

## Evaluation of an Educational Program concerning Food Safety for Food Services Employees in Assiut University Restaurants- Assiut Governorate

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### Abstract

**Background:** Foodborne diseases continue to be a problem that contributes to morbidity and mortality globally.

**Aim:** Evaluate the effectiveness of the educational health program concerning food safety for food services employees in Assiut University restaurants. **Subject and methods:** Quasi experimental design (one group pre and posttest) carried out in Assiut University restaurants on 202 food services employees who selected by convenient sample. Interview questionnaire was used which included personal data and questions regarding knowledge, attitude and practices about food safety measures to assess the effectiveness of the educational program through immediate posttest. **Results:** 65.8% of them were male, 43.1% aged >45 years and 43.1% had > 20 years' experience. Improvement of knowledge regarding food safety noticed after application of the educational program (pre education= 57.33 & post education= 80.12). The mean score of their attitude and practice were 47.05±4.43 and 51.45±6.11 respectively. **Conclusion:** the study confirmed that the design of the program lead to better knowledge of food services employees. Also, they had proper practices and positive attitude regarding food safety. **Recommendation:** Continuous education and supporting program for food service employees to improve their food safety knowledge, Attitudes and practices in this field.

**Keywords:** *Food Safety, Food Service Employees & Restaurants.*

### Introduction

Foodborne diseases continue to be a problem that contributes to morbidity and mortality worldwide (Nkhebenyane & Lues, 2020). Food hygiene is defined as "the measures and conditions necessary to control hazards and to ensure fitness for human consumption of a foodstuff taking into account its intended use". Food illnesses are defined as diseases, usually either infectious or toxic in nature, caused by agents that enter the body through the ingestion of food". International statistics on food-borne diseases disclosed that cases of food-borne illnesses are growing year by year (Annor & Baiden, 2011 & Soares et al., 2012). The cooking and storage of food at improper temperatures and the cross-contamination of food due to unsanitary handling practices are regarded as the main causes of many foodborne disease outbreaks in food preparation and service facilities (Teffo & Tabit, 2020).

Food-borne related illnesses have increased over the years, and negatively affected the health and economic well-being of many developing countries. The rate of foodborne diseases has been on the rise recently, and this has a negative influence on the health and economy aspect of developing countries more than those of developed countries. Also, according to (WHO, 2020), over 200 diseases are caused by eating food contaminated with a variety of microbial pathogens, chemicals, and parasites that contaminate food at different points in the food

production and preparation chain (Nkhebenyane & Lues, 2020).

Food poisoning occurs as a result of ingestion of food contaminated with microorganisms or their toxins, the contamination arising from poor preservation methods, unhygienic handling practices, cross-contamination from food contact surfaces, or from persons harboring the microorganisms in their skin. Unclean practices during food preparation, handling and storage creates the conditions that allows the proliferation and transmission of disease causing organisms such as bacteria, viruses and other food-borne pathogens. Additionally, many reported cases of food-borne viral diseases have been attributed to infected food-handlers involved in catering services (Rosmawati et al., 2015 & Akabanda et al., 2017).

The knowledge, attitudes and practices of food-handlers have been reported in studies from different countries around world. This is because a combination of the three factors: knowledge, attitude and practice of food handlers, play a dominant role in food safety with regards to food service industry (Webb & Morancie, 2015).

Food workers must have the required skills and knowledge to ensure implementation of good hygiene practices and the safety of food concepts within the healthcare facilities. Both prior food- based work experience and education are important inputs towards ensuring workers implement healthy food-based handling tasks. Additionally,

trainings, designing policies, and setting standards can lessen the occurrence of food-based ailments caused by food handlers in food establishments (Alqurashi, Priyadarshini & Jaiswal, 2019).

Community health nurses can have a major influence through health education. They can teach the basics of keeping perishable products sufficiently refrigerated, discarding foods that may be old or spoiled, cooking foods thoroughly, and bringing water to a full boil when appropriate to be certain of eliminating microbes (WHO, 2017). They can raise public awareness regarding the conditions of supermarkets, restaurants, and other food handlers. They can also help promote community standards, enabling legislation, and policies for safer food supplies (Stanhope & Lancaster, 2019).

