

## Assessment of Knowledge, Attitudes and Practices of Food Handlers towards Food Safety in Food Preparation Area in Luxor Hotels

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### Abstract

Food preparation is one of the most important steps in the food cycle which influences the food quality and increases profitability for the hotel. The food preparation must meet or exceed guests' expectations, because guest satisfaction is the overall goal of food service management. Therefore, food preparation is a complex process, but it can be successful when it focuses on guest needs and expectations. This study aims to measure the awareness and knowledge of food handlers that food preparation procedures in order to improve food acceptance, hygiene and quality in Luxor hotels. In order to achieve this aim, a self-administered questionnaire was distributed to food handler; besides, a personal observation checklist was used to ensure that proper procedures are actually applied. The data were analyzed by SPSS program version 20. The result indicated that food handlers know the right knowledge about food safety but they did not know how to apply it. Food handlers know how to cook safely but they do not apply it practically as the total score of attitude and knowledge 100% and it is a great score, while the score of food preparation area was 69.2% and 62.1% in food preparation practice

**Keywords:** Food preparation area, Food acceptance, Food hygiene, Food quality, Food handlers.

### Introduction:

Food safety is defined by FAO /WHO as the assurance that when food is consumed in the usual manner does not cause harm to human health and wellbeing.<sup>1</sup>

According to the World Health Organization (WHO), up to 30% of the populations of developed countries are affected by food borne illness each year; more than 75 million people get sick from food related illnesses in the USA resulting in 325,000 hospitalizations and 5,000 deaths annually<sup>2</sup>. In these countries, errors made in food preparation at home, in restaurants, and other public places are important causes of food borne disease<sup>3</sup>. The problem is likely to be even more widespread in developing countries where food contamination occurs as a result of poor or inadequate production practices. The WHO further notes that food borne diseases affect people's health and well-being significantly and have economic consequences for the society as a whole. These diseases impose a substantial burden on health-care systems and reduce economic productivity. Moreover, as most of these cases are not reported, the true dimension of the problem is not known.<sup>4</sup>

There is a study that revealed a knowledge gap in food hygiene and handling practice; in addition, there is a statistically significant difference between trained (professional) handlers and non-trained handlers with regard to food hygiene.<sup>5</sup>

The high rate and exorbitant cost of food borne disease further indicate a need for food safety education. Reviews on the topic point to two factors important in developing this food safety education. First, is identifying the unsafe food handling behaviors of different target groups and second addressing those poor behaviors that put an individual at risk for food borne illness Overall, to develop new, more effective, audience-specific food safety education interventions, researchers and health educators need a better understanding of food handling practices and this includes direct observation of consumer practices.<sup>6</sup>

Cleaning chemicals can contaminate food if they are not used or stored correctly, so they need to be controlled properly. The transfer of cleaning chemicals to food can occur in a number of ways, for example: chemical residues may be transferred to food containers; chemicals may not be washed away from surfaces following cleaning; if stored incorrectly chemicals could leak into food storage areas. In order to prevent chemical contamination it is important to follow instructions and procedures when using cleaning products.<sup>7</sup>

General requirements Design and construction of food premises: The design and construction of food premises must be appropriate for the activities for which the premises are used; provide adequate space for the activities to be conducted on the food; premises and for the fixtures, fittings and equipment used for those activities; permit the food premises to be effectively cleaned and, if necessary, sanitized; and to the extent that is practicable: exclude dirt, dust, fumes, smoke and other contaminants; not permit the entry of pests; and not provide harborage for pests. Moreover for water supply: Food premises must have an adequate supply of water if water is to be used at the food premises for any of the activities conducted on the food premises.<sup>8</sup>

It is recommended that hand basins should be located at the staff entrances to areas where food is handled. Refer to Storage section 4 and Staff Amenities section.<sup>9</sup>

**Aim of the study:**

1. Assessment of food safety knowledge and attitudes of food handlers in food preparation area.
2. Assessment of food safety practices of food handlers in food preparation area and actual application of these procedures.

**Methodology:**

**Research Population and Sampling Techniques**

**Data Collection:**

The target population for this study was food handlers at Luxor hotels. A cross sectional study of food handlers in food preparation area in Luxor city hotels was conducted from October 2014 to January 2015.

A number of 300 questionnaire forms were distributed to juniors and seniors' of food and beverages and kitchen staff in five and four star hotels. 240 completed forms were valid (80% response rate). Checklists were conducted with the same investigated destinations/resorts for the same purpose. The collected data were analysed using SPSS version 20. A sample of 12 hotels from five and four star hotels in Luxor was chosen to carry out the current research during October 2014 to January 2015 (Table 1).

**Table (1): The Research Samples**

No.	Hotel name		Total Rooms	Category
1.	Hiltonluxor Hotel&Spa	HLH&S	236	5 Star
2.	Luxor Sheraton Hotel& Resort	LSH&R	290	5 Star
3.	Maritim Jolie Ville Kingsis Land Resort	MJVKIR	334	5 Star
4.	Sofitel Karnak Hotel	SKH	347	5 Star

5.	Sofitel Winter Palace Hotel	SWPH	234	5 Star
6.	Sonestast. George Hotelluxor	SSGHL	322	5 Star
7.	Steigen Bergernile Palace Hotel	SNPH	304	5 Star
8.	Akhetaton Village	KIEWS	144	4 Star
9.	Almoudira Hotel	AMH	54	4 Star
10.	Elluxor Hotel	ILH	306	4 Star
11.	Iberotel Luxor Hotel	MLH	185	4 Star
12.	Pyramisa Isis Luxor Hotel	PILH	480+time share	4 Star

**Results:**

This part of the study included the results of the personnel observation check list and the questionnaire forms which distributed on Luxor five and four star hotels to assessment of knowledge, attitudes and practices between food handlers regarding food safety in food preparation area in Luxor Hotels.

