# ASSESSMENT OF GOOD HYGIENIC PRACTICES AMONG FOOD HANDLERS IN SELECTED TOURISM ESTABLISHMENTS, 2022.

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## ABSTRACT

**Background:** Foodborne diseases remain a significant global public health issue, with personal hygiene practices, including handwashing, being critical risk factors. **Aim of the study:** This study aimed to identify factors related to food handlers' hand and personal hygiene practices to improve compliance with food safety legislation. **Materials and Methods:** Data was collected from 62 hotels in Greater Cairo, classified as three-, four-, and five-star hotels. **Results:** In the food preparation areas, there were statistically significant differences between different types of hotels regarding supplying handwashing sinks with soap, use of hand sanitizers, following proper hand washing practices and the presence of signs encouraging and showing the correct method of hand washing. In the restrooms used by food handlers, there were statistically significant differences between different types of hotels regarding supplying handwashing sinks with warm water, soap, paper towels, and air dryers in addition to maintenance of restrooms. There were also statistically significant differences regarding the training of all food handlers on the principles of food safety and documentation of the training. Proper handwashing was more likely with the presence of adequate supplies of soap and paper towels. Frequent handwashing was more likely with the presence of an adequate number of handwashing sinks.

**Conclusion and recommendations: A**dequate supplies for handwashing sinks with soap and paper towels, and warm water was not always provided, especially in three-star hotels. More efforts should be made to maintain these supplies. Training techniques should be developed to guarantee a more effective impact on the trainees.

**Key words:** Assessment, hotels, food safety, training

# INTRODUCTION

Foodborne diseases continue to be a global public health problem with an estimated 600 million people falling ill annually (Faour-Klingbeil and Todd, 2019). In the United States of America, it is estimated that 48 million cases of foodborne illnesses occur and lead to roughly 128000 cases in which hospitalization is needed, and 3000 deaths yearly in the USA (Scharff et al., 2016).

According to the USA Centers for Diseases Control and Prevention (CDC), more than half of the annual reported foodborne illness outbreaks are associated with restaurants (CDC, 2016). According to CDC, surveillance and epidemiological outbreak data have repeatedly identified five major risk factors related to food handlers' behaviors and food preparation practices that contribute to foodborne illnesses; poor personal hygiene, inadequate cooking, contaminated equipment/protection from contamination, improper food holding/time and temperature, and food obtained from unsafe sources (FDA, 2018).

Hands are considered as a major vehicle of contamination. Food handlers with soiled hands and/or fingernails may contaminate the food they handle (FDA, 2022). They can transfer foodborne illness pathogens from their gastrointestinal tracts, contaminated food, and contaminated surfaces to the food through their hands (Paulson, 2002).

Poor personal hygiene was identified as a major factor in 27-38% of reported foodborne illness outbreaks in the US from 1993-1997 (Olsen et al., 2000), while transmission of pathogens to the food through food handlers' hands was a major risk factor in 89% of 81 investigated foodborne illness outbreaks (Guzewich and Ross, 1999). In fact 59% of 308 investigated outbreaks were due to food contamination through hands (Michaels et al., 2004).

To prevent the spread of pathogens and limit the risk of infectious diseases, hand washing is considered an effective method (Larson et al., 2000; Sickbert-


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Bennett et al., 2005). FDA's Food Code 2022 outlines requirements of handwashing facilities and the procedures, and timing that should be followed by food handlers to maintain the cleanliness of their hands to prevent contaminating the food they handle through their hands.

The effectiveness of hand hygiene is attributed to the washing process that include soap and water use, rubbing, and rinsing, and hand drying process. Studies have shown that the washing process has an Effectiveness of 85% in removing transient pathogens and the addition of drying process increases the Effectiveness up to 90% (Todd et al., 2010).

A study concluded that food handlers should maintain their nails short and unpolished and restrict using artificial nails to ease cleaning the nails, reduce the risk of microbial transmission and occurrence of gloves tears (Jumaa, 2005).

Appropriate hands drying after washing is critical as bacteria is more likely to transfer from wet skin than dry skin (Huang and Stack, 2012; FDA, 2022). Food handlers are more likely to wash their hands if the food service establishment provides food safety training, has more than one handwashing facility, and when the handwashing facility is at all times visible to the food handlers (Green et al., 2007).

Food handlers need proper hygiene practices concerning cleanliness of hands and work clothes and correct methods of handling food and utensils. They must also not smoke cigarettes while preparing or serving food while infected with any communicable disease (Al Khatib, and Al Mitwalli, 2009).

Adequate toilet rooms are necessary for the sanitary, effective, and appropriate disposal of human waste, which carries pathogenic microorganisms, and for preventing the potential spread of disease by pests (FDA, 2022). Sections 6-202.14, 5-203.12, 6-302.10, 6-302.11, 6-402.11, 5-501.17 and 6-501.19 of the FDA's 2022 Food Code identifies the requirements of toilets in food establishments.


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Food handlers must follow good hygienic practices when performing their duties to ensure the safety of the food, prevent the introduction of foreign objects into the food, and reduce the likelihood of transmitting disease through food. Insanitary personal practices such as scratching the head, placing the fingers in or about the mouth or nose, and indiscriminate and uncovered sneezing or coughing could contaminate food (FDA, 2022).

Food handlers must neither smoke nor eat in food preparation areas as they can transmit pathogens to food by hand-to-mouth-to-food contact (Onyuna, 2018). Section 6-403.11 of the FDA's 2022 Food Code requires the food establishment to designate a specific area for food handlers to eat, drink, and use tobacco that is located where food, equipment and utensils, and unwrapped single service and use articles are protected from contamination (FDA, 2022).

Contamination of food by hair is regarded as a very serious and sensitive issue by consumers (FDA, 2022). Food handlers could also contaminate their hands when they touch their hair (FDA, 2022). Hence, section 2-402.11 of the FDA's 2022 Food Code requires food handlers to wear hair restraints such as hats, hair coverings or nets, beard restraints, and clothing that covers body hair when handling exposed food, clean equipment and utensils, and unwrapped single service and use articles to prevent their hair from ending up in the food, and food handlers from touching their hair (FDA, 2022).

Regarding food handlers clothing, if soiled, it may harbor pathogens that can be transmitted through food to consumers (Onyuna, 2018). Section 2-304.11 of the FDA's 2022 Food Code requires food handlers to wear clean outer clothing to prevent contamination of food, clean equipment and utensils, and unwrapped single service and use articles (FDA, 2022).

With regard to jewelry use, items like rings and bracelets may collect soil and its design and construction may prevent regular and effective cleaning (FDA, 2022).


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Consequently, jewelry may act as a vector of pathogenic microorganisms that can be transmitted through food to consumers (FDA, 2022). Street clothing and personal belongings can contaminate food, food equipment, and food contact surfaces (Onyuna, 2018). Hence, appropriate storage facilities are required to store food handlers' personal belongings and clothes (FDA, 2022).

In Egypt, food handlers are required to have a health certificate to handle food for the public, as stipulated in Article 8 of Law 10/1966 on the control and monitoring of food handling (Law, 1966). The Minister of Health issued Decree 97/1967 to establish the requirements for food handlers to obtain the certificate, which was later amended by Decree 243/2016 (MOH, 2016). However, these decrees only require clinical and medical investigations, with no reference to personal hygiene or training of food handlers as basic requirements for food safety.

It wasn't until 2019 that the Executive Regulation of the Law of National Food Safety Authority was issued, which references the responsibilities of food business operators to ensure that food handlers follow good food handling practices and receive adequate training (PM, 2019). In 2020, the National Food Safety Authority of Egypt issued the Board of Directors Decree 11/2020, which outlines specific personal hygiene requirements for all food establishments, including hotels (BOD 11/2020).

According to this decree, food employees must hold medical certificates proving that they are free from foodborne diseases, maintain appropriate personal hygiene, wear suitable protective clothing, and implement measures to prevent cross-contamination, including adequate hand washing and the wearing of gloves (if necessary). The decree also requires that employees clean their hands regularly, especially after handling any contaminated materials, and wash their hands with soap and water in a manner that does not re-contaminate them. Additionally, a more specific legal document on the issuance of food handling licenses to tourist and hotel


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establishments was issued by NFSA Board of Directors as Decree number 12/2020, based on the USA Food Code 2017 and its supplement (BOD 12/2020). Compliance with these requirements is now a legal obligation to protect consumers from foodborne illnesses.

The objective of this study is to identify and evaluate the factors affecting the personal hygienic practices of food handlers to design programs and actions aimed at improving compliance with food safety legislation. Ethical approval was obtained from relevant authorities, and informed consent was obtained from every hotel before participating in the study."

## MATERIALS AND METHODS

The study used a cross-sectional descriptive survey to collect data from all three-, four-, and five-star hotels in Greater Cairo, Egypt. According to the Ministry of Tourism database, there were 34, 22, and 29 three-, four-, and five-star hotels, respectively. However, due to Covid-19 lockdowns, data collection was only possible from 16, 17, and 29 three-, four-, and five-star hotels, respectively, which were operating during the study period from 20/02/2022 to 20/04/2022.

