



Food Handlers Current and Future Training Needs Regarding Food Allergy at Five-star Hotels in Greater Cairo

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ABSTRACT

Food allergies pose a significant public health concern, particularly in the hospitality industry, where food handlers play a critical role in ensuring guest safety. This study examines the current state of food allergy training among food handlers at five-star hotels in Greater Cairo and identifies training needs and preference. A cross-sectional survey was administered in person using a questionnaire to 424 food handlers (such as executive chefs, food and beverage staff, kitchen staff, and managers) working in five-star hotels in Greater Cairo, achieving a response rate of 75.7%. The findings reveal that wheat, peanuts, and milk are the most common allergens encountered. A large majority (86.8%) of food handlers frequently engage with customers who have allergies. Despite this, they tend to favor traditional training methods such as workshops and lectures, while modern digital tools remain underutilized. Although food handlers receive some level of food allergy training, its depth and frequency need significant improvement. Notably, 71.7% of food handlers have not undergone specific training on food allergy and allergen management. While there is a strong awareness among staff about the need for thorough training, there remains a significant gap in understanding the importance of effective communication practices. Conclusion: This study recommends that five-star hotels in Greater Cairo implement regular, targeted workshops to enhance food handlers' knowledge and practices in food allergy management. These workshops should cover key areas such as allergen identification, prevention strategies, and emergency response protocols. By integrating food allergy management into standard operating procedures and fostering a culture of proactive safety, hotels can improve staff preparedness, reduce the risk of allergic incidents, and maintain high standards of guest safety and satisfaction.

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Introduction

Food allergies are serious health concern worldwide responsible for sending someone to emergency medical care every three minutes. The cause of food allergies is unknown yet, but their mechanism is the same: A person's body mistakes certain food nutrients as harmful, which triggers an inflammatory response that can threaten the person's health and even cause death. (American Academy Allergy, Asthma & Immunology, 2018) **(Purswani and Kim, 2022)**.

It is worth mentioning that there is a lack of reliable figures to explain the numbers of people suffering from food allergies in most developing countries including Egypt. While, according to the American College of Allergy, Asthma & Immunology (2023), allergies are a common problem in the United States, impacting more than 50 million individuals. Among these, food allergies are especially concerning for children, affecting an estimated 2.4% to 7.5%. Adults are also affected, with food allergy prevalence ranging from 2.1% to 6.5% **(Nanda et al., 2023)**. The spread of prevalence data is wide, ranging from 1% to 10% Worldwide. Accurate determination of the prevalence is still one of the major challenges with food allergies **(Sicherer et al., 2023)**.

The fundamental approach to treating food allergies is to prevent foods that trigger allergic reactions. This involves conscientiously selecting food products, necessitating careful reading of ingredient labels. **(Renz et al., 2018)**.

Five-star hotels, known for their high service standards and diverse clientele, are uniquely positioned to lead the way in food allergy safety. Effective management of food allergies is particularly critical in the hospitality sector, where mishandling allergens can result in life-threatening reactions and legal repercussions. Five-star hotels must ensure that their food handling practices are not only compliant with local health regulations but also meet international standards. However, research indicates that many hotels struggle with implementing effective allergen management strategies **(Bailey et al., 2021)**.

The ability of food handlers to identify, handle, and prevent allergic reactions is essential for maintaining guest safety and satisfaction. Despite growing awareness of food allergies, there is still a shortage of thorough and specialized training programs specifically designed for food handlers in five-star hotels. This issue has been highlighted in various research studies **(Fikirte, 2023)**. Training and knowledge of food handlers are critical factors influencing the effectiveness of allergen management in hotels. Studies have shown that inadequate training can lead to cross-contact and unintentional exposure to allergens **(Young and Thaivalappil, 2018)**. Therefore, identifying the specific training needs of food handlers in five-star hotels is essential for developing comprehensive training programs that address this gap.

