do you wash your hands before touching unwrapped raw foods?	,811		,701			4,11	
Do you wash your hands after touching unwrapped raw foods?	,807		,706			4,14	
Do you wash your hands before touching unwrapped cooked foods?	,793		,689			4,21	
Do you wash your hands after touching unwrapped cooked foods?	,830		,762			4,22	
Attitude							
Safe food handling is an important part of my job responsibilities		,758	,645	3,010	27,487	4,35	0,906
Learning more about food safety is important to me		,783	,699			4,31	
I believe that how I handle food relates to food safety		,737	,546			4,31	
Raw foods should be kept separately from cooked foods		,631	,477			4,37	
Using cap, masks, protective gloves, and adequate clothing reduces the risk of food contamination		,785	,622			4,32	
It is important to know the temperature of the refrigerator to reduce the risk of food safety		,792	,640			4,27	
It is necessary to check thermometer settings of refrigerators and freezers once per day		,713	,611			4,37	
Improper storage of foods may be hazardous to health		,714	,586			4,24	
Food-services staff with abrasion or cuts on fingers or hands should not touch unwrapped foods (do not cover cuts with easily detectable plasters)		,628	,409			4,35	

Extraction method: Principal Component Analysis; **Rotation method**: Varimax;
Kaiser-Meyer-Olkin sampling adequacy:,893; **Bartlett's test of sphericity**: 1521,306; ***d.f.***: 190; $p <$,000;
Total Variance Explained: %63,223; **Total Cronbach's Alpha**: 0,936;
Scale levels: 1. *Strongly disagree*, 2. *Disagree*, 3. *Neither disagree nor agree*, 4. *Agree*, 5. *Strongly agree*.

(p = .003). Similarly, chefs' food safety practices did not show significant differences in terms of gender or occupational experience (p > .05), whereas there were significant differences according to marital status (p = .015) and food safety training (p = .000).

ANOVA was conducted to determine whether chefs' attitudes and practices toward food safety differs significantly according to age groups, education, working position, daily working hours, and type of business. In order to test the homogeneity of variance, the results of the Levene test were examined and it was observed that the variance of the attitudes and practices toward food safety was homogeneous (p > .05).

When the ANOVA results are examined in Table 5, it was found that chefs' attitudes toward food safety did not show significant differences according to age group, daily working hours and type of business (p > .05). There were significant differences (Tukey test) according to education

Table 4. Results of *t*-test.

	Variables	*n*	Mean	Standard deviation	*t*-value	*d.f.*	*p*
Food Safety Attitude	Female	12	4,0926	,82719	−1,359	106	,177
	Male	96	4,3548	,60310			
	Married	54	4,4455	,58902	1,997	106	**,048**
	Single	54	4,2058	,65695			
	10 years and less working experience	66	4,2862	,66526	-,811	106	,419
	11 years and more working experience	42	4,3877	,57981			
	Chefs who received food safety training	86	4,4154	,56329	3,025	106	**,003**
	Chefs who did not receive food safety training	22	3,9747	,76975			
Food Safety Practice	Female	12	3,7167	1,01070	−1,959	106	,053
	Male	96	4,1549	,69119			
	Married	54	4,2792	,66534	2,485	106	**,015**
	Single	54	3,9333	,77679			
	10 years and less working experience	66	4,0955	,78709	−,189	106	,850
	11 years and more working experience	42	4,1232	,66960			
	Chefs who received food safety training	86	4,2427	,65263	4,051	106	**,000**
	Chefs who did not receive food safety training	22	3,5727	,83391			

*n: 108; Confidence interval %95; Significance level: $p < 0.05$; Scale levels: 1. *Strongly disagree*, 2. *Disagree*, 3. *Neither disagree nor agree*, 4. *Agree*, 5. *Strongly agree*.

($p = .041$) and working position ($p = .007$). Food safety practices of chefs did not show significant differences (Tukey test) according to age group, education, or daily working hours ($p > .05$), whereas working position ($p = .038$) and type of business ($p = .028$) were significant.