### Significance of the study

The problems of food safety have increased in developing countries. Food safety is a critical issue facing the food service industry. Diarrhoeal diseases are the most common illnesses resulting from the consumption of contaminated food, causing 550 million people to fall ill and 230 000 deaths occurred every year (WHO, 2020).

An understanding of food safety procedures and potential factors that cause food borne illness is very important for all food handlers. Food safety training has been considered one of the most important ways to prevent or mitigate food contamination risks by adjusting the practices of handlers and improving their attitude (Kunadu et al., 2016). Knowledge, attitudes and practices of food handlers are important for identifying how efficient training in food safety is allowing prioritize actions in planning training (Zanin et al, 2017).

### Aim of the study

Evaluate the effectiveness of educational health program concerning food safety measures for food services employees in Assiut University restaurants – Assiut Governorate.

### Hypothesis

**Hypothesis 1:** Food services employees in Assiut university restaurants were lacking knowledge, skills and attitude regarding food safety that can be corrected by proper educational program.

**Hypothesis 2:** Proper planning and implementation of the educational health program can improve the competency of them.

### Subjects and Methods

**Research design:** Quasi-experimental research design (one group pre and posttest) was used in this study.

**Setting:** The study conducted in four restaurants in Assiut University which include the central

restaurant, restaurants of students' dorms (male and female) and Assiut University hospitals.

### Sampling technique

The target population of the study was food services employees who working in Assiut University, have minimum one year experience and who accepted to participate in the study. Convenient sample was used to collect data from all morning shift (202) food services employees.

**Tools of the study:** Structured interview questionnaire which included the details regarding personal characteristic and questions to assess knowledge, attitude and practice about food safety measures; it structured into two parts:

**Part (1): Personal data it included:** such as name, educational status, age, years of experience and marital status.

### Part (2): Knowledge, attitude and practice questionnaire about food safety

A modified questionnaire for knowledge, attitude and practice of food handlers was used (Sharif & Al-malki, 2010). It included 15 questions for the knowledge, 15 questions about the attitude and 20 designed for the practice. Questions about knowledge scored on a five-point scale (0 to 4) with options of strongly agrees, agree, not sure, disagree and strongly disagree. Questions about attitude were scored on a five-point scale (0 to 4) with options of strongly agrees, agree, not sure, disagree and strongly disagree. For the attitude questionnaire, the direction of the scale was from 0 to 4 for the questions 1–11 then the direction is reversed from 4 to 0 for the questions 12–15. The highest possible score for knowledge and attitude were 60.

Practice questions scored on a five-point scale (0 to 4) with options of always, most of the times, sometimes, rarely or never. The direction of the scale was (4 to 0) and reversed to (0 to 4) for some questions to check the validity of the responses. For the practice questionnaire: the direction of the score was 4–0 for the questions 1–6 then the direction of the score was from 0 to 4 for the questions 7–20. The highest possible score for practice was 80. The higher of mean score the better the knowledge, attitude and practice toward food safety measures.

### Reliability of a tool

The internal consistency of the responses for each scale and the total tool calculated by using Cronbach  $\alpha$  coefficient for the KAP were 70%, 73%, and 99% respectively (Fariba et al., 2018).

### Validity of tool

Questionnaire examined and reappraised by five of specialists in the field of Community Health Nursing at Assiut University who reviewed the questionnaire for clearness, comprehensiveness, understanding and applicability.

## Methodology

### I- Administrative phase

An official letter approval obtained from the Dean of the Faculty of Nursing, Assiut University to the Vice President for Education and Students Affairs to complete the study. The letter included a permission to carry out the study in the selected restaurants in Assiut University.

### Educational program construction

The educational program conducted according to the following four stages:

#### I-Assessment stage

The researchers prepared the questionnaire based on the related article and literature which planned to collect data and develop the educational plan to increase food service employees' knowledge and assess their attitude and practice regarding food safety measures.