Statistical package of social sciences (SPSS) version 20.0 for windows was used to analyze and compute the collected data, with the exception of the open – end question. Frequencies counts and percentage distributions were used to assessment of knowledge, attitudes and practices of food handlers regarding food safety in food preparation area in Luxor hotels.

**Table (2): Distribution of the studied Handlers according to demographic data (n = 240)**

<b>Factor</b>	<b>No.</b>	<b>%</b>
<b>Age</b>		
Less than 20	12	5.0
From 20 to less than 35	198	82.5
From 35 to less than 45	12	5.0
Over 45 years old	18	7.5
<b>Sex</b>		
Male	240	100.0
Female	0	0.0
<b>Job</b>		
Assistant chief departee	57	23.8

First commee	47	19.6
Chief departee	43	17.9
Third commee	26	10.8
Second commee	22	9.2
Other	21	8.8
Helper	10	4.2
Assistant executive chief	9	3.8
Executive chief	5	2.1
<b>Education</b>		
High education	168	70.0
Over mediate	39	16.3
Mediate education	33	13.8
<b>Nationality</b>		
Egyptian	239	99.6
Foreign	1	0.4

The distribution of the studied handlers according to demographic data (n = 240) indicated that percentage of studied food handlers was 85.5% at the age of (20 to 35 years). 100% of all workers were men in the food preparation area. The greatest percentage was 23.8% of the jobs assistant chief departee and the lowest percentage was the assistant executive chief 3.8%. High educated food handlers have the great percentage of 70% of all food handlers; the lowest percentage was 13.8% mediate education. All workers in the food preparation area were Egyptian except one person.

According to preparation area table (3) the results showed that 85.8% of studied samples of food handlers indicated that the floor of the food preparation area usually in good condition. 49.2% indicate that the floor is usually clean. Waste, solid and liquid contaminants are effectively removed by good drainage and sewage system. 27.5% of them indicated that sometimes the kitchen and all service food equipment are periodically cleaned and sanitized according to a cleaning schedule. 47.1% of them indicated that there are usually adequate ventilation and the air conditions is working well. 72.1% of them indicated that the lighting system usually is in good condition. 54.2% of them indicated that the lighting usually well covered in the kitchen. 51.3% of them indicated that there is usually a separate entrance for raw food items and other exit for ready to eat food in the kitchen. 46.7% of them indicated that there are always separate partitions for vegetables, butchery, sauces, salads, desserts and preserved food. 50.4% of them indicated that the drainage system usually works well and the same percent indicated in application of effective cleaning schedule for containers, equipment and premises. 57.5% of them indicated that the kitchen usually has a right location in the hotel according to the standards. 61.7% of them indicated that food preparation area usually has standard design while 59.2% of them indicated that sometimes the kitchen located near the receiving and storage area

while 44.6% of them indicated that the kitchen floor level is rarely at the same level of receiving and storage area. 53.3% of them indicated that the area of the kitchen sometimes matches the rank and capacity of hotel, while 46.3% of them indicated that the temperature of the kitchen sometimes adjusted between 15 and 25°C. 37.9 of them indicated that sometimes there are not any problems related to maintenance in the kitchen. 37.1% of them indicated that usually there is fixed firing protection system in the kitchen the highest average mean was 88.25% with SD 0.63.

According to food preparation practices table (4) the results showed that 43.3% of food handlers indicated that sometimes they store leftover food directly in the refrigerator. 37.1% of them indicated that they are rarely washing hands well and rubbing it at least for 20 seconds after handling of raw food. 44.2% of them indicated that they are usually clean the kitchen counters well after all preparation activities are completed. 67.5% of them indicated that sometimes they isolate ready to eat food above raw food in the refrigerator. 60.8% of them indicated that they are usually using separate knives for meat, vegetables and fruits and the same percent was using separate boards for cutting meat and vegetables. 40.8% of them indicated that sometimes frozen chicken or meat was thawed in the refrigerator on the lowest shelf. 48.3% of them indicated that sometimes they wear glove after handling of raw food. 53.3% of them indicated that sometimes they change the glove after each handling of raw food, the same percentage 60.8% was eating and smoking in designed area only. 46.7% of them indicated that they are usually keeping cooked food covered in the kitchen. 35.8% of them indicated that they are usually clean, sanitize and prepare boards and utensils before using. 29.6% of them indicated that sometimes they use a thermometer during food preparation. 36.7% of them usually check the inner temperature of boiled cooked meat to be over 70°C. 36.3% of them sometimes use a clean and sanitized thermometer. 46.3% of them usually serve ready to eat food at a temperature above 60°C. 45.0% of them usually choose fresh and safe food before food preparation. 72.5% of them always use clean and safe water in cooking, washing fruits and vegetables, preparing drinks, making ice and cleaning food utensils. 44.6% of them always wear special uniform during food preparation. 40.8% of them always separate between raw food and cooked food contact surfaces. 52.9% of them usually make sure to use clean and dry spoon each time during tasting of food. 53.3% of them sometimes cover and put a serial number to each served plate the highest average mean was 94.50% with SD 0.45.