Correlation and regression analyses results

Correlation analysis was used to determine the relationship between food safety attitudes and practices of chefs.

As seen in Table 6, a statistically significant ($p < .001$) and positive correlation ($r = 0.484$) was found between food safety attitudes and practices of chefs. In other words, as the attitudes toward food safety increase, practices also increase. As food safety attitudes decrease, practices also decrease.

Linear regression analysis was performed to examine the independent variable food safety attitudes effects on dependent variable food safety practices (Table 7).

According to the results of the analysis, the model is valid as a whole ($F_{1.151} = 32.437$; s.d.: 1; $p < .001$) and the interpretation can be made based on this model. This model demonstrates that 23.4% of chefs' practices for food safety can be explained by attitudes toward food safety. According to the model, a one-unit increase in the attitude toward food safety leads to an increase of 0.567 units in food safety practice.

Discussion and implications

This study showed that most of the participant chefs are working in restaurants for less than 10 years, between the ages of 18 and 39, high school graduates, and male. The average of chefs about food safety attitudes and practices is generally positive and above average. Unlike an earlier study on food handlers in Turkey (Bas et al., 2006), which stated that 47.8% of food handlers did not have food safety training, this study conducted in the

Table 5. Results of ANOVA.

	Variables	*n*	Mean	Standard Deviation	*F* Value	*p*	
Food Safety Attitude	A	18–29	43	4,2584	,73252	1,735	,165
	B	30–39	37	4,4813	,44686		
	C	40–49	20	4,3792	,55154		
	D	50 and more	7	3,9841	,70105		
	A	Primary school	17	4,0672	,68855	2,591	**,041**
	B	Middle school	34	4,4608	,58420		
	C	High school	44	4,2178	,66104		
	D	Bachelor's degree	12	4,6944	,33876		
	E	Postgraduate	1	4,4444	.		
	A	Executive chef	7	4,2381	,46004	3,729	**,007**
	B	Sous chef	14	4,3730	,57257		
	C	Chef de partie	20	4,4333	,63358		
	D	Chef	48	4,4619	,51181		
	E	Prep-cook	17	3,8235	,85622		
	A	8–9 hours	34	4,3906	,64917	,686	,506
	B	10–11 hours	29	4,2031	,60427		
	C	12 hours and more	42	4,3175	,64629		
	A	Hotel	22	4,3030	,73637	,505	,680
	B	Restaurant	72	4,3426	,60103		
	C	Public Institution	9	4,1270	,76062		
	D	Other	5	4,5389	,36620		
Food Safety Practice	A	18–29	43	3,9948	,81911	2,259	,086
	B	30–39	37	4,3054	,63985		
	C	40–49	20	4,1400	,78566		
	D	50 and more	7	3,6286	,25635		
	A	Primary school	17	4,1059	,83402	,400	,808
	B	Middle school	34	4,2169	,76358		
	C	High school	44	4,0614	,67933		
	D	Bachelor's degree	12	4,0000	,82902		
	E	Postgraduate	1	3,6000	.		
	A	Executive chef	7	3,7714	,79102	2,639	**,038**
	B	Sous chef	14	4,0071	,47792		
	C	Chef de partie	20	4,3138	,67985		
	D	Chef	48	4,2521	,71696		
	E	Prep-cook	17	3,7059	,90862		
	A	8–9 hours	34	3,9029	,80547	2,931	,058
	B	10–11 hours	29	4,0026	,64946		
	C	12 hours and more	42	4,2905	,71014		
	A	Hotel	22	3,7091	,89863	3,146	**,028**
	B	Restaurant	72	4,2052	,68226		
	C	Public institution	9	4,0778	,60782		
	D	Other	5	4,4800	,45497		

*n: 108; Confidence interval %95; Significance level: $p < .05$; Scale levels: 1. *Strongly disagree*, 2. *Disagree*, 3. *Neither disagree nor agree*, 4. *Agree*, 5. *Strongly agree*.

Table 6. Results of correlation analysis between food safety attitudes and practices.