Based on the USA Food Code 2017, an Arabic standardized questionnaire was developed to collect data on hand washing practices, the availability and accessibility of required hand washing facilities and supplies, and other personal hygiene practices of food handlers (FDA, 2017). Data was collected through visual observation checklists, with items determined to be out of compliance when one or more out-of-compliance observations were made. Data was missing for some variables and so the total observations of the different types of hotels were sometimes less than the target. Proper hand washing was assessed satisfactory when the food handlers were observed to follow the hand washing method recommended in section 2-301.12 of the Food Code published by the USA Food and Drug Administration under the title


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"cleaning procedure" (FDA, 2022). Frequent hand washing was assessed satisfactory when none of the food handlers was observed to neglect washing his/her hands when there was a need to do so. For instance, before starting work, after touching garbage, and other instances mentioned in section 2-301.14 of the FDA Food Code under the title "when to wash" (FDA, 2022).

The data collected were analyzed using Epi Info 3.5.4 and IBM SPSS version 29 software. Quantitative data were described using range (minimum and maximum), mean and standard deviation. Median was also provided. Qualitative data were described using numbers and percentages (in parenthesis). Cross-tabulations of different categorical variables with the different types of hotels were made, and the associations between categorical variables were tested using Chi square ($X^2$) with Mont Carlo Correction (confidence level set at 99% and number of samples set at 10000) or the fisher's exact (when the expected value in more than 20% of the cells are less than 5). Statistical significance was defined as $p \leq 0.05$."

## RESULTS

Table (1) showed that all food preparation areas of the hotels had at least one handwashing sink except for one of the three-star hotels 1.6% in which there were not any handwashing sinks. The number of handwashing sinks was considered adequate in around half of the three-star hotels (53.3%), and in more than three quarters of the four- and five-star hotels (76.5%) and (78.6%) consecutively.

In the food preparation areas, handwashing sinks were accessible in 77.8%, 93.8%, and 89.3% of three, four, and five-star hotels consecutively with no statistically significant difference among the three types of hotels. They were not supplied with warm water in 30 (47.6%) of 63 assessed hotels observed for this item (50.0%, 56.3% and 41.4% of three-, four-, and five-star hotels consecutively). No statistically significant difference was observed among the hotels.


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In the food preparation areas, handwashing sinks were accessible in more than 85% of all the hotels studied and the percentage of the hotels complying with this characteristic was almost the same in the three (86.7%), four (88.2%), and five (85.7%) star hotels with no statistically significant difference between them.

Handwashing sinks were not used for any other purpose in around two thirds of the hotels. Four-star hotels were the best to comply with this requirement (almost three quarters) while three-star hotels were the least (less than one quarter).

Handwashing sinks were supplied with warm water in almost half of the studied hotels and the difference between the three types of hotels was not statistically significant as the compliance rate of hotels with this requirement was less than half of the three- and four-star hotels (46.7%), (47.1%) and a little bit more than half of the five-star hotels (48.3%). No statistically significant difference was observed among the hotels studied.

Handwashing sinks in the food preparation areas were not supplied with soap during visits in (9.6%) of all observed hotels. A statistically significant difference was noticed among three-, four- and five-star hotels. The problem was more evident in three-star hotels as 4 (26.7%) of them lack enough supply with soap. In four-star hotels the problem was less evident with only one hotel (6.7%) lacking an adequate supply of soap. All five-star hotels had adequate soap supplies for handwashing sinks.

The same situation applies to the supplies of paper towels for drying hands after handwashing in the food preparation areas. As 61.0% of all hotels paper towels were not provided for at least one handwashing sink. The situation was more evident in three-star hotels as in 73.3% of them paper towels were not provided in at least one handwashing sink. The situation is a little bit better in four- and five-star hotels, in which 70.6% and 48.1% of them had the same problem consecutively.


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Linked to paper towels are hot-air dryers as they can be used to achieve the same purpose of drying hands after washing. Electric hot-air dryers were observed in 2 (4.0%) of all the hotels. None of the three-star hotels had air-dryers installed close to handwashing sinks in food preparation areas and only one hotel had installed air-dryers in each of the four- and five-star hotels and only the one in the five-star hotel was working properly during the visit.

After handwashing the food handlers may contaminate their hands while closing the water taps so some establishments install handwashing stations which are operated without hand contact. Such a type of handwashing station was installed in 57.4% of the studied hotels as shown in table (1).

Table (1) also showed that waste receptacles for disposal of paper towels were available in only 60.5% of a total of 43 hotels assessed for this item. They were available in 70.0%, 50.0% and 61.9% of the three-, four, and five-star hotels consecutively.

Hands can be contaminated after washing and drying them with paper towels when uncovering the waste receptacles. So, waste receptacles close to handwashing stations should be uncovered to avoid hand recontamination as no organic matter should be thrown inside them. However, in this study all examined three- and four-star hotels were using waste receptacles with covers. In the five-star hotels only 2 out of 13 hotels (15.4%) observed for this feature were using receptacles without covers.

Signs and posters encouraging food handlers to wash their hands and showing them the correct method for washing hands were present in only 60.7% of observed hotels. Only one third of the three-star hotels (33.3%) were complying with this requirement and the compliance almost doubled to be (64.7%) and (72.4%) of four-, five-star hotels consecutively. The difference between the three types of hotels was statistically significant.


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Table (1) showed that hand sanitizers were used in 48 (81.4%) of 59 hotels. The three-star hotels were the least to use hand sanitizers with a percentage of (60.0%). The percentage increased to (87.5%) in the four-star hotels and to (89.3%) in the five-star hotels. Hand sanitizers should not be used as an alternative to handwashing practice and in the 48 hotels using hand sanitizers it was found that it is used as an additional measure in all three-star hotels while in four-star hotels it was used as an alternative to handwashing in one hotel representing (7.1%) of them and in two of the five-star hotels representing (8.0%) of them.

In almost half of the four- (50%) and five-star hotels (52.2%) food handlers wash their hands with appropriate frequency with no statistically significant difference between the studied hotels. Washing hands and exposed part of the arms properly is also another important factor in preventing food contamination through employees' hands. In this study there was a statistically significant difference between three-, four-, and five-star hotels regarding this practice as at least one employee was not washing hands properly in more than three quarters of the three-star hotels, in less than half of the four-star hotels and in one third of the five-star hotels.

In addition to the importance of handwashing practices and facilities in food preparation areas, their importance cannot be overlooked in the restrooms used by the food handlers. Table (2) showed that all hotels fulfilled the presence of at least one handwashing station in or close to the restroom used by food handlers. Handwashing sinks in the restrooms of food handlers were supplied with warm water in nearly three quarters (72.6%) of 62 studied hotels. No statistically significant differences were observed between the different types of hotels.

Table (2) showed that handwashing sinks that were in the restrooms used by food handlers were not supplied with soap in (15.3%) of all hotels. A statistically significant difference was observed among three-, four-, and five-star hotels. The


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problem was more evident in three-star hotels as (42.9%) of these hotels lack enough supply with soap and to a lesser extent in four-star hotels as only (17.6%) of them did not have soap for handwashing. Five-star hotels were paying enough attention to the soap supplies for handwashing sinks and none of them was observed to lack adequate supplies of soap. The difference between the three types of hotels was statistically significant.

The same pattern was observed in providing paper towels for drying hands after handwashing. In more than half of the hotels studied (56.5%) of 62 hotels, paper towels were not provided for at least one handwashing sink as shown in table (2). There was also a statistically significant difference between the different types of hotels. The same table showed that the situation was more evident in three-star hotels as in 87.5% of them paper towels were not provided for drying hands after handwashing. The situation is improving in four- and five-star hotels, in which less percentage having the same problem being 58.8% and 37.9% consecutively.

Table (2) showed that electric hot-air dryers were observed in only (44.2%) of the hotels studied. A statistically significant difference among the different types of hotels was found since only 15.4% of three-star hotels had air-dryers installed close to handwashing sinks while in four- and five-star hotels the percentage increased to reach (35.7%) and (64.0%) consecutively. However, even in hotels where air-dryers were installed some of them were not maintained and were not working properly during the visit of observer. Out of the 22 hotels assessed for the maintenance of installed hot-air dryers 45.5% of them were not working properly.

Although handwashing stations which are operated without hand contact were used in 57.4% of studied hotels in the food preparation areas their use was limited to only 3 (4.8%) of hotels in the restrooms used by food handlers (one four-star and two five-star hotels).


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Table (2) showed that waste receptacles for disposal of paper towels were available in 90.4% of a total of 52 hotels assessed for this item. They were available in 92.3%, 84.6% and 92.3% of the three-, four, and five-star hotels consecutively. When considering covering the waste receptacles 54.5% of them had covers in the 33 assessed hotels.

As for signs and posters encouraging food handlers to wash their hands and demonstrating the correct method for washing their hands, table (2) showed that these signs were only present in 39.3% of studied hotels. There was no statistically significant difference among the three-, four-, five-star hotels being present at 26.7%, 41.2% and 44.8% of these hotels, consecutively in contrary to the situation observed in the food preparation areas.