The Middle East, with its unique culinary traditions and increasing tourism, faces specific challenges in managing food allergies. In Egypt, Greater Cairo serves as a hub for luxury hospitality, housing many internationally managed hotels. These establishments cater to a diverse population, including international tourists with varying dietary requirements and food allergy concerns. Despite this, there is limited evidence regarding the training food handlers receive to address food allergies, including the content, frequency, and effectiveness of such training.

This study aims to explore the **current state of food allergy training** by assessing the training received by food handlers in five-star hotels in Greater Cairo, with a focus on the content and

frequency of such training. Additionally, it seeks to identify **future training needs** to enhance food handlers' ability to effectively manage food allergies and minimize the risk of cross-contact.

Literature Review

Food allergies have become a growing public health concern, with their prevalence rising globally (**Allen et al., 2021**). The food service industry plays a crucial role in safeguarding allergic individuals by ensuring appropriate food handling practices. In five-star hotels, where service standards are high, food handlers must be well-trained to address the complexities of food allergies and minimize risks such as cross-contact. Despite the importance of this issue, limited research exists on food allergy training for food handlers in five-star hotels, particularly in the Middle East.

Food Allergy Awareness in the Middle East

The prevalence of food allergies in the Middle East is less documented than in Western countries, but studies suggest that awareness is growing due to globalization and increased access to diverse cuisines (**Al-Muhsen et al., 2019**). However, research indicates a significant gap in knowledge and training among food handlers in the region. A study by **Zuberbier et al. (2018)** highlighted that Middle Eastern food establishments often lack systematic training programs for managing food allergies, potentially putting customers at risk. These findings underline the need for standardized training protocols in high-end establishments like five-star hotels, where clientele expectations are particularly stringent.

Food handlers play a crucial role in preventing the risk of food allergies and adverse reactions (**Dupuis et al., 2016**). Therefore, the knowledge level and actions of food handlers regarding food allergy reactions are of utmost importance. To guarantee everyone understands how to handle food allergies, staff should be trained on ingredients, procedures, and communication. This training should cover not only ingredients and standard protocols, but also how to respond to allergic reaction emergencies. (**Soon, 2020**).

Most entry-level food handlers begin their jobs without formal training in food allergy management. They often have limited understanding of the seriousness of food allergies, the importance of preventing cross-contact, and the need for accurate reading and labeling of allergenic foods (**Carter et al., 2020**).

The lack of knowledge is rarely corrected later as food handlers are afforded few opportunities for food allergy education and training. Indeed, many food service professionals report insufficient knowledge of food allergens, believing small amounts of allergens are safe, or that allergens in foods are reduced as part of the cooking process (**Fierro et al., 2017**).

Current Training Practices for Food Handlers

Globally, training programs for food handlers vary widely, with content often emphasizing general food safety over specific allergen management. In a study on food service staff in Europe, **DunnGalvin et al. (2021)** found that only 35% of employees received specific allergen training, despite its critical importance. This trend appears to persist in the Middle East, where studies are sparse. Research in the Egyptian hospitality sector by **Mohamed and Rashwan (2020)** revealed that while food safety training is common, topics on food allergy management are either briefly

covered or entirely absent. This gap is particularly concerning in five-star hotels, where mismanagement of food allergies could lead to severe reputational and legal consequences.

Challenges in Implementing Training Programs

Barriers to effective food allergy training include limited resources, inadequate awareness among management, and cultural perceptions of food allergies. **Al-Sanea et al. (2022)** emphasized that in Middle Eastern countries, the hospitality industry often prioritizes cost-saving measures over comprehensive staff training. Furthermore, cultural misconceptions, such as underestimating the severity of food allergies, contribute to a lack of urgency in implementing robust training programs (**Al-Muhsen et al., 2019**). These challenges necessitate tailored training solutions that address both operational constraints and cultural attitudes.