	Mean	Std. Dev.	1	2
Food Safety Attitude	4,3257	,63256	-	,484**
Food Safety Practice	4,1063	,74049	,484**	-

**Correlation is significant at the 0,01 level (2-tailed).

Cappadocia region showed that 79.6% of chefs have food safety training. Additionally, food safety trained chefs have higher scores in terms of both attitudes and practices than those who have not received. It can be said that this result supports the Rahman, Arif, Bakar, and Tambi (2012), McIntyre et al. (2013), da Cunha et al. (2014), and Rebouças

Table 7. Results of Simple linear regression of the food safety attitudes and practices.

	Unstandardized Coefficients		Standardized Coefficients		
Model	*B*	Std. Error	Beta	*t*	*p*
(Constant)	1,655	,435		3,806	,000
Food Safety Attitude	,567	,099	,484	5,695	,000

Dependent Variable: Food Safety Practice
R: 0,484; R^2:0,234; **Adjusted** R^2: 0,227; **Model** $F_{1,151}$: 32,437; $p < 0{,}001$; ***d.f.***: 1; **D-W**: 1,978.

et al. (2017) studies. These studies also stated that food safety trained people get higher scores in food safety applications than those who do not. Abdul-Mutalib et al. (2012) also stated that the appropriate knowledge for food safety causes good attitudes and practices. In this context, contrary to the findings of many researchers in literature (Jevšnik et al., 2008; Lange, Göranzon, & Marklinder, 2014; Redmond & Griffith, 2003), in this study, positive results have been obtained in both attitudes and practices.

On the basis of means toward food safety attitudes, it can be said that male chefs have higher attitude scores than female chefs, chefs with 11 years and more experience have higher scores than chefs with less experience, and married chefs have higher scores than single chefs. In addition, while the chefs between the ages of 30–39 have higher scores than other age groups, chefs with a bachelor's degree have higher scores than other education levels. Furthermore, according to the working position, chefs have higher scores than other positions, and chefs working 8–9 hours daily have higher scores, and chefs working in restaurants have higher scores than chefs working in other businesses.

When the chefs' food safety practice means are examined, it is seen that the means changed according to the groups. It is understood that the chefs between the ages of 18 and 29 have higher practice scores than other age groups, and secondary school graduates have higher scores than other education levels, and chef de parties have higher scores than other positions. The differences related to the mean levels of the chefs regarding attitudes and practices toward food safety are seen in many similar studies (Abdullahi et al., 2016; Abdul-Mutalib et al., 2012; Sanlier & Konaklioglu, 2012).

In this study, it is considered as an important finding that the attitudes toward food safety differ according to the marital status of the chefs, the level of education, working position, and food safety training status. In addition, it is considered as an important finding that the food safety practices are statistically different according to the marital status of the chefs, food safety training status, working position, and type of business they work. There are several possible explanations for these results. The reasons for these differences can be socio-cultural, socio-economic, or professional. Female chefs in the food and beverage sector has increased in recent years, and it is normal to assume that male chefs are more aware of their attitudes and practices with the experience of working in this sector for many years. In addition, it is reasonable that chefs' attitudes and practices toward food safety are more positive as the experience period increases. Moreover, it can be said that the culture of cooking at home in Turkey contributes food safety attitudes and practices of married chefs more positive. Furthermore, it can be said that employees as chefs and chef de parties pay more attention to attitudes and practices toward food safety in order to achieve their career goals.

Another important finding of the study is that there is a middle-level positive relationship ($r = 0.48$) at attitudes and practices. This result supports the findings of Tan, Bakar, Karim, Lee, and Mahyudin (2013), Zanin, da Cunha, Stedefeldt, and Capriles (2015), and Dudeja, Singh, Sahni, Kaur, and Goel (2017) studies. In supportive nature, regression analysis showed that food safety attitudes had a statistically significant low-level positive effect ($r^2 = 0.23$) on food safety practices.