The use of hand sanitizers in the restrooms designated for food handlers is significantly less than its use in the food preparation areas as they were used in 17 out of 50 observed hotels in the restrooms representing 34.0% of them as shown in table (2) compared to 81.4% of hotels in food preparation areas as shown in table (1). The three-star hotels were the least to use hand sanitizers in restrooms with a percentage of 14.3%. The percentage increased to 33.3% in the four-star hotels and to 45.8% in the five-star hotels. Of the 17 hotels where hand sanitizers were available in the restrooms designated for food handlers, 15 hotels were assessed for their use as an alternative of handwashing and the findings indicated that all the hotels were using them as an additional measure.

An extremely important requirement in the Egyptian legislation governing food handling in food establishments, including hotels, is that toilets shall not open directly into food preparation areas. In this study this requirement was fulfilled in 96.7% of the 60 hotels assessed for this requirement. Unexpectedly, the violation was noted in two of the five-star hotels. The outer openings of restroom and doors shall also be self-closing to minimize the potential for the spread of the disease by the


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movement of flies and other insects between the toilet facility and food preparation areas. In the 59 hotels observed for the protection of outer openings in this study, 46.7%, 43.8%, and 14.3% of three-, four-, and five-star hotels did not fulfil this requirement consecutively. In addition, the doors of restrooms were not self-closing in 81.3%, 76.5%, 53.6% of the three-, four- and five-star hotels consecutively.

As for washing hands and exposed part of the arms properly there was a statistically significant difference among the three types of the studied hotels in this item as the percentage of compliance was increasing from 35.7% in the three-star hotels, to 43.8% in the four-star hotels to 73.9% in the five-star hotels.

Table (2) showed that maintenance of restrooms and keeping them in good condition was achieved in 42.9%, 50.0% and 79.3% of three-, four-, and five-star hotels and the difference among them was statistically significant.

Table (3) showed that there was no statistically significant difference between the three types of hotels when assessing personal hygiene practices other than handwashing (wearing clean outer clothing, using hair restraints properly; trimming and cleaning fingernails; wearing no jewelry; washing hands after touching or scratching body; Smoking, eating, drinking in food preparation areas).

The level of cleanliness of outer clothing of food handlers was improving in hotels with increased number of stars being 42.9%, 64.7%, and 75.9% in three-, four-, and five-star hotels consecutively. However, no statistically significant difference was detected. Hair restraints were properly used in 57.1%, 58.8%, and 72.4% of three-, four- and five-star hotels consecutively with no statistically significant difference detected.

The same table also showed that areas for changing clothes were clearly designated in 71.4%, 100%, and 92.6% of the five-, four, and three-star hotels, consecutively with no statistically significant difference detected among them. As for eating, drinking, and smoking, designated areas were clearly identified in all five-star


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hotels. In the four- and three-star hotels these areas were designated in 94.1% and 60.0% of these hotels, consecutively with no statistically significant difference detected for this variable.

A statistically significant difference was noted among the different types of hotels participating in the study in their efforts to train all their food handlers on the principles of food safety being best in five-star hotels and least in three-star hotels. Also, the documentation on training activities was best in the five-star hotels with statistically significant differences.

Table (4) showed that the presence of adequate supplies of both soap and paper towels had a statistically significant effect on the likelihood of the appropriateness of handwashing practices. It also showed that the presence of an adequate number of handwashing sinks had statistically significant effect on the likelihood of frequent handwashing. Neither training of all food handlers nor the presence of signs encouraging handwashing and showing correct handwashing practice had a statistically significant effect on the likelihood of the frequency or appropriateness of handwashing practices.


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**Table (1):** Comparison between three-, four- and five-star hotels concerning handwashing facilities and practices in food preparation areas, Greater Cairo, Egypt, 2022

| Item | Three-Stars Hotels | | | Four-Stars Hotels | | | Five-Stars Hotels | | | P value | Total Hotels | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Yes (%) | No (%) | Total | Yes (%) | No (%) | Total | Yes (%) | No (%) | Total | | Yes (%) | No (%) | total |
| Presence of at least one handwashing sink | 15 (93.8) | 1 (6.3) | 16 | 17 (100) | 0 (0) | 17 | 29 (100) | 0 (0) | 29 | 0.355[F] | 61 (1.6) | 1 (98.4) | 62 |
| Adequate number of handwashing sinks | 8 (53.3) | 7 (46.7) | 15 | 13 (76.5) | 4 (23.5) | 17 | 22 (78.6) | 6 (21.4) | 28 | 0.232[F] | 43 (71.7) | 17 (28.3) | 60 |
| Handwashing sinks are accessible | 13 (86.7) | 2 (13.3) | 15 | 15 (88.2) | 2 (11.8) | 17 | 24 (85.7) | 4 (14.3) | 28 | 1.000[F] | 52 (86.7) | 8 (13.3) | 60 |
| Handwashing sinks are not used for other purposes | 12 (20.0) | 3 (80.0) | 15 | 12 (70.6) | 5 (29.4) | 17 | 14 (48.3) | 15 (51.7) | 29 | 0.085 | 38 (62.3) | 23 (37.7) | 61 |
| Handwashing sinks equipped with warm water | 7 (46.7) | 8 (53.3) | 15 | 8 (47.1) | 9 (52.9) | 17 | 17 (58.6) | 12 (41.4) | 29 | 0.656 | 32 (52.5) | 29 (47.5) | 61 |
| Handwashing sinks provided with soap during visit | 11 (73.3) | 4 (26.7) | 15 | 14 (93.3) | 1 (6.7) | 15 | 22 (100) | 0 (0) | 22 | 0.008* | 47 (90.4) | 5 (9.6) | 52 |
| No hand contact when operating handwashing sinks | 7 (46.7) | 8 (53.3) | 15 | 12 (70.6) | 5 (29.4) | 17 | 16 (55.2) | 13 (44.8) | 29 | 0.373 | 35 (57.4) | 26 (42.6) | 61 |
| Use of sanitizers | 9 (60.0) | 6 (40.0) | 15 | 14 (87.5) | 2 (12.5) | 16 | 25 (89.3) | 3 (10.7) | 28 | 0.080[F] | 48 (81.4) | 11 (18.6) | 59 |
| When used, sanitizers are used as an alternative to soap | 0 (0.0) | 9 (100.0) | 9 | 1 (7.1) | 13 (92.9) | 14 | 2 (8.0) | 23 (92.0) | 25 | 1.000[F] | 3 (6.3) | 45 (93.8) | 48 |
| Presence of paper towels | 4 (26.7) | 11 (73.3) | 15 | 5 (29.4) | 12 (70.6) | 17 | 14 (51.9) | 13 (48.1) | 27 | 0.175 | 23 (39.0) | 36 (61.0) | 59 |
| Presence of electric hot-air dryers | 0 (0.0) | 12 (100.0) | 12 | 1 (6.7) | 14 (93.3) | 15 | 1 (4.3) | 22 (95.7) | 23 | 1.000[F] | 2 (4.0) | 48 (96.0) | 50 |
| Hot-air dryers maintained and working | 0 (0.0) | 0 (0.0) | 0 | 0 (0.0) | 1 (100) | 1 | 1 (100) | 0 (0.0) | 1 | 1.000[F] | 1 (50.0) | 1 (50.0) | 2 |
| Employees wash their hands at an appropriate frequency. | 4 (28.6) | 10 (71.4) | 14 | 6 (50.0) | 6 (50.0) | 12 | 12 (52.2) | 11 (47.8) | 23 | 0.345 | 22 (44.9) | 27 (55.1) | 49 |
| Employees wash their hands properly. | 3 (23.1) | 10 (76.9) | 13 | 9 (52.9) | 8 (47.1) | 17 | 18 (66.7) | 9 (33.3) | 27 | 0.035* | 30 (52.6) | 27 (47.4) | 57 |
| Presence of signs encouraging handwashing and showing correct method of washing hands | 5 (33.3) | 10 (66.7) | 15 | 11 (64.7) | 6 (35.3) | 17 | 21 (72.4) | 8 (27.6) | 29 | 0.039* | 37 (60.7) | 24 (39.3) | 61 |
| Presence of waste receptacles beside handwashing sinks for disposing paper towels | 7 (70.0) | 3 (30.0) | 10 | 6 (50.0) | 6 (50.0) | 12 | 13 (61.9) | 8 (38.1) | 21 | 0.671[F] | 26 (60.5) | 17 (39.5) | 43 |
| Waste receptacles covered | 7 (100) | 0 (0) | 7 | 6 (100) | 0 (0) | 6 | 11 (84.6) | 2 (15.4) | 13 | 0.776[F] | 24 (92.3) | 2 (7.7) | 26 |

Chi Square (Mont Carlo) test was used for detecting statistical significance difference among the studied three-, four-, and five-star hotels.
F Fisher Exact test of statistical significance used when more than 20% of cells in cross tabulation have expected value less than 5
* Statistically significant $p \leq 0.05$