Future Training Needs

To address the gaps in current training, future programs should focus on creating comprehensive modules that emphasize practical knowledge, such as identifying allergens, preventing cross-contact, and responding to allergic reactions. Interactive training methods, including role-playing scenarios and simulations, have proven effective in enhancing retention and application of knowledge (**Madsen et al., 2020**). For five-star hotels in Greater Cairo, such training should also incorporate multilingual resources to accommodate the diverse workforce typically employed in these establishments.

Additionally, regulatory frameworks in Egypt could be strengthened to mandate allergen-specific training for food handlers in the hospitality sector. Comparative studies from countries with stringent regulations, such as the UK's Food Information Regulations (2014), demonstrate how policy can drive improvements in food allergy management (**Bailey et al., 2019**).

The literature highlights significant gaps in food allergy training for food handlers, particularly in five-star hotels in the Middle East. While global studies offer insights into effective training practices, there is a pressing need for localized research to address the unique challenges and cultural contexts of the region. Future efforts should focus on developing comprehensive, culturally sensitive training programs and implementing regulatory measures to ensure the safety of food-allergic guests in high-end hospitality settings.

Materials and Methods

Research Design and Participants

This study is Cross-sectional: The data collected from a sample of food handlers at one-time point. This method allows for efficient data collection from a large number of participants at a single point in time, enabling us to capture a snapshot of the current state of food allergy awareness and practices among food handlers in five-star hotels of Great Cairo.

The Study Community and Sample: The study focuses on five-star hotels in Greater Cairo, so the target population includes food handlers and relevant staff in these establishments.

The study population of the research was **(28)** hotels, which is the number of five-star hotels in Greater Cairo, according to the latest issue of the Egyptian Hotel Guide book issued by the

Chamber of Hotel Establishments affiliated to the Ministry of Tourism for the year 2022, at the time of the field study.

Study Sample: A number of (14) hotels were selected to form a convenience sample, representing 50% of the total population within the research population . " The other hotels were not included in this study because their internal policies require maintaining the confidentiality of employee data."

Target Population: Food handlers (Executive Chefs, Food and Beverage Staff, Kitchen Staff and Food and Beverage Managers) working in Five-star Hotels in Great Cairo. The data collection process took five months, from July 2023 to December 2023. A number of (4٧٤) questionnaires were collected. The sample size of (385) questionnaires was determined according to the following statistical equation.

$$N = \frac{P(1-P)Z^2}{E^2}$$

Where:

- N = Population size
- Z = Confidence level (0.95, which is 0.05 divided by 1.96 for a confidence interval of 95%)
- P = Proportion of the population with the characteristic of interest (0.05)
- Q = 1 - P (0.95)
- E = Margin of error (0.05)
- n = Sample size

Calculation:

$$n = (1.96^2 * 0.05 * 0.95) / 0.05^2$$
$$= 384.16$$

Therefore, the sample size should be at least 385 individuals.

To avoid biases associated with convenience sampling, a list of all eligible five-star hotels in Greater Cairo was compiled. Hotels were then randomly selected to participate. Within each selected hotel, a random sample of food handlers was invited to participate, ensuring diverse representation across job roles.

Ethical Considerations:

- The study tools approved by Fayoum university supreme committee for scientific research ethics

- Initial contact was made through human resource departments. Researchers sent formal letters outlining the study's objectives, its importance to the hospitality industry, and assurances of confidentiality and anonymity.
- Informed consent obtained from all participants prior to data collection.
- Participation voluntary, and participants had the right to withdraw from the study at any time.

Questionnaire Design: The questionnaire was developed using related resources and some previous studies on the issue (Choi and Rajagopal, 2013; Shafie and Azman, 2015; Dupuis et al., 2016; Soon, 2019). The questionnaire was designed with five sections. The first section gathered demographic information from participants through six questions. The second section focused on food handlers' experience with food allergies, consisting of three questions. The third section assessed the food allergy training participants had received at their workplace with six questions. The fourth section aimed to evaluate the need for food allergy training, with six questions. The fifth section explored food handlers' preferences regarding training content and style through two questions.