Practically, the findings of this study demonstrated that chefs in restaurants, hotels, and public institutions have high-level food safety attitudes and practices. It is extremely important that substantive food safety theoretical education and practical training should be provided for all chefs in both new recruitments and all working positions. The results of the study showed that males had higher attitudes and practices than females, 30–39 years of aged chefs had higher attitudes and practices than other age groups, married chefs had higher attitudes and practices than singles, chefs and chef de parties had higher attitudes and practices than other positions, 11 years and more experienced chefs had higher attitudes and practices than less experienced chefs. In this context, it can be said that the employment of chefs in the mentioned demographics in food and beverage establishments may have more productive results in practices. In addition, executives of food and beverage establishments may be advised to take steps to fill the gap by having in-service trainings on food safety for chefs other than the above-mentioned demographics. Furthermore, since chefs working in hotel and restaurant establishments, which are important elements of tourism sector, have lower attitudes and practices than chefs working in other establishments, it may be suggested that all chefs working in these establishments should receive periodic food safety training.

Conclusions and limitations

In general, it can be said that the attitudes and practices of chefs toward food safety in the tourism sector are above average. Therefore, it is important to employ the chefs who have received food safety training especially in the employment process and the chefs who have not been trained should receive food safety training. In food and beverage establishments, meeting the food safety conditions of the products as well as the taste, appearance, and presentation are extremely important in terms of service quality, customer satisfaction, and loyalty. In this context, it may be suggested that the executives of the food and beverage establishments should seriously inspect the existing food safety practices of chefs and make continuous improvements.

There are some limitations of this study. Firstly, due to the small number of chefs working in the Cappadocia region, the sample was limited despite all our efforts. In addition, although the reliability coefficient is high, the interpretation of the findings is limited due to the possibility that participant chiefs can respond to the statements as they should be. This situation requires the evaluation of the results in this context.

It is recommended that further studies should be carried out with different methods, samples, cultures, geographies, and professions. Benchmark studies can also be carried out according to the development level of countries.

Acknowledgments

The authors thank the Cook Associations in the Cappadocia region for their contribution and assistance in the data collection process. The authors additionally thank all chefs who participated in this research.

ORCID

Reha Kılıçhan http://orcid.org/0000-0003-2570-5771
Harun Çalhan http://orcid.org/0000-0002-7256-2411
Mehmet Umur http://orcid.org/0000-0001-8996-3687

References

Abdullahi, A., Hassan, A., Kadarman, N., Saleh, A., Baraya, Y. S., & Lua, P. L. (2016). Food safety knowledge, attitude, and practice toward compliance with abattoir laws among the abattoir workers in Malaysia. *International Journal of General Medicine*, *9*, 79–87. doi:10.2147/IJGM.S98436

Abdul-Mutalib, N. A., Abdul-Rashid, M. F., Mustafa, S., Amin-Nordin, S., Hamat, R. A., & Osmana, M. (2012). Knowledge, attitude and practices regarding food hygiene and sanitation of food handlers in Kuala Pilah, Malaysia. *Food Control*, *27*(2), 289–293. doi:10.1016/j.foodcont.2012.04.001

Afolaranmi, T. O., Hassan, Z. I., Bello, D. A., & Misari, Z. (2015). Knowledge and practice of food safety and hygiene among food vendors in primary schools in Jos, Plateau State, North Central Nigeria. *Journal of Medical Research*, *4*(2), 016–22.

Akabanda, F., Hlortsi, E. H., & Owusu-Kwarteng, J. (2017). Food safety knowledge, attitudes and practices of institutional food-handlers in Ghana. *BMC Public Health*, *17*, 40–48. doi:10.1186/s12889-016-3986-9

Al-Shabib, N. A., Mosilhey, S. H., & Husain, F. M. (2016). Cross-sectional study on food safety knowledge, attitude and practices of male food handlers employed in restaurants of King Saud University, Saudi Arabia. *Food Control*, *59*, 212–217. doi:10.1016/j.foodcont.2015.05.002

Angelillo, I. F., Viggiani, N. M. A., Rizzo, L., & Bianco, A. (2000). Food handlers and foodborne diseases: Knowledge, attitudes and reported behavior in Italy. *Journal of Food Protection*, *63*(3), 381–385. doi:10.4315/0362-028X-63.3.381