#### II-Planning stage

##### Objective of the program

To evaluate the effectiveness of educational health program about food safety measures among food service employees in Assiut University restaurants.

##### Contents of the program:

1. Introduction and definition of food safety.
2. Causative agents of food illness.
3. Signs and symptoms of food illness.
4. Five keys for food safety
5. Right methods for preparation and preservation of food.
6. Role of the community health nurse

##### The program arrangement

The researchers prepared the place of lecture, meeting, brochure, etc. the program conducted at the office of the restaurants' managers. Time of teaching was determined based on the suitable time of the study participants. The researchers used plain teaching styles like: lecture, discussion. The media handouts regarding food safety measures were given to all participants after finishing the program.

#### III.Implementation stage

The study performed in duration from the first of February to the end of April 2018, two days/ week. During the interview, the researchers illustrated the goal of the research to the food services employees. Pretest was done prior the meeting to evaluate the recipients' knowledge, attitude and their practices. The time needed to complete the pretest was ranged from 15- 20 minutes, 24: 26 employees per day. Every participant took two sessions for one and half hour to each to complete the program contents. Session one included (Introduction and definition of food safety, causative agents of food illness and signs and symptoms of food illness). Session two included (five keys for food safety ,right methods for

preparation, preservation of food and role of community health nurse).

**IV- Evaluation stage:** The evaluation was done through posttest by repeating the same format of pretest which done immediately after implementing and completing the course to assess participants' knowledge.

#### Pilot study

Pilot study carried out before starting of data collection on twenty food services employees which included in the study. The aim of this study was to test the clarity of the tools and to estimate the required time to fill the questionnaire.

#### Ethical considerations

Research proposal approved from ethical committee in the Faculty of Nursing, Assiut University. There was no risk for study subjects during application of the research. Oral consent obtained from food handlers that were willing to participate in the study after explaining the nature and purpose of the study.

#### Statistical analysis

The data computerized and verified using the SPSS version 16 to perform tabulation and statistical analysis. Qualitative variables described in frequency and percentages, statistical significant considered at P- value  $\leq 0.05$ .

**Results**

**Table (1):** Distribution of food services employees according to their personal data at Assiut University restaurants.

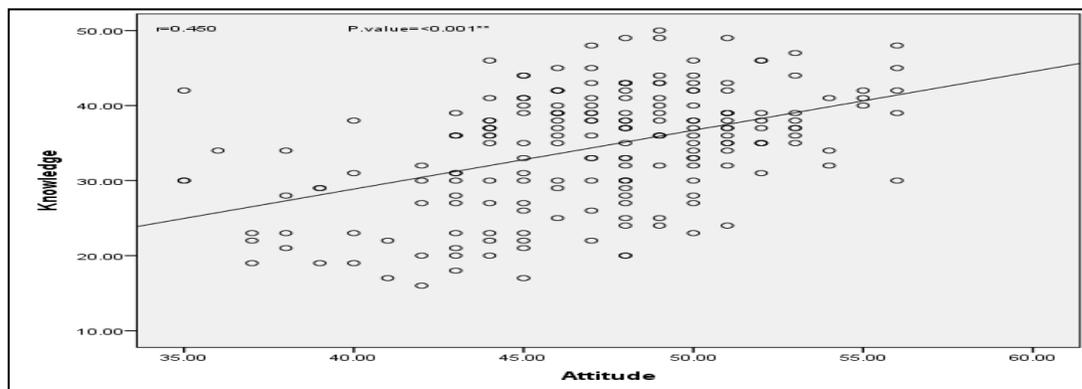
Personal data	No. (n= 202)	%
<b>Age group:</b>		
< 35 years	42	20.8
From 35-45 years	73	36.1
> 45 years	87	43.1
<b>Gender:</b>		
Male	133	65.8
Female	69	34.2
<b>Experience years:</b>		
<10 year	84	20.8
From 10-20 year	146	36.1
> 20 year	174	43.1
<b>Marital Status:</b>		
Single	16	7.9
Married	184	91.1
Widow	2	1.0
<b>Education Level:</b>		
Illiterate	44	21.8
Basic education	88	43.6
Secondary education	58	28.7
University	12	5.9

**Table (2):** Distribution of food services employees’ achieved points of knowledge score before and after the educational program regarding food safety measures at Assiut University restaurants.