Data Analysis: The data obtained by the questionnaire was analyzed using Statistical Package for Social Sciences (SPSS) version 25. Descriptive statistics including frequencies, percentage distributions, means, and standard deviations were used to evaluate demographic characteristics. While cross-sectional studies are valuable for providing an initial understanding of food allergy training needs, their limitations necessitate more robust and dynamic research approaches. Longitudinal studies, mixed-method designs, and experimental interventions can offer deeper insights and stronger evidence to inform the development of effective training programs. By addressing these gaps, future research can contribute significantly to enhancing food allergy management practices in five-star hotels in Greater Cairo and beyond.

Results and Discussion

1- Demographic Data of the Participants

Table 1. Frequency Distribution of the Studied Food Handlers' Personal Characteristics

Personal Characteristics Items	No.	%
Age (Years)		
– 18-25	56	13.2
– <25-34	123	29
– <34-41	145	34.2
– <41-49	74	17.5
– <50	26	6.1
Gender		
– Male	333	78.5
– Female	91	21.5
Educational Level		
– Illiterate	5	1.1

– Technical education	180	42.5
– Bachelor's degree	220	51.9
– Postgraduate	19	4.5
Experience (Years)		
– Less than 1	17	4
– < 1-3	56	13.2
– < 3-6	78	18.4
– <6-8	49	11.6
– < 8	224	52.8
Job Type		
– Main Chef	73	17.2
– Assistant Chef	143	33.7
– Food and Beverage Manager	14	3.3
– Restaurant Manager	46	10.8
– Kitchen staff	103	24.3
– Manager	45	10.6
– Service staff	73	17.2

Most food handlers are between the ages of 25 and 41, accounting for 63.2% of the workforce, indicating that it is largely made up of young and middle-aged adults. The data also reveals a noticeable gender imbalance, with males making up 78.5% of the food handler population, while females represent 21.5%. Additionally, 94.4% of food handlers have at least a technical education or a bachelor's degree. More than half of them (52.8%) have over 8 years of experience in the field.

2- Food Handlers Experience with Food Allergy

Table2. Frequency Distribution of the Studied Food Handlers' Experiences with Food Allergy.

Items	No.	%
Dealing with people who had food allergies		
– Yes	368	86.8
– No	56	13.2
The most common food allergies among the customers that visited your hotel		
– Soy	22	5.2
– Seafood	49	11.6
– Milk	52	12.3
– Wheat	181	42.7
– Egg	27	6.4
– Tree nut	21	5
– Peanut	57	13.4
– Sesame	10	2.4
– Others	5	1.2
How frequently does a customer with food allergies visit your hotel?		
– Rarely (4 or less per year)	53	12.5

– Occasionally (5-8 customers /year)	152	35.8
– Often (9-12 Per year)	142	33.5
– Frequently (more than 12 per year)	77	18.2

A large majority (86.8%) of the food handlers have encountered customers with food allergies, highlighting that managing these allergies is a common and essential part of their service. Only 13.2% stated they had not dealt with food allergies. **Wheat** is the most frequent allergen, affecting (42.7%) of customers with allergies, followed by **Peanut** (13.4%), **Milk** (12.3%), and **Seafood** (11.6%). The frequency of visits by customers with food allergies varies, with 35.8% of staff reporting occasional visits (5-8 customers/year), while 33.5% reported frequent visits (9-12 customers/year).

These statistics highlight the essential importance of awareness and preparedness in addressing food allergies within the hospitality sector. With a significant number of guests having food allergies and frequenting these establishments, it is vital for hotels to implement robust procedures to effectively manage and accommodate such dietary needs.

3- Food Handlers' Training Type Regarding Food Allergies

Table 3. Frequency Distribution of Studied Food Handlers' Training regarding Food Allergies.