According to attitudes and knowledge of food handlers table (5) 65.4% of food handlers always know that the unhygienic practices of food expose the food handler to catch a disease. 50.4% of them always know that hands must be dried well after washing during food preparation. 99.6% of them always know that they must cover the head during food preparation. 75.4% of them always avoid pets in the kitchen. 44.2% of them sometimes know that the utensils racks must made from metal to be easy cleaned. 35.0% of them rarely get any educational food practice lessons. 57.5% always know that they should not wear any rings or jewellery during food preparation. 59.5% of them always know that they should not eat during food preparation the highest average mean was 99.92% with SD 0.06.

**Table (3): Distribution of the studied Handlers according to food preparation area (n = 240)**

	Never		Rarely		Some times		Usually		Always		Mean ±SD	Av %	Rank
	No.	%	No.	%	No.	%	No.	%	No.	%			
<b>Food Preparation Area</b>													
1- The floor of the food preparation area is in good condition	0	0.0	0	0.0	0	0.0	206	85.8	34	14.2	4.14±0.35	82.83	6
2- The floor is clean, waste, solid and liquid contaminants are effectively removed by good drainage and sewage system	0	0.0	0	0.0	19	7.9	103	42.9	118	49.2	4.41±0.63	88.25	1
3- The kitchen and all service food equipment are periodically cleaned and sanitized according to a cleaning schedule.	0	0.0	58	24.2	66	27.5	62	25.8	54	22.5	3.47±1.09	69.33	14
4- Adequate ventilation and the air conditions is working well	0	0.0	0	0.0	15	6.3	113	47.1	112	46.7	4.40±0.61	88.08	2
5- The lighting system is in good condition	0	0.0	0	0.0	0	0.0	173	72.1	67	27.9	4.28±0.45	85.58	5
6- The lighting is well covered in the kitchen	0	0.0	0	0.0	58	24.2	130	54.2	52	21.7	3.98±0.68	79.50	8
7- Is there is a separate entrance for raw food items and other exit for ready to eat food in the kitchen.	0	0.0	0	0.0	62	25.8	123	51.3	55	22.9	3.97±0.70	79.42	9
8- Are there separate partitions for vegetables, butchery, sauces, salads, desserts, preserved food	0	0.0	15	6.3	89	37.1	24	10.0	112	46.7	3.97±1.04	79.42	9
9- Does the drainage system work well	0	0.0	0	0.0	20	8.3	121	50.4	99	41.3	4.33±0.62	86.58	4

10- Do you apply effective cleaning schedule for containers ,equipment and premises	0	0.0	0	0.0	12	5.0	121	50.4	107	44.6	4.40±0.58	87.92	3
11- The kitchen has a right location in the hotel according to the standards	0	0.0	0	0.0	39	16.3	138	57.5	63	26.3	4.10±65	82.00	7
12- Food preparation area has standard design	0	0.0	0	0.0	52	21.7	148	61.7	40	16.7	3.95±62	79.00	11
13- Is the kitchen located near the receiving and storage area?	0	0.0	0	0.0	142	59.2	79	32.9	19	7.9	3.49±0.64	69.75	13
14- The kitchen floor level is at the same level of receiving and storage area.	24	10.0	107	44.6	74	30.8	35	14.6	0	0.0	2.50±0.86	50.00	18
15- The area of the kitchen matching the rank and capacity of hotel.	0	0.0	38	15.8	128	53.3	46	19.2	28	11.7	3.27±0.87	65.33	16
16- The temperature of the kitchen is adjusted between 15 and 25 degree C.	0	0.0	36	15.0	111	46.3	69	28.8	24	10.0	3.34±0.85	66.75	15
17- There is not any problems related to maintenance in the kitchen.	0	0.0	86	35.8	91	37.9	39	16.3	24	10.0	3.0±0.96	60.08	17
18- Is there fixed firing protection system in the kitchen.	0	0.0	20	8.3	76	31.7	89	37.1	55	22.9	3.75±0.90	74.92	12

**Table (4): Distribution of the studied Handlers according to food preparation practices (n = 240)**

	Never		Rarely		Some times		Usually		Always		Mean ±SD	Av %	Rank
	No.	%	No.	%	No.	%	No.	%	No.	%			
<b>Food preparation practices</b>													
1- Do you store leftover food directly in the refrigerator	0	0.0	0	0.0	104	43.3	102	42.5	34	14.2	3.71±0.7 0	74.17	14
2- Washing hands well and rubbing it at least for 20 seconds after handling of raw food.	18	7.5	89	37.1	79	32.9	40	16.7	14	5.8	2.76±1.0 1	55.25	23
3- The kitchen counters were cleaned well after all preparation activities are completed.	0	0.0	0	0.0	92	38.3	106	44.2	42	17.5	3.79±0.7 2	75.83	12
4- Isolate ready to eat food above raw food in the refrigerator	0	0.0	0	0.0	162	67.5	45	18.8	33	13.8	3.46±0.7 3	69.25	16
5- Using separate knives for meat, vegetables and fruits.	0	0.0	0	0.0	38	15.8	146	60.8	56	23.3	4.08±0.6 2	81.50	6
6- Do you use separate boards for cutting meat and vegetables	0	0.0	0	0.0	38	15.8	146	60.8	56	23.3	4.08±0.6 2	81.50	6
7- Frozen chicken or meat was thawed in the refrigeration on the lowest shelf	0	0.0	76	31.7	98	40.8	51	21.3	15	6.3	3.02±0.8 8	60.42	22
8- Do you wear glove after handling of raw food	0	0.0	14	5.8	116	48.3	84	35.0	26	10.8	3.51±0.7	70.17	15