Angelo, K. M., Nisler, A. L., Hall, A. J., Brown, L. G., & Gould, L. H. (2017). Epidemiology of restaurant-associated foodborne disease outbreaks, United States, 1998-2013. *Epidemiol Infect*, *145*, 523–534. doi:10.1017/S0950268816002314

Annor, G. A., & Baiden, E. A. (2011). Evaluation of food hygiene knowledge attitudes and practices of food handlers in food businesses in Accra, Ghana. *Food and Nutrition Sciences*, *2*, 830–836. doi:10.4236/fns.2011.28114

Ansari-Lari, M., Soodbakhsh, S., & Lakzadeh, L. (2010). Knowledge, attitudes and practices of workers on food hygienic practices in meat processing plants in Fars, Iran. *Food Control*, *21*, 260–263. doi:10.1016/j.foodcont.2009.06.003

Artık, N., Sanlıer, N., & Ceyhun Sezgin, A. (2017). *Gıda güvenliği ve gıda mevzuatı*. Ankara, Turkey: Detay Yayıncılık.

Askarian, M., Gholamhosein, K., Aminbaig, M., Memish, Z. A., & Jafari, P. (2004). Knowledge, attitudes, and practices of food service staff regarding food hygiene in Shiraz, Iran. *Infection Control & Hospital Epidemiology*, *25*(1), 16–20. doi:10.1086/502285

Asmawi, U. M. M., Norehan, A. A., Salikin, K., Rosdi, N. A. S., Munir, N. A. T. A., Basri, N. B. M., … Nor, N. M. (2018). An assessment of knowledge, attitudes and practices in food safety among food handlers engaged in food courts. *Current Research in Nutrition and Food Science*, *6*(2), 346–353. doi:10.12944/CRNFSJ.6.2.09

Barjaktarović-Labović, S., Mugoša, B., Andrejević, V., Banjari, I., Jovićević, L., Djurović, D., & Radojlović, J. (2018). Food hygiene awareness and practices before and after intervention in food services in Montenegro. *Food Control*, *85*, 466–471. doi:10.1016/j.foodcont.2017.10.032

Bas, M., Ersun, A. S., & Kıvanc, G. (2006). The evaluation of food hygiene knowledge, attitudes, and practices of food handlers in food businesses in Turkey. *Food Control*, *17*(4), 317–322. doi:10.1016/j.foodcont.2004.11.006

Bas, M., Yuksel, M., & Cavusoglu, T. (2007). Difficulties and barriers for the implementing of HACCP and food safety systems in food businesses in Turkey. *Food Control*, *18*(2), 124–130. doi:10.1016/j.foodcont.2005.09.002

Baser, F., Ture, H., Abubakirova, A., Sanlier, N., & Cil, B. (2017). Structural modeling of the relationship among food safety knowledge, attitude and behavior of hotel staff in Turkey. *Food Control*, *73*, 438–444. doi:10.1016/j.foodcont.2016.08.032

Bolton, D. J., Meally, A., Blair, I. S., McDowell, D. A., & Cowan, C. (2008). Food safety knowledge of head chefs and catering managers in Ireland. *Food Control*, *19*(3), 291–300. doi:10.1016/j.foodcont.2007.04.006

Choudhury, M., Mahanta, L., Goswami, J., Mazumder, M., & Pegoo, B. (2011). Socio-economic profile and food safety knowledge and practice of street food vendors in the city of Guwahati, Assam, India. *Food Control*, *22*, 196–203. doi:10.1016/j.foodcont.2010.06.020

Cohen, E., & Avieli, N. (2004). Food in tourism: Attraction and impediment. *Annals of Tourism Research*, *31*(4), 755–778. doi:10.1016/j.annals.2004.02.003

da Cunha, D. T., Stedefeldt, E., & de Rosso, V. V. (2014). The role of theoretical food safety training on Brazilian food handlers' knowledge, attitude and practice. *Food Control*, *43*, 167–174. doi:10.1016/j.foodcont.2014.03.012