Items	No.	%
Training specific to food allergy and allergen handling		
– Yes	120	28.3
– No	304	71.7
Training program received		
– Serve safe Allergen	63	14.9
– Part of food safety Training	360	84.9
– Other	1	0.2

The table provides insights into the availability and type of training received by food handlers related to food allergy and allergen management.

Prevalence of Food Allergy Training: A significant majority of food handlers (71.7%) have not received specific training related to food allergy and allergen handling. This indicates a gap in targeted education for managing food allergies, which is critical for managing food allergies safely and preventing allergic reactions, as recommended by **Goguen et al. (2019)**.

The high percentage of food handlers lacking specific training on food allergies underscores the need for more specialized training programs. This aligns with **Bailey et al. (2021)**, who emphasized that effective allergen management demands in-depth knowledge beyond standard food safety practices. It requires specific procedures for preventing cross-contact and managing allergen-related information.

Previous research has frequently recommended food allergy training to help minimize food allergy incidence in food service establishments. However, fewer than half of food service employees report having received any food allergy training, with formal food allergy training being reported by less than a quarter of food service employees (**Young and Thaivalappil,2018**).

Types of Training Programs Received: Among those who have received training, the vast majority (84.9%) received it as part of broader food safety training. This suggests that while food safety training programs include allergen management, they may not provide in-depth coverage of food allergy-specific issues. A smaller proportion (14.9%) received training specifically on Serve Safe Allergen, which is designed to provide focused education on food allergies, which can improve the competence of food handlers in managing allergen risks effectively.

To prevent food allergy risks, it is essential for hotels to implement effective food allergy training programs for their staff. Research by **Radke et al., (2016)** suggests that training programs should include information on identifying common allergens, understanding cross-contact risks, and recognizing and responding to allergic reactions. Additionally, the use of practical, hands-on training sessions can help reinforce theoretical knowledge and ensure that staff are well-prepared to handle food allergy-related situations.

overall, while food safety training is prevalent, the significant number of food handlers without specific allergen training highlights a crucial area for improvement. Investing in dedicated food allergy training can enhance overall food safety and better protect individuals with food allergies.

4- Food Handlers' Training Received at Work Place

Table 4. Frequency Distribution of Studied Food Handlers' Training

Received at Workplace.

Training Name	Never		Rarely		Sometimes		Often		Always		Mean (%)	interpretation	Rank
	No.	%	No.	%	No.	%	No.	%	No.	%			
1-I have received training to identify the major food allergens	46	10.8	53	12.5	76	17.9	115	27.1	134	31.6	71.2	Often	4
2-I have received training on how to read food ingredient labels for food allergen identification	14	3.3	56	13.2	74	17.5	117	27.6	163	38.4	76.8	Often	1

3-I have received training on how to avoid cross-contact between foods during preparation or service	40	9.4	38	9	80	18.9	129	30.4	137	32.3	73.4	Often	3
4-I have received training on how to communicate allergen information to customers	47	11.6	28	6.6	79	18.6	130	30.7	140	33	63.7	Often	5
5-I have received training on how to handle an allergic reaction	21	5	48	11.3	79	18.6	132	31.1	144	34	75.4	Often	2

The study results provide insights into the self-reported training experiences of food handlers regarding various aspects of food allergy management. Each training area is ranked based on mean percentage scores, and these scores reflect how frequently participants report receiving that training. The interpretation of responses follows a Likert scale, where "Often" signifies the most common response for all the training areas.

Training to identify the major food allergens ranks **first**, with 76.8% of respondents reporting they "Often" receive this training ($M = 3.84$, $SD = 1.16$). This aligns with the critical need for food service professionals to understand the most common allergens, such as peanuts, shellfish, and gluten (**Lopes et al., 2022**).

Training on how to avoid cross-contact between foods during preparation or service is ranked **second**, with 75.4% of respondents ($M = 3.77$, $SD = 1.17$) indicating they "Often" receive this training. Preventing cross-contact is a fundamental component of food allergen management, as it guarantees that allergen-free foods remain safe for consumption, as noted by **Jackson et al. (2020)**.