											7		
9- Do you change the glove after each handling of raw food	0	0.0	34	14.2	128	53.3	72	30.0	6	2.5	$3.21 \pm 0.7$ 1	64.17	21
10- Eating food in designed area only	0	0.0	0	0.0	38	15.8	146	60.8	56	23.3	$4.08 \pm 0.6$ 2	81.50	6
11- Smoking in designed area only	0	0.0	0	0.0	38	15.8	146	60.8	56	23.3	$4.08 \pm 0.6$ 2	81.50	6
12- Do you keep cooked food covered in the kitchen	0	0.0	0	0.0	53	22.1	112	46.7	75	31.3	$4.09 \pm 0.7$ 3	81.83	5
13- Do you clean and sanitize preparing boards and utensils before using	0	0.0	27	11.3	68	28.3	86	35.8	59	24.6	$3.74 \pm 0.9$ 6	74.75	13
14- Do you use a thermometer during food preparation	0	0.0	67	27.9	71	29.6	64	26.7	38	15.8	$3.30 \pm 1.0$ 4	66.08	19
15- Do you check the inner temperature of boiled cooked meat to be over 70 Dc.	0	0.0	67	27.9	53	22.1	88	36.7	32	13.3	$3.35 \pm 1.0$ 3	67.08	17
16- Do you use a clean and sanitized thermometer.	0	0.0	57	23.8	87	36.3	70	29.2	26	10.8	$3.27 \pm 0.9$ 4	65.42	20
17- Do you serve ready to eat food at a temperature above 60 Dc	0	0.0	24	10.0	36	15.0	111	46.3	69	28.8	$3.94 \pm 0.9$ 1	78.75	10

18- Do you choose fresh and safe food before food preparation	0	0.0	0	0.0	54	22.5	108	45.0	78	32.5	$4.10 \pm 0.7$ 4	82.00	4
19- Do you use clean and safe water in cooking, washing fruits and vegetables, preparing drinks, making ice and cleaning food utensils.	0	0.0	0	0.0	0	0.0	66	27.5	174	72.5	$4.73 \pm 0.4$ 5	94.50	1
20- Do you wear special uniform during food preparation.	0	0.0	0	0.0	36	15.0	97	40.4	107	44.6	$4.30 \pm 0.7$ 1	85.92	2
21- Do you separate between raw food and cooked food contact surfaces	0	0.0	0	0.0	49	20.4	93	38.8	98	40.8	$4.20 \pm 0.7$ 6	84.08	3
22- During tasting of food do you make sure to use clean and dry spoon each time.	0	0.0	0	0.0	74	30.8	127	52.9	39	16.3	$3.85 \pm 0.6$ 7	77.08	11
23- Do you cover and put a serial number to each served plate.	0	0.0	32	13.3	128	53.3	44	18.3	36	15.0	$3.35 \pm 0.8$ 9	67.00	17

**Table (5): Distribution of the studied Handlers according to attitudes and knowledge of food handlers (n = 240)**

	Never		Rarely		Some times		Usually		Always		Mean ±SD	Av %	Rank
	No.	%	No.	%	No.	%	No.	%	No.	%			
<b>Attitudes and Knowledge of Food Handlers</b>													
1- Do you know that the un hygienic practices of food expose the food handler to catch a disease.	0	0.0	0	0.0	6	2.5	77	32.1	157	65.4	4.63±0.53	92.58	3
2- Do you know that hands must be dried well after washing during food preparation.	0	0.0	0	0.0	0	0.0	119	49.6	121	50.4	4.50±0.50	90.08	5
3- Do you know that you must cover your head during food preparation	0	0.0	0	0.0	0	0.0	1	0.4	239	99.6	5.0±0.06	99.92	1
4- Do you know that you have to avoid pets in the kitchen	0	0.0	0	0.0	0	0.0	59	24.6	181	75.4	4.75±0.43	95.08	2
5- Do you know that the utensils racks must made from metal to be easy cleaned	0	0.0	0	0.0	106	44.2	78	32.5	56	23.3	3.79±0.80	75.83	7
6- Do you get any educational food practice lessons.	0	0.0	84	35.0	72	30.0	58	24.2	26	10.8	3.11±1.01	48.17	8
7- Do you know that you should not wear any rings or jewelry during food preparation?	0	0.0	0	0.0	18	7.5	84	35.0	138	57.5	4.50±0.63	90.00	5
8- Do you know that you should not eat during food preparation	0	0.0	0	0.0	0	0.0	97	40.4	143	59.6	4.60±0.49	91.92	4

Table (6) showed that the mean scores of studied food handlers were 70.47% in food and preparation area, 68.46% in food preparation practices and 84.0% in attitudes and knowledge.

**Table (6): Descriptive analysis of the studied Handlers according to scores (n = 240)**

	<b>Total score</b>	<b>Mean %score</b>
<b>Food preparation area</b>		
Min. – Max.	61.0 – 78.0	59.72 – 83.33
Mean ± SD	68.74 ± 4.43	70.47 ± 6.16
<b>Food preparation practices</b>		
Min. – Max.	74.0 – 97.0	55.43 – 80.43
Mean ± SD	85.99 ± 5.51	68.46 ± 5.99
<b>Attitudes and knowledge</b>		
Min. – Max.	31.0 – 38.0	71.88 – 93.75
Mean ± SD	34.88 ± 1.84	84.0 ± 5.74

Table (7) showed that 69.2% of the studied food handlers sample got high score in food preparation area, 62.1% got high score in food preparation practice, while 100% of food handlers got high score in attitudes and knowledge which indicate that there is a gap between the attitudes and knowledge and both food preparation practices and food preparation area this mean knowledge is perfect but practices need improvement.