Dudeja, L. C. P., Singh, A., Sahni, N., Kaur, S., & Goel, S. (2017). Effectiveness of an intervention package on knowledge, attitude, and practices of food handlers in a tertiary care hospital of north India: A before and after comparison study. *Medical Journal Armed Forces India*, *73*, 49–53. doi:10.1016/j.mjafi.2016.10.002

Elobeid, T., Ioannis, S., & Vijay, G. (2019). Impact of food safety training on the knowledge, practice, and attitudes of food handlers working in fast-food restaurants. *British Food Journal*, *121*(4), 937–949. doi:10.1108/BFJ-01-2019-0066

Faour-Klingbeil, D., Kuri, V., & Todd, E. (2015). Investigating a link of two different types of food business management to the food safety knowledge, attitudes and practices of food handlers in Beirut, Lebanon. *Food Control*, *55*, 166–175. doi:10.1016/j.foodcont.2015.02.045

Fischer, A. R. H., & Frewer, L. J. (2008). Food-safety practices in the domestic kitchen: Demographic, personality, and experiential determinants. *Journal of Applied Social Psychology*, *38*(11), 2859–2884. doi:10.1111/jasp.2008.38.issue-11

George, D., & Mallery, P. (2010). *SPSS for windows step by step*. A simple study guide and reference. Boston, MA, USA: Pearson Education.

Giritlioglu, I., Batman, O., & Tetik, N. (2011). The knowledge and practice of food safety and hygiene of cookery students in Turkey. *Food Control*, *22*(6), 838–842. doi:10.1016/j.foodcont.2010.09.016

Gizaw, Z., Gebrehiwot, M., Haile, D., & Teka, Z. (2014). Food safety knowledge, attitude and associated factors of food handlers working in substandard food establishments in Gondar Town, Northwest Ethiopia. *International Journal of Medical and Health Sciences Research*, *1*(4), 37–49.

Gray, C. D., & Kinnear, P. R. (2012). *IBM SPSS statistics 19 made simple*. Hove, East Sussex, UK: Psychology Press.

Green, L., Selman, C., Banerjee, A., Marcus, R., Medus, C., Angulo, F. J., … Buchanan, S.; EHS-Net Working Group. (2005). Food service workers' self-reported food preparation practices: An EHS-Net study. *International Journal of Hygiene and Environmental Health*, *208*(1–2), 27–35. doi:10.1016/j.ijheh.2005.01.005

Howells, A. D., Roberts, K. R., Shanklin, C. W., Pilling, V. K., Brannon, L. A., & Barrett, B. B. (2008). Restaurant employees' perceptions of barriers to three food safety practices. *Journal of the American Dietetic Association*, *108*(8), 1345–1349. doi:10.1016/j.jada.2008.05.010

Jackson, S. L. (2011). *Research methods: A modular approach* (2nd ed.). Belmont, CA: Wadsworth/Cengage Learning.

Jevšnik, M., Hlebec, V., & Raspor, P. (2008). Consumers' awareness of food safety from shopping to eating. *Food Control*, *19*(8), 737–745. doi:10.1016/j.foodcont.2007.07.017

Kendall, H., Kaptan, G., Stewart, G., Grainger, M., Kuznesof, S., Naughton, P., … Frewer, L. J. (2018). Drivers of existing and emerging food safety risks: Expert opinion regarding multiple impacts. *Food Control*, *90*, 440–458. doi:10.1016/j.foodcont.2018.02.018

Kim, Y. G., Eves, A., & Scarles, C. (2009). Building a model of local food consumption on trips and holidays: A grounded theory approach. *International Journal of Hospitality Management*, *28*(3), 423–431. doi:10.1016/j.ijhm.2008.11.005

Ko, W. H. (2010). Evaluating food safety perceptions and practices for agricultural food handler. *Food Control*, *21*(4), 450–455. doi:10.1016/j.foodcont.2009.07.005

Ko, W. H. (2011). Food sanitation knowledge, attitude, and behavior for the university restaurants employees. *Food and Nutrition Sciences*, *2*(7), 744–750. doi:10.4236/fns.2011.27102