Training on managing allergic reactions is rated third ($M = 3.67$, $SD = 1.27$), with 73.4% of participants indicating they "Often" receive such training. This aligns with Turner et al. (2021), who emphasize that training in responding to allergic reactions is essential, as a prompt and effective response can be life-saving.

Training on reading food ingredient labels for allergen identification ranks **fourth** in terms of frequency, with 71.2% of respondents stating they "Often" receive this training ($M = 3.56$, $SD = 1.33$). This training is essential in minimizing allergic reactions, as clear ingredient identification enables food service workers to recognize potential allergens (**Bailey et al., 2021**).

Finally, training on how to communicate allergen information to customers ranks **fifth**, with 63.7% of respondents indicating they receive this training "Often" ($M = 3.68$, $SD = 1.29$). Although this ranks lower, effective communication is pivotal in ensuring customers with allergies are well-informed (**Taylor and Baumert, 2019**).

of being equipped to manage allergic reactions effectively, ensuring the safety of individuals with food allergies, as recommended by **Frederick et al. (2018)**.

Training on how to read food ingredient labels for allergen identification follows closely, with a mean score of 4.63 (92.6% very necessary) (Rank 2). Accurate identification of allergens in ingredients is essential for preventing allergic reactions, and the high perceived necessity of this training highlights its importance (**Bailey et al., 2021**).

Training on how to avoid cross-contact between foods during preparation or service also scores very high, with a mean of 4.61 (92.2% very necessary) (Rank 3). Preventing cross-contact is a key practice in allergen management to avoid unintentional allergen exposure (**Goguen et al., 2019**).

Training on identifying the major food allergens is similarly highly rated, with a mean score of 4.59 (91.8% very necessary) (Rank 4). This suggests a strong conviction regarding the importance of knowing the most common allergens and being able to identify them during food preparation, as noted by **Cavaliere and De Marchi (2021)**.

Training on how to communicate allergen information to customers is ranked fifth, with a mean score of 4.58 (91.6% very necessary) (Rank 5). though it is somewhat less prioritized than other training topics. Effective communication is essential for providing customers with accurate information about allergens according to **Lee and Sozen (2020)**,

Training food handlers about food allergies (KAP - Knowledge, Attitude, Practice) can benefit hotels in two ways. First, it elevates their reputation and standards. Second, it reduces the risk of widespread illnesses, making the community healthier overall (**Mohammadi -Nasrabadi et al., 2021**). To guarantee everyone understands how to handle food allergies, staff should be trained on ingredients, procedures, and communication. This training should cover not only ingredients and standard protocols, but also how to respond to allergic reaction emergencies. (**Soon, 2020**).

Food allergy training should be designed based on the areas that need improvement, as knowledge may differ based on the position in the food service establishments (managerial staff vs employees) and types of food service establishment (**Lee and Sozen, 2018**).

Overall, Given the high perceived necessity for all training topics, it is evident that comprehensive training programs covering all these areas are essential for effective allergen management. Ensuring that food handlers receive thorough and regular training on these aspects will contribute significantly to maintaining food safety and minimizing the risk of allergic reactions.

6- Food Handlers' Requirements for Food Allergy Training Content and Style

Table 6. Frequency Distribution of Studied Food Handlers' Requirements regarding Content and Training style

Items	No.	%
Content		
– steps to make a plan to deal with customers with food allergies and respond to their inquiries	163	38.4
– How to deal with a customer with a food allergy reaction	18	4.3
– Information about food allergy disease	134	31.6
– Steps to make a menu that contains meal ingredients?	109	25.7
Ideal Training Style		
– Lecture	130	30.7
– Online class	44	10.4
– Mobile app	49	11.6
– Booklets	19	4.5
– Posters	54	12.7
– Workshop	128	30.2

The table presents data on preferred training content and ideal training styles for food handlers regarding food allergy management. This information highlights the areas where training is most needed and the preferred methods for delivering this training.