**Table (7): Distribution of level score (n = 240)**

	<b>Low</b>		<b>Moderate</b>		<b>High</b>	
	<b>(&lt;33%)</b>		<b>(33.3% – 66.6%)</b>		<b>(&gt;66.6%)</b>	
	<b>No.</b>	<b>%</b>	<b>No.</b>	<b>%</b>	<b>No.</b>	<b>%</b>
<b>Food Preparation Area</b>	0	0.0	74	30.8	166	69.2
<b>Food preparation practices</b>	0	0.0	91	37.9	149	62.1
<b>Attitudes and knowledge</b>	0	0.0	0	0.0	240	100.0

Table (8) showed that there is a significant negative correlation between food preparation area and practice, there is a significant positive correlation between food preparation area and attitudes and knowledge of food handlers and there is positive significant correlation between practice and attitude and knowledge of food handlers.

**Table (8): Correlation between knowledge, practice and attitude of Handlers**

	<b>R</b>	<b>p</b>
<b>Food preparation area vs practices</b>	-0.248*	<0.001*
<b>Food preparation area vs Attitudes and knowledge</b>	0.198*	0.002*
<b>Practices vs Attitudes and knowledge</b>	0.299*	<0.001*

r: Pearson coefficient

\*: Statistically significant at  $p \leq 0.05$

Regarding food preparation area :Table(9 ) showed that there is a significant difference between five stars hotels and four stars hotels at: The kitchen and all service food equipment are periodically cleaned and sanitized according to a cleaning schedule as five stars hotels got 100% while four stars hotels got 40%. There is a significant difference between five and four star hotels in the lighting is well covered in the kitchen and there is a significant difference between five and four star hotels at there is not any problems related to maintenance in the kitchen.

**Table (9): Comparison between the two studied groups according to food preparation area**

<b>Food preparation area</b>	<b>5 Star hotels (n = 7)</b>				<b>4 Star hotels (n = 5)</b>				$\chi^2$	<b>FE p</b>
	<b>Yes</b>		<b>No</b>		<b>Yes</b>		<b>No</b>			
	<b>No.</b>	<b>%</b>	<b>No.</b>	<b>%</b>	<b>No.</b>	<b>%</b>	<b>No.</b>	<b>%</b>		
1- The floor of the food preparation area is in good condition	6	85.7	1	14.3	1	20.0	4	80.0	5.182	0.072
2- The floor is clean, waste, solid and liquid contaminants are effectively removed by good drainage and sewage system	7	100.0	0	0.0	3	60.0	2	40.0	3.360	0.152
3- The kitchen and all service food equipments are periodically cleaned and sanitized according to a cleaning schedule.	7	100.0	0	0.0	2	40.0	3	60.0	5.600*	0.045*
4- Adequate ventilation and the air conditions is working well	7	100.0	0	0.0	5	100.0	0	0.0	-	-
5- The lighting system is in good condition	7	100.0	0	0.0	5	100.0	0	0.0	-	-
6- The lighting is well covered in the kitchen	7	100.0	0	0.0	2	40.0	3	60.0	5.600*	0.045*

7- Is there is a separate entrance for raw food items and other exit for ready to eat food in the kitchen.	6	85.7	1	14.3	2	40.0	3	60.0	2.743	0.222
8- Are there separate partitions for vegetables, butchery, sauces, salads, desserts, preserved food	6	85.7	1	14.3	2	40.0	3	60.0	2.743	0.222
9- Does the drainage system work well	7	100.0	0	0.0	5	100.0	0	0.0	-	-
10- Do you apply effective cleaning schedule for containers ,equipments and premises	7	100.0	0	0.0	4	80.0	1	20.0	1.527	0.417
11- The kitchen has a right location in the hotel according to the standards	7	100.0	0	0.0	5	100.0	0	0.0	-	-
12- Food preparation area has standard design	7	100.0	0	0.0	5	100.0	0	0.0	-	-
13- Is the kitchen located near the receiving and storage area.	7	100.0	0	0.0	4	80.0	1	20.0	1.527	0.417
14- The kitchen floor level is at the same level of receiving and storage area.	7	100.0	0	0.0	3	60.0	2	40.0	3.360	0.152
15- The area of the kitchen matching the rank and capacity of hotel.	7	100.0	0	0.0	3	60.0	2	40.0	3.360	0.152
16- The temperature of the kitchen is adjusted between 15 and 25 degree C.	6	85.7	1	14.3	2	40.0	3	60.0	2.743	0.222
17- There is not any problem related to maintenance in the kitchen.	6	85.7	1	14.3	0	0.0	5	100.0	8.571*	0.015*
18- Is there fixed firing protection system in the kitchen?	7	100.0	0	0.0	4	80.0	1	20.0	1.527	0.417

$\chi^2$ : value for Chi square

FE: Fisher Exact test

\*: Statistically significant at  $p \leq 0.05$

Regarding food preparation practice table(10) showed that there is a significant difference between five stars hotels and four stars hotels regarding isolate ready to eat food above raw food in the refrigerator, Using separate knives for meat, vegetables and fruits and the question Do you use separate boards for cutting meat and vegetables. There is a significant difference between five and four star hotels in: Do you change the glove after each handling of raw food.