Ko, W. H. (2013). The relationship among food safety knowledge, attitudes and self-reported HACCP practices in restaurant employees. *Food Control*, *29*(1), 192–197. doi:10.1016/j.foodcont.2012.05.076

Kraus, S. J. (1995). Attitudes and the prediction of behaviour: A meta-analysis of the empirical literature. *Personality and Social Psychology Bulletin*, *21*, 58–75. doi:10.1177/0146167295211007

Kunadu, A. P. H., Ofosu, D. B., Aboagye, E., & Tano-Debrah, K. (2016). Food safety knowledge, attitudes and self-reported practices of food handlers in institutional foodservice in Accra, Ghana. *Food Control*, *69*, 324–330. doi:10.1016/j.foodcont.2016.05.011

Lange, M., Göranzon, H., & Marklinder, I. (2014). Teaching young consumers: Food safety in home and consumer studies from a teacher's perspective. *International Journal of Consumer Studies*, *38*, 357–366. doi:10.1111/ijcs.12108

Liu, S., Liu, Z., Zhang, H., Lu, L., & Huang, Q. (2015). Knowledge, attitude and practices of food safety amongst food handlers in the coastal resort of Guangdong, China. *Food Control*, *47*, 457–461. doi:10.1016/j.foodcont.2014.07.048

Manning, C. K., & Snider, O. S. (1993). Temporary public eating places: Food safety knowledge, attitudes and practices. *Journal of Environmental Health*, *56*(1), 24–28.

McIntyre, L., Vallaster, L., Wilcott, L., Henderson, S. B., & Kosatsky, T. (2013). Evaluation of food safety knowledge, attitudes and self-reported hand washing practices in FOODSAFE trained and untrained food handlers in British Columbia, Canada. *Food Control*, *30*(1), 150–156. doi:10.1016/j.foodcont.2012.06.034

Mizanur, R., Arif, M. T., Bakar, K., & Tambi, Z. (2012). Food safety knowledge, attitude and hygiene practices among the street food vendors in Northern Kuching City, Sarawak. *Borneo Science*, *31*, 107–116.

Moreaux, S., Adongo, C., Mensah, I., & Amuquandoh, F. E. (2018). There is information in the tails: Outliers in the food safety attitude-behaviour gap. *Food Control*, *87*, 161–168. doi:10.1016/j.foodcont.2017.12.024

Mortlock, M. P., Peters, A. C., & Griffith, C. J. (1999). Food hygiene and hazard analysis critical control point in the United Kingdom food industry: Practices, perceptions, and attitudes. *Journal of Food Protection*, *62*(7), 786–792. doi:10.4315/0362-028X-62.7.786

Nee, S. O., & Sani, N. A. (2011). Assessment of knowledge, attitudes and practices (KAP) among food handlers at residential colleges and canteen regarding food safety. *Sains Malaysiana*, *40*(4), 403–410.

Nik Husain, N. R., Wan Muda, W. M., Noor Jamil, N. I., Nik Hanafi, N. N., & Abdul Rahman, R. (2016). Effect of food safety training on food handlers' knowledge and practices: A randomized controlled trial. *British Food Journal*, *118*(4), 795–808. doi:10.1108/BFJ-08-2015-0294

Omari, R., Frempong, G. K., & Arthur, W. (2018). Public perceptions and worry about food safety hazards and risks in Ghana. *Food Control*, *93*, 76–82. doi:10.1016/j.foodcont.2018.05.026

Omemu, A. M., & Aderoju, S. T. (2007). Food safety knowledge and practices of street food vendors in the city of Abeokuta, Nigeria. *Food Control*, *19*(4), 396–402. doi:10.1016/j.foodcont.2007.04.021

Ovca, A., Jevšnik, M., Kavčič, M., & Raspor, P. (2018). Food safety knowledge and attitudes among future professional food handlers. *Food Control*, *84*, 345–353. doi:10.1016/j.foodcont.2017.08.011

Rahman, M. M., Arif, M. T., Bakar, K., & Tambi, Z. B. (2012). Food safety knowledge, attitude and hygiene practices among the street food vendors in northern Kuching City, Sarawak. *Borneo Science*, *31*, 95–103.