Preferred Training Content: The most sought-after content is "How to make a plan to deal with customers with food allergies and respond to their inquiries," with 38.4% of respondents identifying this as a priority. This reflects a need for standard policy and procedures on managing food allergy inquiries and ensuring a consistent response protocol, this is in line with several studies showing that many hotels lack comprehensive food allergy policies. **Placa, (2021)** found that although many hotels are aware of food allergies, they frequently lack specific, standardized procedures for managing them effectively. The absence of such standardization can result in inconsistent practices, heightening the risk of accidental allergen exposure.

"Information about food allergy disease" is also a significant area of interest, with 31.6% of respondents choosing it. This suggests a strong demand for educational content about the nature of food allergies and their implications. "How to make a menu that contains meal ingredients" and "How to deal with a customer with a food allergy reaction" are less prioritized, with 25.7% and

4.3% of respondents respectively. While still important, these topics are less emphasized compared to understanding food allergies and planning responses.

Ideal Training Styles: The most favored training styles are "Lecture" (30.7%) and "Workshop" (30.2%). Both methods are preferred for their interactive and detailed approach, making them suitable for comprehensive allergen training. As stated **Lee and Sozen, (2020)** Workshops, in particular, offer hands-on experience, which can be highly beneficial for practical skill development.

These results align with **Zanin et al.'s (2017)** conclusion that the success of the program was significantly influenced by workshops where managers could engage in interactive sessions. These studies indicate that a variety of training methods and techniques can effectively enhance participants' overall knowledge scores. However, while gaining knowledge of proper food safety practices is a crucial first step, it is essential that this knowledge be applied in practice to ensure the training's effectiveness.

Lecture and workshop preferences (30.7% and 30.2%) vs. digital tools (online classes 10.4%, mobile apps 11.6%)

The overwhelming preference for traditional, in-person methods like lectures and workshops over digital methods is notable. This could contradict broader trends toward digital learning tools in other sectors. Reasons might include:

- Perceived effectiveness of hands-on or interactive training in addressing food safety issues.
- Potential technological barriers, such as lack of access to digital devices or familiarity with digital platforms among employees.
- The contextual nature of food allergy training, where physical demonstrations or discussions may feel more relevant.

"Online class" (10.4%) and "Mobile app" (11.6%) are less favored, indicating a preference for more traditional or interactive methods over digital learning platforms.

overall, the data underscore the necessity of comprehensive training on food allergies, focusing on both customer interaction and response strategies. While the preferred training styles lean toward lectures and workshops, there is an evident need for additional emphasis on managing allergic reactions and understanding food allergies. Future training programs should address these gaps to ensure food handlers are well-equipped to provide safe dining experiences for all customers.

Conclusion and Recommendations

The findings provide valuable insights into food allergy management practices and customer profiles within the Middle Eastern hospitality industry. This study sheds light on several key areas requiring attention, while contributing to the broader understanding of allergy-related challenges and training preferences in the region.

1. Emerging Allergens and Safety Priorities

- **Wheat Allergy Dominance:** With wheat accounting for 42.7% of reported allergies, it is the most prevalent allergen among hotel customers. This emphasizes the urgent need for targeted measures such as clear labeling of wheat-containing dishes and introducing alternative options like gluten-free products.
- **Peanuts and Milk Allergies:** These allergens also pose significant risks, with 13.4% and 12.3% prevalence, respectively. Hotels should implement strict cross-contamination protocols and training to address these allergens effectively.
- **Underrepresented Allergens:** Although allergens like soy, tree nuts, and sesame appear less frequently, their inclusion in training and safety measures remains critical due to their potentially severe reactions.