Table (10): Comparison between the two studied groups according to food preparation practices

Food Preparation Practices	5 Star hotels (n = 7)				4 Star hotels (n = 5)				$\chi^2$	FE p
	Yes		No		Yes		No			
	No.	%	No.	%	No.	%	No.	%		
1- Do you store leftover food directly in the refrigerator.	7	100.0	0	0.0	3	60.0	2	40.0	3.360	0.152
2- Washing hands well and rubbing it at least for 20 seconds after handling of raw food.	5	71.4	2	28.6	1	20.0	4	80.0	3.086	0.242
3- The kitchen counters were cleaned well after all preparation activities are completed.	7	100.0	0	0.0	3	60.0	2	40.0	3.360	0.152
4- Isolate ready to eat food above raw food in the refrigerator.	7	100.0	0	0.0	2	40.0	3	60.0	5.600*	0.045*
5- Using separate knives for meat, vegetables and fruits.	7	100.0	0	0.0	2	40.0	3	60.0	5.600*	0.045*
6- Do you use separate boards for cutting meat and vegetables	7	100.0	0	0.0	2	40.0	3	60.0	5.600*	0.045*
7- Frozen chicken or meat was thawed in the refrigeration on the lowest shelf	7	100.0	0	0.0	4	80.0	1	20.0	1.527	0.417
8- Do you wear glove after handling of raw food	6	85.7	1	14.3	2	40.0	3	60.0	2.743	0.222
9- Do you change the glove after each handling of raw food	5	71.4	2	28.6	0	0.0	5	100.0	6.122*	0.028*
10- Eating food in designed area only	5	71.4	2	28.6	1	20.0	4	80.0	3.086	0.242
11- Smoking in designed area only	6	85.7	1	14.3	2	40.0	3	60.0	2.743	0.222
12- Do you keep cooked food covered in the kitchen	7	100.0	0	0.0	5	100.0	0	0.0	-	-
13- Do you clean and sanitize preparing boards and utensils before using	7	100.0	0	0.0	5	100.0	0	0.0	-	-
14- Do you use a thermometer during food	6	85.7	1	14.3	1	20.0	4	80.0	5.182	0.072





1- Do you know that the un hygienic practices of food expose the food handler to catch a disease.	7	100.0	0	0.0	5	100.0	0	0.0	-	-
2- Do you know that hands must be dried well after washing during food preparation.	7	100.0	0	0.0	4	80.0	1	20.0	1.527	0.417
3- Do you know that you must cover your head during food preparation	7	100.0	0	0.0	5	100.0	0	0.0	-	-
4- Do you know that you have to avoid pets in the kitchen	7	100.0	0	0.0	4	80.0	1	20.0	1.527	0.417
5- Do you know that the utensils racks must made from metal to be easy cleaned	6	85.7	1	14.3	2	40.0	3	60.0	2.743	0.222
6- Do you get any educational food practice lessons?	5	71.4	2	28.6	0	0.0	5	100.0	6.122*	0.028*
7- Do you know that you should not wear any rings or jewelry during food preparation?	6	85.7	1	14.3	360.0	80.0	2	40.0	1.029	0.523
8- Do you know that you should not eat during food preparation	6	85.7	1	14.3	4	80.0	1	20.0	0.069	1.000

$\chi^2$ : value for Chi square

FE: Fisher Exact test

\*: Statistically significant at  $p \leq 0.05$

The results in table (12) compared between five stars hotel and four stars hotels that the total score percent in food preparation area was significant, the total score percent in food preparation practice was significant and the total score percent in attitudes and knowledge of food handlers was significant.

**Table (12): Comparison between the two studied groups according to knowledge, practice and attitude**

	5 Star hotels (n = 7)	4 Star hotels (n = 5)	t	p
<b>Food Preparation Area</b>				
<b>Total score</b>				
Min. – Max.	14.0 – 18.0	7.0 – 16.0	4.017*	0.002*

Mean ± SD	17.29 ± 1.50	11.40 ± 3.51		
<b>Percent score</b>				
Min. – Max.	77.78 – 100.0	38.89 – 88.89	4.017*	0.002*
Mean ± SD	96.03 ± 8.31	63.33 ± 19.48		
<b>Food preparation practices</b>				
<b>Total score</b>				
Min. – Max.	19.0 – 23.0	10.0 – 18.0	4.519*	0.006*
Mean ± SD	21.0 ± 1.53	13.0 ± 3.74		
<b>Percent score</b>				
Min. – Max.	82.61 – 100.0	43.48 – 78.26	4.519*	0.006*
Mean ± SD	91.30 ± 6.64	56.52 ± 16.27		
<b>Attitudes and Knowledge of Food Handlers</b>				
<b>Total score</b>				
Min. – Max.	5.0 – 8.0	4.0 – 7.0	2.497*	0.032*
Mean ± SD	7.29 ± 1.11	5.40 ± 1.52		
<b>Percent score</b>				
Min. – Max.	62.50 – 100.0	50.0 – 87.50	2.497*	0.032*
Mean ± SD	91.07 ± 13.91	67.50 ± 18.96		

t: Student t-test

\*: Statistically significant at  $p \leq 0.05$

The results in table (13) indicated that there is a significant difference between five and four stars hotels in food preparation practice while there is no significant difference between five and four star hotels in food preparation area and attitude and knowledge of food handlers