Ramnauth, M., Driver, F., & Vial, P. B. (2008). Food safety management in the fish industry in Mauritius: Knowledge, attitude and perception. *British Food Journal*, *110*(10), 989–1005. doi:10.1108/00070700810906615

Rebouças, L. T., Santiago, L. B., Martins, L. S., Menezes, A. C. R., Araújo, M. P. N., & Almeida, R. C. C. (2017). Food safety knowledge and practices of food handlers, head chefs and managers in hotels' restaurants of Salvador, Brazil. *Food Control*, *73*, 372–381. doi:10.1016/j.foodcont.2016.08.026

Redmond, E. C., & Griffith, C. J. (2003). Consumer food handling in the house: A review of food safety studies. *Journal of Food Protection*, *66*, 130–161. doi:10.4315/0362-028X-66.1.130

Samapundo, S., Thanh, T. C., Xhaferi, R., & Devlieghere, F. (2016). Food safety knowledge, attitudes and practices of street food vendors and consumers in Ho Chi Minh City, Vietnam. *Food Control*, *70*, 79–89. doi:10.1016/j.foodcont.2016.05.037

Sani, N. A., & Siow, O. N. (2014). Knowledge, attitudes and practices of food handlers on food safety in food service operations at the Universiti Kebangsaan Malaysia. *Food Control*, *37*, 210–217. doi:10.1016/j.foodcont.2013.09.036

Sanlier, N., & Konaklioglu, E. (2012). Food safety knowledge, attitude and food handling practices of students. *British Food Journal*, *114*, 469–480. doi:10.1108/00070701211219504

Sneed, J., Strohbehn, C., & Gilmore, S. A. (2004). Food safety practices and readiness to implement HACCP programs in assisted-living facilities in Iowa. *Journal of the American Dietetic Association*, *104*(11), 1678–1683. doi:10.1016/j.jada.2004.08.031

Sneed, J., & Strohbehn, C. H. (2008). Trends impacting food safety in retail foodservice: Implications for dietetics practice. *Journal of the American Dietetic Association*, *108*(7), 1170–1177. doi:10.1016/j.jada.2008.04.009

Stratev, D., Odeyemi, O. A., Pavlov, A., Kyuchukova, R., Fatehi, F., & Bamidele, F. A. (2017). Food safety knowledge and hygiene practices among veterinary medicine students at Trakia University, Bulgaria. *Journal of Infection and Public Health*, *10*(6), 778–782. doi:10.1016/j.jiph.2016.12.001

Tabachnick, B. G., & Fidell, L. S. (2013). *Using multivariate statistics* (6th ed.). Pearson: Boston, MA, USA.

Tan, L. T., Bakar, F. A., Karim, M. S. A., Lee, H. Y., & Mahyudin, N. A. (2013). Hand hygiene knowledge, attitudes and practices among food handlers at primary schools in Hulu Langat district, Selangor (Malaysia). *Food Control*, *34*(2), 428–435. doi:10.1016/j.foodcont.2013.04.045

Tokuc, B., Ekuklu, G., Berberoglu, U., Bilge, E., & Dedeler, H. (2009). Knowledge, attitudes and self-reported practices of food service staff regarding food hygiene in Edirne, Turkey. *Food Control*, *20*(6), 565–568. doi:10.1016/j.foodcont.2008.08.013

Trafialek, J., Domańska, A., & Kolanowski, W. (2019). Analysis of food safety compliance in Warsaw nurseries. *Food Control*, *96*, 421–431. doi:10.1016/j.foodcont.2018.09.039

Wu, Y. N., Liu, P., & Chen, J. S. (2018). Food safety risk assessment in China: Past, present and future. *Food Control*, *90*, 212–221. doi:10.1016/j.foodcont.2018.02.049

Zanin, L. M., da Cunha, D. T., Stedefeldt, E., & Capriles, V. D. (2015). Seafood safety: Knowledge, attitudes, self-reported practices and risk perception among seafood workers. *Food Research International*, *67*, 19–24. doi:10.1016/j.foodres.2014.10.013