	Highest Possible Score (%)	Pre education		After education	
		AchivedPoints (%)	Level of Knowledge	AchivedPoints(%)	Level of Knowledge
Knowledge Level	60	34.4(57.33%)	Unsatisfactory	48.07(80.12%)	Satisfactory

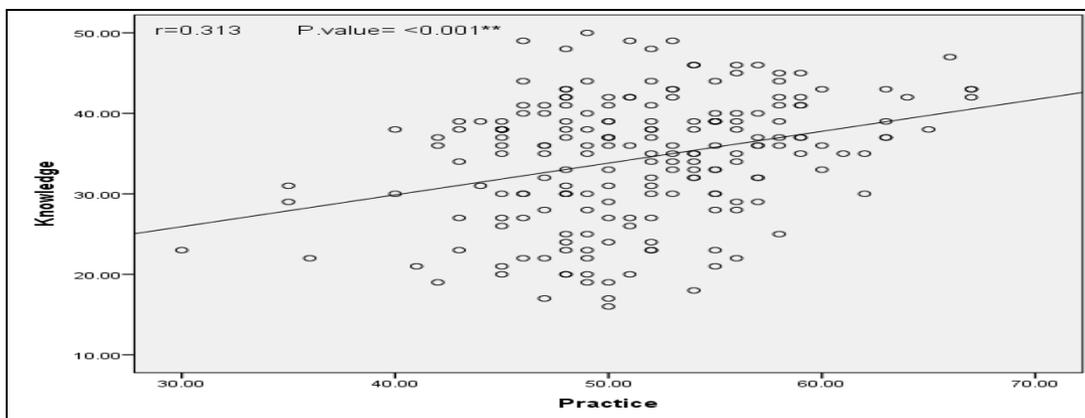
**Table(3):** Food services employees’ attitude and practice regarding food safety measures at Assiut University restaurants.

	No. items	Max score	Range	Mean±SD
<b>Attitude</b>	15	60	35-56	47.05±4.43
<b>Practice</b>	20	80	30-67	51.45±6.11



Statistically Significant Correlation at P. value <0.01

**Figure (1):** Correlation between food service employees’ knowledge and attitude score about food safety measures before the education program in Assiut University’s restaurants



Statistically Significant Correlation at P. value <0.01

Figure (2): Correlation between food service employees’ knowledge and practice score about food safety measures before the education program at Assiut University restaurants.

Table (4): Relationship between food services employees’ knowledge score with their personal data before and after education program at Assiut University restaurants.

Personal data	No. (n=202)	
	Before education	After education
	Mean ± SD	Mean ± SD
<b>Age group</b>		
Less than 35	34.4±6.55	48.76±4.18
From 35-45	34.05±8.04	48.37±4.34
More than 45	34.68±8.01	47.48±4.34
<b>P. value</b>	0.879	0.219
<b>Gender</b>		
Male	34.89±8.2	48.05±4.26
Female	33.43±6.63	48.12±4.45
<b>P. value</b>	0.203	0.912
<b>Experience year</b>		
Less than 10 year	33.01±8.02	48.09±4.2
From 10-20 year	36.16±7.62	48.53±4.38
More than 20 year	34.68±7.09	47.6±4.44
<b>P. value</b>	0.054	0.511
<b>Marital Status</b>		
Single	33.31±8.34	47.38±3.4
Married	34.57±7.6	48.18±4.37
Widow	27±14.14	43±2.83
<b>P. value</b>	0.326	0.192
<b>Education level</b>		
Illiterate	34.36±9.16	47.59±4.9
Basic education	33.72±8.38	48.11±3.8
Secondary education	34.71±5.38	48.31±4.68
University	38±5.92	48.33±4.19
<b>P. value</b>	0.336	0.857

- Independent t-test    -One Way Anova test    \* Significant difference at p. value<0.05

Table (5): Relationship between food services employees’ attitude and practice with their personal data before education program at Assiut University restaurants.