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**Table (2):** Comparison between three-, four- and five-star hotels concerning handwashing facilities and practices in rest rooms of food handlers, Greater Cairo, Egypt, 2022

| | Three-Star Hotels | | | Four-Star Hotels | | | Five-Star Hotels | | | P value | Total | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Yes (%) | No (%) | Total | Yes (%) | No (%) | Total | Yes (%) | No (%) | Total | | Yes (%) | No (%) | Total |
| Presence of at least one handwashing sink | 16 (100) | 0 (0) | 16 | 17 (100) | 0 (0) | 17 | 29 (100) | 0 (0) | 29 | NA | 62 (100.0) | 0 (0) | 62 |
| Handwashing sinks are provided with warm water | 9 (56.3) | 7 (43.8) | 16 | 12 (70.6) | 5 (29.4) | 17 | 24 (82.8) | 5 (17.2) | 29 | 0.132[F] | 45 (72.6) | 17 (27.4) | 62 |
| Handwashing sinks provided with soap during visit | 8 (57.1) | 6 (42.9) | 14 | 14 (82.4) | 3 (17.6) | 17 | 28 (100.0) | 0 (0) | 28 | <0.001*[F] | 50 (84.7) | 9 (15.3) | 59 |
| Handwashing sinks are operated without touching the faucets | 0 (0) | 16 (100.0) | 16 | 1 (5.9) | 16 (94.1) | 17 | 2 (6.9) | 27 (93.1) | 29 | 0.792[F] | 3 (4.8) | 59 (95.2) | 62 |
| Availability of hand sanitizers | 2 (14.3) | 12 (85.7) | 14 | 4 (33.3) | 8 (66.7) | 12 | 11 (45.8) | 13 (54.2) | 24 | 0.162[F] | 17 (34.0) | 33 (66.0) | 50 |
| When used, sanitizers are used as an alternative to soap | 0 (0.0) | 1 (100.0) | 1 | 0 (0.0) | 4 (100.0) | 4 | 0 (0.0) | 10 (100) | 10 | NA | 0 (0.0) | 15 (100) | 15 |
| Availability of paper towels | 2 (12.5) | 14 (87.5) | 16 | 7 (41.2) | 10 (58.8) | 17 | 18 (62.1) | 11 (37.9) | 29 | 0.006* | 27 (43.5) | 35 (56.5) | 62 |
| Availability of electric air dryers | 2 (15.4) | 11 (84.6) | 13 | 5 (35.7) | 9 (64.3) | 14 | 16 (64.0) | 9 (36.0) | 25 | 0.013* | 23 (44.2) | 29 (55.8) | 52 |
| Electric air dryers work properly | 0 (0.0) | 1 (100) | 1 | 1 (20.0) | 4 (80.0) | 5 | 11 (68.8) | 5 (31.3) | 16 | 0.070[F] | 12 (54.5) | 10 (45.5) | 22 |
| Food handlers wash their hands correctly | 5 (35.7) | 9 (64.3) | 14 | 7 (43.8) | 9 (56.3) | 16 | 17 (73.9) | 6 (26.1) | 23 | 0.044* | 29 (54.7) | 24 (45.3) | 53 |
| Availability of posters that encourages handwashing and illustrate the correct way to do so | 4 (26.7) | 11 (73.3) | 15 | 7 (41.2) | 10 (58.8) | 17 | 13 (44.8) | 16 (55.2) | 29 | 0.497 | 24 (39.3) | 37 (60.7) | 61 |
| Availability of waste receptacles | 12 (92.3) | 1 (7.7) | 13 | 11 (84.6) | 2 (15.4) | 13 | 24 (92.3) | 2 (7.7) | 26 | 0.832[F] | 47 (90.4) | 5 (9.6) | 52 |
| Waste receptacles are covered | 5 (50.0) | 5 (50.0) | 10 | 5 (62.5) | 3 (37.5) | 8 | 8 (53.3) | 7 (46.7) | 15 | 0.909[F] | 18 (54.5) | 15 (45.5) | 33 |
| Waste receptacles can contaminate hands (if covers need to be lift by hands) | 2 (25.0) | 6 (75.0) | 8 | 1 (16.7) | 5 (83.3) | 6 | 3 (27.3) | 8 (72.7) | 11 | 1.0[F] | 6 (24.0) | 19 (76.0) | 25 |
| Toilet rooms are provided with self-closing doors | 3 (18.8) | 13 (81.3) | 16 | 4 (23.5) | 13 (76.5) | 17 | 13 (46.4) | 15 (53.6) | 28 | 0.108 | 20 (32.8) | 41 (67.2) | 61 |
| Outer openings are protected against insects | 8 (53.3) | 7 (46.7) | 15 | 9 (56.3) | 7 (43.8) | 16 | 24 (85.7) | 4 (14.3) | 28 | 0.173 | 41 (69.5) | 18 (30.5) | 59 |
| Toilet rooms open directly into food handling areas | 0 (0) | 16 (100.0) | 16 | 0 (0) | 16 (100) | 16 | 2 (7.1) | 26 (92.9) | 28 | 0.582 | 2 (3.3) | 58 (96.7) | 60 |
| Toilet rooms are well maintained and in a good condition | 6 (42.9) | 8 (57.1) | 14 | 8 (50.0) | 8 (50.0) | 16 | 23 (79.3) | 6 (20.7) | 29 | 0.032* | 37 (62.7) | 22 (37.3) | 59 |

Chi Square (Mont Carlo) test was used for detecting statistical significance difference among the three-, four-, and five-star hotels.

F Fisher Exact test of statistical significance used when more than 20% of cells in cross tabulation have expected value less than 5

* Statistically significant $p \leq 0.05$

NA: Not Applicable and no statistics are computed because the variable is a constant.



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**Table (3):** Comparison between three-, four- and five-star hotels concerning personal hygiene practices other than handwashing, Greater Cairo, Egypt, 2022

| Item | Three-Star Hotels | | | Four-Star Hotels | | | Five-Star Hotels | | | P value | Total | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Yes (%) | No (%) | Total | Yes (%) | No (%) | Total | Yes (%) | No (%) | Total | | Yes (%) | No (%) | Total |
| Clean Outer Clothing | 6 (42.9) | 8 (57.1) | 14 | 11 (64.7) | 6 (35.3) | 17 | 22 (75.9) | 7 (24.1) | 29 | 0.386 | 39 (65.0) | 21 (35.0) | 60 |
| Hair Restraints used | 8 (57.1) | 6 (42.9) | 14 | 10 (58.8) | 7 (41.2) | 17 | 21 (72.4) | 8 (27.6) | 29 | 0.651 | 39 (65.0) | 21 (35.0) | 60 |
| Fingernails trimmed | 7 (50.0) | 7 (50.0) | 14 | 12 (70.6) | 5 (29.5) | 17 | 22 (78.6) | 6 (21.4) | 28 | 0.16 | 41 (69.5) | 18 (30.5) | 59 |
| Body Scratch without proper handwashing | 3 (21.4) | 11 (78.6) | 14 | 6 (35.3) | 11 (64.7) | 17 | 8 (27.6) | 21 (72.4) | 29 | 0.192 | 17 (28.3) | 43 (71.7) | 60 |
| Wearing no jewelry | 11 (78.6) | 3 (21.4) | 14 | 13 (76.5) | 4 (23.5) | 17 | 18 (62.1) | 11 (37.9) | 29 | 0.741 | 42 (70.0) | 18 (30.0) | 60 |
| Designated areas for eating, drinking, and smoking | 6 (60.0) | 4 (40.0) | 10 | 16 (94.1) | 1 (5.9) | 17 | 28 (100) | 0 (0.0) | 28 | 0.501 | 50 (90.9) | 5 (9.1) | 55 |
| Smoking, eating, drinking in food preparation areas | 5 (41.7) | 7 (58.3) | 12 | 3 (17.6) | 14 (82.4) | 17 | 10 (34.5) | 19 (65.5) | 29 | 0.33 | 18 (31.0) | 40 (69.0) | 58 |
| Designated areas for changing cloths | 10 (71.4) | 4 (28.6) | 14 | 17 (100) | 0 (0.0) | 17 | 25 (92.6) | 2 (7.4) | 27 | 0.187 | 52 (89.7) | 6 (10.3) | 58 |
| Training of all employees in food safety principles | 2 (14.3) | 12 (85.7) | 14 | 11 (64.7) | 6 (35.3) | 17 | 25 (86.2) | 4 (13.8) | 29 | 0.0000* | 38 (63.3) | 22 (36.7) | 60 |
| Documentation of Training for employees | 4 (30.8) | 9 (69.2) | 13 | 13 (76.5) | 4 (23.5) | 17 | 26 (92.9) | 2 (7.1) | 28 | 0.0001* | 43 (74.1) | 15 (25.9) | 58 |

Chi Square (Mont Carlo) test was used for detecting statistical significance difference among the three-, four-, and five-star hotels.