**Table (13): Comparison between the two studied groups according to level of scores**

	5 Star hotels (n = 7)	4 Star hotels (n = 5)	$\chi^2$	FE <sub>p</sub>
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	No.	%	No.	%		
<b>Food Preparation Area</b>						
Low (<33%)	0	0.0	0	0.0		
Moderate (33.3% – 66.6%)	0	0.0	2	40.0	3.360	0.152
High (>66.6%)	7	100.0	3	60.0		
<b>Food preparation practices</b>						
Low (<33%)	0	0.0	0	0.0		
Moderate (33.3% – 66.6%)	0	0.0	3	60.0	5.600*	0.045*
High (>66.6%)	7	100.0	2	40.0		
<b>Attitudes and Knowledge of Food Handlers</b>						
Low (<33%)	0	0.0	0	0.0		
Moderate (33.3% – 66.6%)	1	14.3	3	60.0	2.743	0.222
High (>66.6%)	6	85.7	2	40.0		

$\chi^2$ : value for Chi square FE: Fisher Exact test \*: Statistically significant at  $p \leq 0.05$

The results showed in table (14) the correlation between food preparation area, food preparation practice and attitude and knowledge of food handlers and indicated that there is none significant positive correlation between food preparation area and food preparation practices in five and four hotels, there is none

significant negative correlation between food preparation area and attitude and knowledge in five stars hotels while it was none significant but positive correlation in four stars hotels and there is positive non-significant correlation between food preparation practice and attitude and knowledge of food handlers in five stars hotels but it was significant positive correlation in four stars hotels.

**Table (14), Correlation between knowledge, practice and attitude in each group**

	5 Star hotels (n = 7)		4 Star hotels (n = 5)	
	r	p	r	p
<b>Food Preparation Area vs Food preparation practices</b>	0.729	0.063	0.800	0.104

<b>Food Preparation Area vs Attitudes and Knowledge of Food Handlers</b>	-0.057	0.903	0.620	0.264
<b>Food preparation practices vs Attitudes and Knowledge of Food Handlers</b>	0.490	0.264	0.925*	0.024*

r: Pearson coefficient

\*: Statistically significant at  $p \leq 0.05$

### Discussion:

From table (2) as the results of demographic data of workers in food preparation area showed that 82.5% of food handlers were at the age of (20-35) indicated that the work in the kitchen needs high muscular power and great efforts. Ranking in table (2) showed that the highest percent of existing job was 23% assistant chief departee that indicated that the assistant chief departee is the key person and the actual responsible one in the kitchen, while the executive chief 2.1% got the lowest percent. The high educated food handlers have got the highest percent 70% indicated that the work in the kitchen needs highly qualified and well educated workers it followed by over mediate 16.3% then 13.8%. All of workers were Egyptians except one this is due to foreigners may prefer to work at other places in the kitchen .In contrast to <sup>5</sup> which indicated that the socio-demographic data of the food handlers is majority (73.4%) of the food handlers were females and (26.6%) were males where most of them(55.6%) were between 21 and 30 years of age with median age of 22 years, majority (50.2%) of food handlers completed at least primary school and (8.1%) had no formal education.

The ranking of results of studied food handlers in food preparation area table (3) indicated that the high score was in the floor is clean, waste, solid and liquids and contaminants are effectively removed by good drainage sewage system the mean was 4.41. Adequate ventilation and air condition is working well the mean was 4.40 the same as applying of effective cleaning schedule for containers, equipment and premises and then the rest of questions got a serial ranking as: Does drainage the system work well, The lighting system is in good condition, The floor of the food preparation area is in good condition, The kitchen has a right location in the hotel according to the standards, The lighting is well covered in the kitchen, Is there is a separate entrance for raw food items and other exit for ready to eat food in the kitchen, Are there separate partitions for vegetables, butchery, sauces, salads, desserts, preserved food, Food preparation area has standard design, Is there fixed firing protection system in the kitchen, Is the kitchen located near the receiving and storage area. The kitchen and all service food equipment are periodically cleaned and sanitized according to a cleaning schedule; the temperature of the kitchen is adjusted between 15 and 25°C, The area of the kitchen matching the rank and capacity of hotel. There are not any problems related to maintenance in the kitchen. The kitchen floor level is at the same level of receiving and storage area.

The ranking of results according to food preparation practice table (4) indicated that high mean of scores was in Do you use clean and safe water in cooking, washing fruits and vegetables, preparing drinks, making ice and cleaning food utensils, Do you wear special uniform during food preparation then Do you separate between raw food and cooked food contact surfaces and other questions got serial rank as: Do you choose fresh and safe food before food preparation, Do you keep cooked food covered in the kitchen, Eating food in designed area only, Smoking in designed area only, Using separate knives for meat, vegetables and fruits, Do you use separate boards for cutting meat and vegetables, During tasting of food do you make sure to use clean and dry spoon each time, The kitchen counters were cleaned well after all preparation activities

are completed, Do you clean and sanitize preparing boards and utensils before using, Do you store leftover food directly in the refrigerator, Do you wear glove after handling of raw food, Isolate ready to eat food above raw food in the refrigerator, Do you check the inner temperature of boiled cooked meat to be over 70 Dc, Do you cover and put a serial number to each served plate, Do you use a thermometer during food preparation, Do you use a clean and sanitized thermometer, Do you change the glove after each handling of raw food, Frozen chicken or meat was thawed in the refrigeration on the lowest shelf, Washing hands well and rubbing it at least for 20 seconds after handling of raw food.

The ranking of studied food handlers according to attitude and knowledge table (5) the high mean score was, Do you know that you must cover your head during food preparation, Do you know that you have to avoid pets in the kitchen, Do you know that the unhygienic practices of food expose the food handler to catch a disease, Do you know that you should not eat during food preparation, Do you know that hands must be dried well after washing during food preparation, Do you know that you should not wear any rings or jewelry during food preparation, Do you know that hands must be dried well after washing during food preparation, Do you know that the utensils racks must be made from metal to be easy cleaned, Do you get any educational food practice lessons.