2. Customer Interaction Trends

The data shows that 86.8% of respondents have dealt with customers with food allergies, and nearly half encounter such customers at least 9 times a year. This high interaction frequency underscores the importance of equipping hotel staff with robust knowledge and skills for allergy management, not only for routine prevention but also for emergency response.

3. Training Gaps and Preferences

Despite the regularity of allergy-related encounters, a significant gap exists in training preferences. Traditional methods like workshops and lectures dominate, while digital tools such as mobile apps and online classes are underutilized. These findings suggest a need to modernize training approaches to include digital platforms, which can provide real-time, practical tools to staff.

4. Regional Contribution to Food Allergy Management

This study provides a nuanced understanding of food allergy trends and management practices in the Middle East, where research in this domain has been relatively sparse. The findings highlight region-specific allergens, such as wheat, and cultural or infrastructural barriers that may shape training preferences. They also emphasize the role of frequent allergy-friendly customer interactions in enhancing food safety standards.

Recommendations for Hospitality Stakeholders in Five-Star Hotels to Manage Food Allergies

Safety and Awareness Recommendations

- Develop a region-specific allergen database to support the industry in identifying common allergens and adapting safety protocols accordingly.
- Enhance staff training with a focus on emerging allergens, preventive measures, and emergency responses, particularly for wheat and peanut allergies.
- Promote blended learning approaches that integrate traditional workshops with digital tools to maximize accessibility and effectiveness.

Implement Regular Workshops: Five-star hotels in Greater Cairo should organize regular, targeted workshops for food handlers, focusing on food allergy management, including best practices, allergen identification, prevention, and emergency response protocols.

Prioritize Ongoing Education: Continuous training, such as mandatory refresher courses, should be conducted to keep staff updated on the latest developments in food allergy management, ensuring they maintain a high level of preparedness.

Integrate Allergy Management into Standard Procedures: Food allergy management should be incorporated into the hotels' standard operating procedures, supported by comprehensive training materials, to foster a proactive safety culture and uphold the hotel's reputation for excellent guest service.

By identifying key allergens, customer interaction patterns, and training preferences, this study contributes to establishing a foundation for improved food allergy management in the Middle Eastern hospitality sector. These insights can inform policy development, safety protocols, and training programs, ultimately fostering safer dining experiences for all customers.

Recommendations for the Ministry of Tourism Addressing Food Allergy Issues Create

- **National Guidelines:** Formulate national guidelines for managing food allergies in hospitality establishments, ensuring consistency across all five-star hotels.
- **Create food allergy legalizations:** To protect customers with food allergy
- **Regular Audits:** Conduct regular audits to ensure compliance with these policies and provide feedback for continuous improvement.

Implementation Plan for the Ministry of Tourism's Recommendations on Food Allergy Management

1. **Stakeholder Engagement:**
 - Engage key stakeholders, including hotel management, culinary schools, and health authorities, in the development and implementation of these recommendations.
2. **Pilot Programs:**
 - Launch pilot programs in select five-star hotels to test the effectiveness of the proposed measures and gather feedback for refinement.
3. **Monitoring and Evaluation:**
 - Establish a monitoring and evaluation framework to assess the impact of the implemented policies and practices on food allergy management in hotels.
4. **Awareness Campaigns:**
 - Conduct awareness campaigns to educate the public and hotel guests about the importance of food allergy management and the steps being taken to ensure their safety.
5. **Certification:** Offer certification programs for food handlers to recognize and validate their knowledge and skills in managing food allergies.

By addressing these key issues, the Ministry of Tourism can enhance the safety and satisfaction of guests with food allergies, thereby improving the overall reputation and competitiveness of five-star hotels in Greater Cairo.

Recommendations for further research

- Investigate the long-term effects of advanced and continuous training programs on food handlers' knowledge, attitudes, and practices related to food allergies.
- Compare the efficacy of different training methodologies, such as online courses, in-person workshops, and practical simulations, to determine the most effective approaches.
- Assess the retention of knowledge and skills over time and identify the optimal frequency for refresher training sessions.

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