F Fisher Exact test of statistical significance used when more than 20% of cells in cross tabulation have expected value less than 5

* Statistically significant $p \leq 0.05$



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**Table (4):** Some Factors Affecting Handwashing Practices in the Food Preparation areas, Selected Hotels, Greater Cairo, Egypt, 2022

| | | Proper Handwashing | | n | Odds Ratio[a] | Lower 95% CI[b] | Upper 95% CI[b] | P Value |
|---|---|---|---|---|---|---|---|---|
| | | Yes (%) | No (%) | | | | | |
| **Adequate number of handwashing sinks** | Yes (%) | 23(57.5%) | 17(42.5%) | 56 | 1.74 | 0.54 | 5.60 | 0.35 |
| | No (%) | 7(43.8%) | 9(56.3%) | | | | | |
| **Adequate supplies of soap** | Yes (%) | 25 (58.1%) | 18(41.9%) | 48 | Undefined | 1.2 | Undefined | 0.02[F] |
| | No (%) | 0(0.0) | 5(100) | | | | | |
| **Adequate supplies of paper towels** | Yes (%) | 16(72.7%) | 6(27.3%) | 55 | 4.67 | 1.26 | 18.29 | 0.008 |
| | No (%) | 12(36.4%) | 21(63.6%) | | | | | |
| **Training of all food handlers** | Yes (%) | 21(61.8%) | 13(38.2%) | 56 | 2.33 | 0.78 | 6.98 | 0.10 |
| | No (%) | 9(40.9%) | 13(59.1%) | | | | | |
| **Presence of signs encouraging handwashing and showing correct handwashing practice** | Yes (%) | 20(58.8%) | 14(41.2%) | 57 | 1.86 | 0.64 | 5.41 | 0.25 |
| | No (%) | 10(43.5%) | 13(56.5%) | | | | | |

| | | Frequent Handwashing | | n | Odds Ratio[a] | Lower 95% CI[b] | Upper 95% CI[b] | P Value |
|---|---|---|---|---|---|---|---|---|
| | | Yes (%) | No (%) | | | | | |
| **Adequate number of handwashing sinks** | Yes (%) | 20(57.1%) | 15(42.9%) | 49 | 8.0 | 1.55 | 41.24 | 0.006 |
| | No (%) | 2(14.3%) | 12(85.7%) | | | | | |
| **Handwashing sinks are not used for other purposes** | Yes (%) | 16(51.6%) | 15(48.4%) | 49 | 2.13 | 0.64 | 7.13 | 0.214 |
| | No (%) | 6(33.3%) | 12(66.7%) | | | | | |
| **Training of all food handlers** | Yes (%) | 14(50.0%) | 14(50.0%) | 48 | 1.5 | 0.47 | 4.79 | 0.49 |
| | No (%) | 8(40.0%) | 12(60.0%) | | | | | |
| | Yes (%) | 14(46.7%) | 16(53.3%) | 49 | 1.20 | 0.38 | 3.83 | 0.75 |

[a] Odds ratios above 1 indicates that handwashing was more likely to occur with the activity; odds ratios below 1 indicate that handwashing was less likely to occur with the activity.
[b] CI, confidence interval



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## Discussion

Many studies have documented the major risk factors of food safety in different types of retail food establishments. The most important of these factors are personal hygiene, temperature control, prevention of cross contamination and purchasing food from approved sources. In order to control the risks associated with each of these factors, food establishments need to provide the appropriate supplies, facilities and equipment on the one hand and the food handlers should be trained on the proper use of these facilities and equipment and follow the good manufacturing and hygienic practices on the other hand.

The current study was trying to explore the availability of supplies, facilities, and equipment in three-, four-, and five-star hotels in Cairo and Giza and to evaluate the practices of food handlers in these establishments.

Handwashing has a critical role in preventing foodborne illnesses. To wash hands properly food establishments should provide handwashing sinks that are only used for handwashing and there must be the necessary supplies. In the current study there was at least one handwashing sink in the restrooms used by food handlers in all the studied hotels and in the food preparation areas in almost all the observed hotels (98.4%) a finding which is higher than that noted by Rebouças et al. (2017) in Brazil reporting that a total of 81.3% of the participants in their study stated that the establishments have a sink for washing hands. It is also higher than that reported in a study done in Ethiopia by Abdi, et al. (2020) in which hand washing facilities were present in only 30% of food establishments.

Washing hands appropriately requires handwashing sinks to be supplied with warm water, soap, and paper towels or electric air dryers. The present study documented inadequate supplies of these items in at least one handwashing sink in (47.5%), (9.6%), (61.0%) and (96%) in the food preparation areas and in (27.4%),


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(15.3%), (98.4%), (56.5%), and (55.8%) in the restrooms used by food handlers of the observed hotels respectively. Rebouças et al. (2017) stated that (15.6%) of the participants reported that the establishments did not provide sinks with tap water, soap, antiseptic or paper towels.

Abdi, et al. (2020) stated that approximately half (48.0%) of hand washing facilities, in the establishments having these facilities near the toilet areas, were not supplied with detergents or soap for hand washing purposes. Wahdan et al. (2019), in his assessment of food safety practices of food handlers in the 17 governmental hospitals of Gharbia Governorate, reported that there were no dryers in any hospital. Kitchen paper towels and cloth were used for drying hands in (60.9%) and (36.6%) of the observations respectively.

In an assessment of the sanitary conditions and food handling practices of kitchens and dining rooms in 40 restaurants in Jimma town, Ethiopia, Neme, 2017 assessed the personal hygiene practices reported that about 48 (60%) were washing their hands with water and soap after toilet while 30 (37.5%) were washing their hands with water only, and 2 (2.5%) were not washing their hands after toilet. They also found that about 24 (30%) of food handlers washed their hands with water and soap after touching dirty materials, 28 (35%) with water only and 28(35%) were not washing their hands. Almost 48 (60%) did not have hand washing habits before handling food, 22 (27.5%) washed with water only and a few food handlers about 10 (12.5%) were washed with water and soap.

In another study conducted in Nigeria, Ifeadike et al., 2014 found that less than one-third of the study respondents (30.4%) indicated using soap and water for washing their hands before starting the preparation of food and/or after handling raw poultry or meat. Also, in the same study less than one-third of the study respondents (30.4%) used sanitizers and disinfectants at workplace while in our study sanitizers


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were available in the food preparation areas in one third (34.0%) of the studied hotels.

The discrepancy between the findings may be due to the differences in the type of food establishments studied and study area context. The study by Abdi, et al. 2020 in Ethiopia was conducted in Bole sub-city which is one of eight sub-cities found in Addis Ababa, the capital of Ethiopia and participants of the study were food handlers who worked in different food establishments such as hotels below star level, café and restaurants, bar and restaurants, restaurants, and bar snacks. Rebouças et al (2017) aimed 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 interviewing with 265 food handlers and with 32 head chefs and managers. While the studied food handlers by Ifeadike et al. (2014) were representing restaurants, bars, butcher shops, and juice vendors in two of the six council areas in Abuja, the federal capital territory of Nigeria.

Food handlers should be trained on the different occasions they need to wash their hands, such as before starting work, after touching their hair or skin, after using toilets, etc., although knowledge itself does not guarantee that the food handlers will have good attitude towards handwashing and follow good practices during handwashing.

In the current study food handlers did not wash their hands with the appropriate frequency in 27/49 (55.1%) of the observed hotels. This finding is similar to that reported by Wahdan et al., 2019 who found that food handlers did not wash their hands with appropriate frequency which varied with different occasions being (58.4%) of the observations when it comes to washing hands after handling raw food; (62.1%) of the observations before handling ready to eat food; (99.4%) of observations after touching hair, nose and ears. Rebouças et al. 2017 also found that most handlers (91.3%) did not obey a frequency suitable for cleaning of their hands.


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Handwashing facilities may be operated without hand contact using different mechanisms like photocells or knee contact to avoid recontamination of hands after washing and cleaning. In the present study no hand contact when operating handwashing sinks was reported in 35/60 (57.4%) in the food preparation areas and in 3/62 (4.8%) in the toilets used by food handlers. Wahdan et al. 2019 reported that tap was turned without touching it in only (1.2%) of the observations.

Abdi, et al. (2020) found that among the study participants, 90 (22.8%) of food handlers were observed using appropriate hand washing procedures compared to (54.7%) in our study. Green et al., (2007) found that appropriate handwashing was positively related to two factors associated with restaurants' hand sinks: multiple hand sinks and a hand sink in the worker's sight. These factors contribute to sink accessibility, which likely promotes hand washing. In the present study there was a strong association between the presence of an adequate number of sinks and frequent handwashing by food handlers in the food preparation areas.

Djidjor et al. (2020) found that (87.1%) of the respondents in his study disagreed when asked whether they cover their dustbins. In the current study waste receptacles in the food preparation areas were covered in (92.3%) of the studied hotels. Waste receptacles close to hand washing sinks are not required to be covered as they are only used for disposal of paper towels with no organic matter. The high percentage of the hotels covering waste receptacles in this study in the food preparation areas may be due to the misunderstanding of the instructions given by the food safety officers to food business operators that waste receptacles should be covered all the time when not in use without distinction between those used for disposing paper towels and organic matter that can attract flies or pests. Fortunately, the waste receptacles which had covers in all the hotels were designed to allow opening without hand contact (foot operated).