Table (6) shows that the mean score were 84.0% in attitude and knowledge, while it was 68.4% in food preparation practice that means the food handlers know the right knowledge about food safety but they did not know how to apply it. This agrees with study indicated that<sup>6</sup>, there are significant differences were found to exist in the perceptions, opinions, knowledge, and self-reported practices of those who had experienced food-borne illness in the past twelve months versus those who had not. Significant differences were also found with respect to various demographic variables, especially, with respect to age and education levels.

From table (7) The attitude and knowledge was 100% and it is a great score, while the score of food preparation area was 69.2% and 62.1% in food preparation practice that the food handlers know how to cook safely but they did not apply it practically and this result verified in table(5) showed that there is a significant negative correlation between food preparation area and practice, there is a significant positive correlation between food preparation area and attitudes and knowledge of food handlers as  $P=0.002$  and there is a positive significant correlation between practice and attitude and knowledge of food handlers.

That agrees with study stated that food safety at home may result in increased potential for unsafe food-handling behaviors and consequential increased risk of illness.<sup>x</sup>

This agrees with a report on consumer food-handling practices indicated that although consumer awareness of pathogens is increasing consumers do not always follow safe handling to minimize pathogens. For example, most consumers do not use a food thermometer to ensure that the food has been cooked to safe internal temperature to kill pathogens.<sup>xi</sup>

In food preparation area there is a significant difference between five and four stars hotels in the answers of: the kitchen and all service food equipment are periodically cleaned and sanitized according to a cleaning schedule. Gaps persist,<sup>xii, xiii</sup> Partnership for Food Safety<sup>xiv</sup> although knowledge does not necessarily translate into implementation of correct behaviors.<sup>xv</sup> There is a review on consumer food-handling found that knowledge, self-reported behaviors, as well as, intentions, did not correspond with observed food handling behaviors. Cleaning and sanitizing according to cleaning schedule the score was 100% in five star hotels, while in four star hotels the score was 40%, this indicates that there is a huge gap between five and four stars hotels at this point. The same was in the answer of: lighting is well covered in the kitchen. The answer of: there is no any problem related to maintenance is significant.

From table (11) there is significant difference between five and four hotels in the answer of: do you get any educational food practice lessons. From table (13) there is a significant difference between five and four star hotels in food preparation practice and this result verified in table (10) in the answers of Isolate ready to eat food above raw food in the refrigerator, Using separate knives for meat, vegetables and fruits, do you use separate boards for cutting meat and vegetables, and the answer of do you change the glove after each handling of raw food. This is verified by results in table (14) which indicate that there is significant positive correlation between food preparation practices and attitudes in four stars hotels.

### Conclusions

- The result indicated that 100% of all workers were men this result agree with the traditions in Upper Egypt and confirm that food preparation work needs great efforts.
- The high educated food handlers have got the highest percent 70% indicated that the work in the kitchen needs more qualified and well educated workers.
- The food handlers know the right knowledge about food safety but they did not know how to apply it.
- Food handlers know how to cook safely but they did not apply it practically as the total score of attitude and knowledge 100% and it is a great score, while the score of food preparation area was 69.2% and 62.1% in food preparation practice.
- Washing hands well and rubbing it at least for 20 seconds after handling of raw food have got the last position in ranking of food preparation practices.
- There is a huge gap between five and four star hotels as the point of cleaning and sanitizing according to cleaning schedule the score was 100% in five stars hotels, while in four stars hotels the score was 40%.
- There is a significant difference between five and four star hotels in educational food practice lessons.

### Recommendations

- HACCP-based programs should be implemented in hotels to enhance food safety and quality.
- Application of food safety educational programs
- Training the food handlers about hand washing and glove use.
- Food service establishments must be kept in good sanitary condition.
- Food preparing area must be at the same level with the receiving and storage area.
- The kitchen and all service food equipment should periodically clean and sanitized according to cleaning schedule at four stars hotels.
- Licensing of food handlers and regular inspection targeted to improve their hygienic food practices.

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### تقيم معدى الطعام من حيث المعرفة والاتجاهات والممارسة الفعلية فى فنادق الأقبصر

تهدف هذه الدراسة إلى قياس وعى معدى الطعام ومعلوماتهم عن إعداد الطعام بالنسبة لأماكن إعداد الطعام وعملية إعداد الطعام، وكذلك التطبيق الفعلى لهذه المعلومات وذلك بهدف تحسين صحة وجودة وتقبل الغذاء فى فنادق الأقبصر. ولتحقيق هذا الهدف استخدمت وسيلتان من وسائل البحث وهما نموذج الاستطلاع وقائمة الملاحظة الشخصية وتقديمها لمعدى الطعام لمعرفة مدى وكمية معلوماتهم عن إعداد الطعام ومدى مطابقتها لإنتاج الطعام بصورة صحية والتطبيق الفعلى لهذه المعلومات. تم جمع البيانات وعمل تحليل إحصائى لها باستخدام برنامج التحليل الإحصائى SPSS نسخة 20. ومن أهم النتائج أن 100% من العاملين فى مناطق إعداد الطعام من الرجال وهذا يتفق مع عادات وتقاليد المجتمع، لأن العمل يحتاج قوة عضلية. وكما أن العاملين فى مناطق إعداد الطعام يعرفون المعلومات الصحيحة ولكن لا يطبقونها.

**الكلمات الدالة:** منطقة إعداد الطعام، تقبل الغذاء، سلامة الغذاء، جودة الغذاء، معدو الطعام.