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Food handlers should be trained in different topics related to personal hygiene like the different occasions they need to wash their hands, such as before starting work, after touching their hair or skin, after using toilets, etc. and like the proper techniques of handwashing. Many studies have identified training as a key factor for improving hand washing and other personal hygiene practices among food handlers (Campbell et al., 1998; Green et al, 2007; Roberts, et, al. 2008; Adesokan HK et al. 2015).

Ansari-Lari et al. (2010), and Vo, et.al, (2015) found in their studies that there was a significant positive correlation between knowledge and attitude of food handler. Differently, the work performed by Lim et al. (2016) demonstrated that food safety knowledge and attitude of the food preparer in the house was not correlated. Knowledge itself does not guarantee that the food handlers will have a good attitude towards handwashing and follow good practices during handwashing and further measures like strict supervision should be employed.

Training food handlers on principles of food safety was modest in three-star hotels as only 14.3% of these establishments reported that all their food handlers received food safety training. In the current study the relationship between training of all food employees and proper hand washing was insignificant.

These results agree with a study done in Lagos State, Nigeria by Lateefat et al. in 2022 on three, four, five star-rated hotels having similar findings regarding the formal training on food safety and the knowledge of food handlers and hence the implementation of food safety practices as the study results revealed no significant relation between formal training and knowledge on food safety. These findings could be attributed to other factors which need to be studied, including time, cost of carrying out the practices or even the personal attitude of the food handlers during food handling. Food handlers should be taught food safety practices practically rather than theoretically.


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The findings of this study indicate that several factors were related to hand hygiene practices and support those who have suggested that food handlers hand hygiene improvement programs should be multidimensional addressing additional factors. These factors may include, but certainly not limited to, those found to be significant in this study: number and location of hand sinks, availability of supplies (e.g., soap, towels, or warm air dryers). This is consistent with a study where food handlers were asked directly about their knowledge, practices, and barriers to hand washing in restaurants, the barriers came to be the availability of supplies, accessibility of hand washing sinks, absence of enough time to wash hands between tasks, high volume of business, inadequate food handler training, insufficient training at the restaurant, stress, and lack of accountability (Pragle, 2007).

Wearing clean outer clothing was observed in 65.0% of the hotels in the current study which matches the percentage of food handlers wearing a uniform in the study done by Azanaw et el., (2019) being 63%. Neme, 2017 reported that majority 52 (65%) of food handlers wore gown but in only half 40 (50%) of them the gowns were clean, and the fingernails of food handlers were trimmed. Zaki & Helmy (2014) found that only 3/12 (25%) of handlers wore a clean uniform, when working in food production, and 2/12 (%) used protective clothing and a cap (hair restraint) when touching or distributing unwrapped food. Wahdan et al. 2019 found that most of the food handlers were wearing clean coats in 83.9% of the observations.

Azanaw et al. (2019) also found that more than half of (51.5%) food handlers use hair net during food preparation, while Wahdan et al. 2019 found that 78.3% of the food handlers were using head covers. Neme, 2017 found that almost more than half 44 (55%) of them had no hair cover.

Furthermore, wearing clean outer clothing was observed in 65.0% of the hotels in this study which matches the percentage of food handlers wearing a uniform in the study done by Azanaw et el., (2019) being 63%.


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In a study to assess food hygiene practices of food vendors in some selected basic schools in Birim Central Municipality in the Eastern Region-Ghana, Djidjor et al. (2020) found that (53.8%) of the respondents agreed that they cut their fingernails twice a week. Concerning covering hair all when handling food (59. 1%) of the respondents agreed that they cover their hair all the time when handling food.

The studies by Rodríguez et al. (2011), Campos et al. (2009) and Veiros et al. (2009) detected the proper use of hair nets in only 23%, 33%, 24% respectively. Baltazar reported a higher percentage of compliance (75%). In the current study fingernails of food handlers were trimmed in 69.5% of the hotels while hair restraints were used in 65.0% of these hotels.

Neme, 2017 found that more than half 44 (55%) of food handlers were wearing rings and jewelries, while Wahdan et al. 2019 found that jewelry and watches were not removed before washing hands in 96.9% of the observations. In our study 18/60 (30%) were wearing jewelry or watches during the visits.

Surprisingly, although areas for eating, drinking, and smoking were clearly designated in all the five-star hotels, the investigators of the study reported observing at least one of the food handlers eating, drinking, or smoking inside the food preparation areas in (34.5%) of these hotels which reflects the need to consider other interventions to promote compliance with good hygiene practices and not just to provide the physical facilities. Al Khatib, and Al Mitwalli, (2009) stated that the absence of a special area for the food-handlers in most of the restaurants encouraged them to smoke in areas of food preparation, as they spend most of their working time there.

In the present study food managers indicated receiving training on the principles of food safety in (53.3%), (76.5%) and (96.6%) of the three-, four-, and five-star hotels. The percentages decreased to (14.3%), (64.7%), and (86.2%) of these hotels when asking about training of all food handlers and not just the food managers.


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These findings agree with those noted by Abd al-Fattah and Fuad (2013) including five- and four-star resort hotels in Sharm El Sheikh as 199/243 (82%) of the respondents indicated having training programs for food safety in their operations. However, they disagree with those noted by Zaki and Helmi (2014), in their study including three- and four-star hotels in which all executive chefs and kitchen staff reported attending the food safety training courses conducted by the Egyptian Tourism Federation (ETF), and other private companies working in the field of certification and training.

In another study including a sample of the four and five-star hotels in Greater Cairo area, Hussein and Gadelrab (2017) reported that the entire 10/10 five-star hotels (100%) and 6/8 (75%) four-star hotels trained employees for proper personal hygiene. The same study also reported that 8/10 (80%) of the five-star hotels and 0/8 (0.0%) of the four-star hotels included in the study provided annual HACCP training.

The discrepancy in the results may be attributed to the difference in the locations and in the time periods of the studies and the high turnover rate in the tourism sector, which is highly sensitive to external factors like pandemics, conflicts, etc. The effect of high turnover rates on the implementation of food safety systems was also documented by many studies (Panisello and Quantict, 2001; Eves and Dervisi, 2005; Wu, 2012;).

Hussein and Gadelrab (2017) also noticed that the entire 10/10 (100 %) of the five-star hotels and 6/8 (75%) of the four-star hotels were keeping training records. Similar findings were reported in the current study showing that the documentation of training took place in (92.9%), (76.5%), and (30.8%) of the five-, four and three-star hotels respectively.

In catering settings other than hotels, Neme et al. (2017) reported that the majority (87.5%) of the food handlers did not take any training related to food hygiene. Wahdan et al., (2019), also reported smaller percentage in governmental


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hospitals of an Egyptian governorate as half of the food handlers had previous food safety training courses. Even in developed countries like Ireland Bolton et al., 2008 surveyed two hundred head chefs and catering managers responsible for food hygiene in catering establishments and found that 20% of kitchen staff had no formal training. The variation in the findings may be attributed to the differences in the facility type in different countries. In addition, a considerable percentage of the workers in this sector are not permanent staff.

Several studies have identified training as a key factor for improving hand washing and other personal hygiene practices among food handlers (Campbell et al., 1998; Green et al., 2007; Roberts et al., 2008; Adesokan et al., 2015).

In the current study the relationship between training of all food employees and proper hand washing was insignificant. These results agree with a study done in Lagos State, Nigeria by Lateefat et al. in 2022 on three, four, five star-rated hotels having similar findings regarding the formal training on food safety and the knowledge of food handlers and hence the implementation of food safety practices as the study results revealed no significant relation between formal training and knowledge on food safety. These findings could be attributed to other factors which need to be studied, including time, cost of carrying out the practices or even the personal attitude of the food handlers during food handling. Food handlers should be taught food safety practices practically rather than theoretically.

The findings of this study indicate that several factors were related to hand hygiene practices and support those who have suggested that food handlers hand hygiene improvement programs should be multidimensional addressing additional factors. These factors may include, but certainly not limited to, those found to be significant in this study: number and location of hand sinks, availability of supplies (e.g., soap, towels, or warm air dryers). This is consistent with a study where food handlers were asked directly about their knowledge, practices, and barriers to hand


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washing in restaurants, the barriers came to be the availability of supplies, accessibility of hand washing sinks, absence of enough time to wash hands between tasks, high volume of business, inadequate food handler training, insufficient training at the restaurant, stress, and lack of accountability (Pragle et al., 2007).

**Limitation of the study:** There are several factors that may impact hand hygiene behaviors that were not examined in this study. For example, we didn't study the effect of training on the knowledge, attitude and beliefs on hand hygiene practices. Although the data indicates that there are significant relationships between several factors and hand hygiene practices, more research is needed to determine the causal nature of those relationships.

## CONCLUSION AND RECOMMENDATIONS:

From this study it can be concluded that almost all tourism establishments have understood the importance of installing at least one handwashing sink in the food preparation areas and restrooms used by the food handlers. However, adequate supplies for handwashing sinks with soap and paper towels, and warm water were not always provided, especially in three-star hotels. Proper handwashing practices were linked to the presence of adequate supplies of soap and paper towels so more efforts should be made to maintain these supplies. Training of food handlers was not shown to have statistically significant association with proper or frequent hand washing. General training of food handlers on food safety by itself may not be enough to improve the handwashing practices of food handlers. Specific targeted training programs on hand hygiene may be needed or supervision mechanisms. Training techniques should also be developed to guarantee a more effective impact on the trainees. Training techniques should be developed to guarantee a more effective impact on the trainees.


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## REFERENCES

Abd al-Fattah, M. A. and Fuad, M. A. (2013). Food safety between knowledge and the actual application : a practical study on the food and beverage sector employees' in the Egyptian resort hotels. Journal of Association of Arab Universities for Tourism and Hospitality, Vol. 10, no. (s):115-125.

Abdi, AM; Amano, A.; Abrahim, A.; Getahun, M.; Ababor, S. and Kumie, A. (2020) Food Hygiene Practices and Associated Factors Among Food Handlers Working in Food Establishments in the Bole Sub City, Addis Ababa, Ethiopia. Risk Management and Healthcare Policy, 13: 1861–1868. https://doi.org/10.2147/RMHP.S266342

Adesokan, HK.; Akinseye, V.O. and Adesokan, G.A. (2015) Food Safety Training Is Associated with Improved Knowledge and Behaviours among Foodservice Establishments' Workers. Int J Food Sci. 2015:328761. https://doi.org/10.1155/2015/328761

Al Khatib, I.A. and Al Mitwalli, S.M. (2009). Food sanitation practices in restaurants of Ramallah and Al-Bireh district of Palestine. EMHJ - Eastern Mediterranean Health Journal, 15 (4): 951-958, 2009. https://apps.who.int/iris/handle/10665/117719.

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. https://doi.org/10.1016/j.foodcont.2009.06.003

Azanaw, J.; Gebrehiwot, M. and Dagne, H. (2019) Factors associated with food safety practices among food handlers: facility-based cross-sectional study. BMC Res Notes 12, 683. https://doi.org/10.1186/s13104-019-4702-5

BOD 11, (2020) Board of Directors of the Egyptian National Food Safety Authority Decree number 11 of the year 2020 on the Technical Regulations Governing the Implementation of Food Safety Requirements in Food Establishments. Available at: https://www.nfsa.gov.eg/Images/App_PP/DeskTop/App_Web/1/MyWebMedia/PDF/BOD%20Decision%2011%20of%202020.docx (Accessed: 30 May 2023)

BOD 12, (2020) Board of Directors of the Egyptian National Food Safety Authority Decree number 11 of the year 2020 on the Issuance of Food Handling License to Tourist and Hotel Establishments. Available at: https://www.nfsa.gov.eg/Images/App_PP/DeskTop/App_Web/1/MyWeb

Media/PDF/decisions_en/12-2020.pdf (Accessed: 30 May 2023)

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, 19:291–300. 10.1016/j.foodcont.2007.04.006

Bryan, F. L.; Guzewich, J. J. and Todd, E. C. D. (1997) Surveillance of foodborne disease III. Summary and presentation of data on vehicles and contributory factors; their value and limitations. Journal of Food Protection, 60(6):701-714 https://doi.org/10.4315/0362-028X-60.6.701

Campbell, M.; Gardner, C.; Dwyer J.; Isaacs, S.; Krueger, P. and Ying J. (1998) Effectiveness of public health interventions in food safety: a systematic review. Canadian Journal of Public Health 89:197–202. https://doi.org/10.1007/BF03404474

Campos, A.K.C.; Cardonha, A.M.S.; Pinheiro, L.B.G.; Ferreira, N.R.; Azevedo, P.R.M. and Stamford, T.L.M. (2009). Assessment of personal hygiene and practices of food handlers in municipal public schools of Natal, Brazil. Food Control 20(9): 807-810.

CDC (2016) 'Surveillance for Foodborne Disease Outbreaks, United States, 2014, Annual Report' Atlanta, Georgia: US Department of Health and Human Services, CDC, 2016.

Djidjor, E. K.; Ohene-Asah J.W.; Iddrisu I.N. and Kudjodji J. (2020). An Assessment of Food Hygiene Practices among Food Vendors in Some Selected Basic Schools in the Birim Central Municipality. Journal of Food Technology Research, 7(1):59–68. https://doi.org/10.18488/journal.58.2020.71.59.68

Eves, A., and Dervisi, P. (2005). Experiences of the implementation and operation of hazard analysis critical control points in the food service sector. International Journal of Hospitality Management, 24, 3-19.

Faour-Klingbeil, D. and Todd, E. (2019) Prevention and Control of Foodborne Diseases in Middle-East North African Countries: Review of National Control Systems. International Journal of Environmental Research and Public Health, 17(1), 70. https://doi.org/10.3390/ijerph17010070

FDA (2017) Food Code 2017. Available at: https://www.fda.gov/food/fda-food-code/food-code-2017 (Accessed: 30 May 2023).

FDA (2018). FDA Report on the Occurrence of Foodborne Illness Risk Factors in Fast Food and Full-service Restaurants, 2013-2014.

FDA (2022) Food Code 2022. Available at: https://www.fda.gov/food/fda-food-code/food-code-2022 (Accessed: 30 May 2023).



Vol. (52); Iss. (7); No. (5); July. 2023
ISSN 1110-0826
ONLINE ISSN 2636 - 3178

Gould, L. H.; Ida Rosenblum, I.; Nicholas, D.; Phan, Q. and Jones, T. F. (2013) Contributing Factors in Restaurant-Associated Foodborne Disease Outbreaks, FoodNet Sites, 2006 and 2007, Journal of Food Protection, 76(11):1824–1828. doi: 10.4315/0362-028X.JFP-13-037.

Green, L. R.; Radke, V.; Mason, R.; Bushnell, L.; Reimann, D.W.; Mack, J.C.; Motsinger, M.D.; Stigger, T. and Selman, C.A (2007) 'Factors Related to Food Worker Hand Hygiene Practices†', Journal of Food Protection, 70(3): 661–666. doi: 10.4315/0362-028X-70.3.661.

Guzewich, J. and Ross, M. P. (1999) Evaluation of Risks Related to Microbiological Contamination of Ready-to-Eat Foods by Food Preparation Workers and the Effectiveness of Interventions to Minimize Those Risks. Silver Spring, MD: Food and Drug Administration, Center for Food Safety and Applied Nutrition. Available at: https://citeseerx.ist.psu.edu/doc_view/pid/7866fcb5ebda21e78fdaea78da30936f4fe206a9 (Accessed: 12 December 2022).

Hall, G.; Kirk, M.D. Becker, N.; Gregory, J.E.; Unicomb, L.; Millard, G.; Stafford, R.; and Lalor K (2005) Estimating Foodborne Gastroenteritis, Australia. Emerging Infectious Disease Journal, 11(8): 1257-64. doi: 10.3201/eid1108.041367.

Huang, C.; Ma, W. and Stack, S. (2012) 'The hygienic efficacy of different hand-drying methods: A review of the evidence. Mayo Clinic Proceedings, 87(8):791-8 doi: 10.1016/j.mayocp.2012.02.019.

Hussein, M. M. & Gadelrab, R. M. A. (2017) Auditing food safety management systems: a case study of hotels' food production. International Academic Journal of the Faculty of Tourism and Hotel Management. avaialable at https://www.researchgate.net/publication/324676694_Auditing_Food_Safety_Management_Systems_A_Case_Study_of_Hotels%27_Food_Production_Areas

Ifeadike, C.O.; Ironkwe, O.C.; Prosper O. U.; Adogu1, P. O. and Nnebue, C.C. (2014). Assessment of the food hygiene practices of food handlers in the Federal Capital Territory of Nigeria.' Tropical Journal of Medical Research. 17. 10.4103/1119-0388.130175. DOI:10.4103/1119-0388.130175

Jumaa, P. A. (2005) 'Hand hygiene: Simple and complex', International Journal of Infectious Diseases., 9(1):3-14. doi: 10.1016/j.ijid.2004.05.005.

Larson, E. L.: Early, E.; Cloonan, P.; Sugrue, S.; and Parides M. (2000) An organizational climate intervention associated with increased

handwashing and decreased nosocomial infections. Behavioral medicine (Washington, D.C.), 26(1):14–22. doi: 10.1080/08964280009595749.

Lateefat H.M.; Henry, S.O. and Adewoye, S. (2022) Time for Action: Assessment of Knowledge on Hazard Analysis and Critical Control Points of Food Handlers in Standard Hotels in Lagos State, Nigeria. medRxiv - Occupational and Environmental Health IF) 2022.02.13.22270814; Doi: https://doi.org/10.1101/2022.02.13.22270814

Law number 10 of 1966 on Food Control and Regulation of its Handling, Arab Republic of Egypt, article 8. Arabic version is available https://nfsa.gov.eg/Images/App_PP/DeskTop/App_Web/1/MyWebMedia/PDF/Legislation/2.pdf (Accessed: 23 May 2023)

Lim, T.-P., Chye, F. Y., Sulaiman, M. R., Suki, N. M., & Lee, J.-S. (2016). A structural modeling on food safety knowledge, attitude, and behaviour among Bum Bum Island community of Semporna, Sabah. Food Control, 60: 241-246.

Michaels, B.; Keller, C.; Blevins, M.; Paoli, G.; Ruthman, T.; Todd, E. and Griffith, C.J. (2004) Prevention of food worker transmission of foodborne pathogens: risk assessment and evaluation of effective hygiene intervention strategies. Food Service Technology, 4(1):31–49. https://doi.org/10.1111/j.1471-5740.2004.00088.x.

MOH (1967) Egyptian Minister of Health Decree number 97 of the year 1967 on the requirements to be fulfilled by food handlers to make sure that they are free from communicable diseases and their examination procedures. Arabic version Available at: https://nfsa.gov.eg/Images/App_PP/DeskTop/App_Web/1/MyWebMedia/PDF/Legislation/25.pdf (Accessed: 23 May 2023)

MOH (2016) Egyptian Minister of Health and Population Decree number 243 of the year 2016 amending Minister of Health Decree 97/1967 on the requirements to be fulfilled by food handlers to make sure that they are free from communicable diseases and their examination procedures.

Neme, K. (2017). Assess Sanitary Condition and Food Handling Practices of Restaurants in Jimma Town, Ethiopia: Implication for Food Born Infection and Food Intoxication. Food Science and Quality Management, 60, 62-69. available at: https://www.iiste.org/Journals/index.php/FSQM/article/view/35342

Olsen, S. J.; MacKinnon, L.C.; Goulding, J.S.; Bean, N.H. and Slutsker, L. (2000) 'Surveillance for foodborne-disease outbreaks--United States, 1993-

1997.', MMWR. CDC surveillance summaries : Morbidity and mortality weekly report. CDC surveillance summaries / Centers for Disease Control, 49(1):1–62. PMID: 10789699

Onyuna, A. (2018) Effect of Food Handling Habits on Food Safety in Catering Units in Public University in Kenya. African Journal of Education, Science and Technology, 4(4):323-336. Retrieved from https://www.ajest.info/index.php/ajest/article/view/340

Paulson, D. (2002) Handwashing, Gloving, and Disease Transmission by the Food Preparer', in Handbook of Topical Antimicrobials: 838–845. doi: 10.1201/9780203909256.ch17.

Panisello, P. J., and Quantict, P. C. (2001). Technical barriers to hazard analysis critical point. Food Control, 12:165-173.

Pragle, A. S.; Harding, A. K. and Mack, J. C. (2007) Food workers' perspectives on handwashing behaviors and barriers in the restaurant environment. Journal of environmental health, 69(10):27–32. PMID: 17583293.

PM (2019) Prime Minister of Egypt Decree number 412 of the year 2019 promulgating the Executive Regulation of the Law of National Food Safety Authority. Available at: https://nfsa.gov.eg/Images/App_PP/DeskTop/App_Web/1/MyWebMedia/PDF/Prime%20Minister%20Decree%20412-2019,%20the%20Executive%20Regulations%20of%20National%20Food%20Safety%20Law%20(final)-English-V%202%20May%202019.pdf (Accessed: 23 May 2023)

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

Roberts, K.; Barrett, B.; Howells, A.; Shanklin, C.; Pilling, V., and Brannon, L. (2008).'Food safety training and foodservice employees' knowledge and behavior', Food Protection Trends, 28 (4):252-260.

Scharff, R. L.; Besser, J.; Sharp, D. J.; Jones, T. F.; Gerner-Smidt, P. and Hedberg, C.W. (2016) An Economic Evaluation of PulseNet: A Network for Foodborne Disease Surveillance. American Journal of Preventive Medicine, 50(5, Supplement 1):S66–S73. doi: https://doi.org/10.1016/j.amepre.2015.09.018.

Sickbert-Bennett, E. E.; Weber, D.J.; Gergen-Teague, M.F.; Sobsey, M.D.; Samsa,

G.P. and Rutala, W. A. (2005) Comparative efficacy of hand hygiene agents in the reduction of bacteria and viruses. American Journal of Infection Control, 33(2):67–77. https://doi.org/10.1016/j.ajic.2004.08.005.

Todd, E. C.; Michaels, B.S.; Smith, D.; Greig, J.D. and Bartleson, C.A. (2010) 'Outbreaks where food workers have been implicated in the spread of foodborne disease. Part 9. Washing and drying of hands to reduce microbial contamination', Journal of Food Protection. International Association for Food Protection, 73(10):1937–55. doi: 10.4315/0362-028X-73.10.1937.

Veiros, M.B.; Proença, R.P.C.; Santos, M.C.T.; Rocha, A. and Kent-Smith, L. (2007). Proposta de check-list hígio-sanitária para unidades de restauração. Alimentação Humana, 13 (3):51-61.

Vo, T. H.; Le, N. H.; Le, A. T. N.; Minh, N. N. T. and Nuorti, J. P. (2015). Knowledge, attitudes, practices and training needs of food-handlers in large canteens in Southern Vietnam. Food Control, 57, 190-194.

Wahdan IH, Gad ZM, Habib IM, Elshabasy OA. Effect of an educational program on food safety practices in food preparation and handling procedures in governmental hospitals of an Egyptian governorate. JHIPH. 2019;49(2):90-96.

Wu, S.L. (2012) Factors influencing the implementation of food safety control systems in Taiwanese international tourist hotels. Food Control Vol.28 No.2 :265-272 ref.43 https://doi.org/10.1016/j.foodcont.2012.05.038

Zaki, M., and Helmy, N. (2014). Evaluating the Food Safety Knowledge, Attitudes and Practices (KAP) of Kitchen Staff in Economy Hotels in Cairo and Giza. Journal of Association of Arab Universities for Tourism and Hospitality, 11(1), 137-153. doi: 10.21608/jaauth.2014.54078



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# تقييم الممارسات الصحية الجيدة للعاملين في تداول الأغذية، عينة مختارة من الفنادق السياحية، 2022

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## المستخلص

**الخلفية:** لا تزال الأمراض المنقولة بالغذاء تمثل مشكلة صحية على المستوى العالمى. حيث أظهرت الدراسات أن النظافة الشخصية بما تشمله من ممارسات غسل اليدين هى أحد أهم عوامل الخطورة لهذه الأمراض.

**هدف الدراسة:** تم إجراء الدراسة لتقييم ممارسات العاملين فى تداول الغذاء المتعلقة بالنظافة الشخصية لتيسير الامتثال بشكل أفضل لتشريعات سلامة الغذاء.

**المنهجية:** شملت الدراسة 62 فندقًا بالقاهرة الكبرى مصنفة ثلاثة، أربعة وخمسة نجوم. تم جمع البيانات باستخدام استبيان قياسى تم تطويره بناءً على كود الغذاء الأمريكى لعام 2017.

**النتائج:** أظهرت الدراسة وجود فروق ذات دلالة إحصائية بين أنواع الفنادق المختلفة فيما يتعلق بتوفر ملصقات تشجع وتبين الطريقة الصحيحة لغسل اليدين، اتباع الممارسات الصحيحة لغسل الايدي فى مناطق تحضير الطعام. وبدورات المياه المخصصة لمتداولى الاغذية ظهرت فروق ذات دلالة إحصائية بين أنواع الفنادق المختلفة فيما يتعلق بتزويد أحواض غسيل اليدين بالصابون والمناشف الورقية ومجففات الهواء وصيانة الحمامات. كما ظهرت فروق ذات دلالة إحصائية فيما يتعلق بتخصيص مناطق محددة للأكل والشرب والتدخين لمتداولى الغذاء وكذلك ما يتعلق بتدريب جميع المتعاملين مع الأغذية على مبادئ سلامة الغذاء وتوثيق التدريب. وأظهرت الدراسة أن غسل اليدين بالطريقة الصحيحة يكون أكثر احتمالا عند وجود إمدادات كافية من الصابون والمناشف الورقية أو مجففات الهواء، وان غسل اليدين بشكل متكرر أكثر احتمالا مع وجود عدد كاف من أحواض غسل اليدين.

**الخلاصة والتوصيات:** لا يتم توفير المستلزمات الكافية من الصابون والمناشف الورقية والماء الدافئ لأحواض غسل اليدين لا سيما فى الفنادق ذات الثلاث نجوم، ويجب بذل المزيد من الجهود للحفاظ على كفاية هذه الإمدادات. ويجب تطوير تقنيات التدريب للعاملين فى تداول الغذاء لضمان تأثير أكثر فعالية على المتدربين.

**الكلمات المفتاحية:** تقييم، فنادق، سلامة الغذاء، تدريب