Personal data	No. (n=202)	
	Attitude	Practice
	Mean $\pm$ SD	Mean $\pm$ SD
<b>Age group</b>		
Less than 35	47.12 $\pm$ 4.88	50.98 $\pm$ 6.37
From 35-45	47.64 $\pm$ 4.3	50.9 $\pm$ 5.86
More than 45	46.52 $\pm$ 4.29	52.13 $\pm$ 6.18
<b>P. value</b>	0.276	0.388
<b>Gender</b>		
Male	47.47 $\pm$ 4.53	52.02 $\pm$ 5.85
Female	46.25 $\pm$ 4.14	50.35 $\pm$ 6.48
<b>P. value</b>	0.063	0.066
<b>Experience years</b>		
Less than 10 year	46.71 $\pm$ 4.36	51.27 $\pm$ 5.75
From 10-20 year	47.6 $\pm$ 5.07	51.37 $\pm$ 6.44
More than 20 year	47.02 $\pm$ 3.84	51.77 $\pm$ 6.37
<b>P. value</b>	0.502	0.886
<b>Marital Status</b>		
Single	46.5 $\pm$ 3.92	52.81 $\pm$ 5.61
Married	47.11 $\pm$ 4.47	51.34 $\pm$ 6.18
Widow	45.5 $\pm$ 6.36	50 $\pm$ 0
<b>P. value</b>	0.769	0.619
<b>Education Level</b>		
Illiterate	46.73 $\pm$ 3.79	52.05 $\pm$ 6.73
Basic education	46.77 $\pm$ 4.6	51.23 $\pm$ 6.1
Secondary education	47.79 $\pm$ 4.55	51.38 $\pm$ 5.89
University	46.67 $\pm$ 4.81	51.17 $\pm$ 5.41
<b>P. value</b>	0.515	0.905

- Independent t-test

One Way Anova test

\* Significant difference at p. value&lt;0.05

**Table (1):** Regarding the personal data of food service employees; they were male, aged more than 45 years, had more than 20 years' experience, married and had basic education as following 65.8%, 43.1%, 43.1% 91.1% and 43.6% respectively.

**Table (2):** Declares that there was improvement of food service employees' knowledge regarding food safety measure after application of the education program (pre education= 57.33 & post education= 80.12).

**Table (3):** Shows the mean score of attitude and practice of food service employees regarding food safety measure before the application of the education program 47.05 $\pm$ 4.43 and 51.45 $\pm$ 6.11 respectively.

**Figure (1):** Clarifies the positive correlation ( $r=0.450$  & P value= <0.001) between food service employees' knowledge and attitude score before the education program.

**Figure (2):** Demonstrates the positive correlation ( $r=0.313$  & P value= <0.001) between food service employees' knowledge and practice score before the education program at Assiut University restaurants.

**Figure (2):** Correlation between food service employees' knowledge and practice score about food safety measures before the education program at Assiut University restaurants

**Table (4):** Clears that there was statistical significant difference between food services employees' years of experience and their knowledge regarding food safety measures before the application of education program (p- value=0.054). While, there weren't relationship their age, gender, marital status and educational level with knowledge after the education program (p-value=0.219, 0.912, 0.192 and 0.857 respectively) at Assiut University restaurants.

**Table (5):** Illustrates that weren't statistical significance difference between food services employees' attitude and practice and their age, gender, experience years, marital status and education level (P value= 0.276, 0.388; 0.063, 0.066; 0.502, 0.886; 0.769, 0.619; 0.515 and 0.905 respectively).

## Discussion

Food safety is a continuous public health concern supported by the fact that in developing countries, the

rates of foodborne diseases are growing and encompass a wide spectrum of illnesses. Unsafe food triggers a vicious food-based cycle of both foodborne diseases, especially affecting vulnerable consumers such as young people. According to the Centers for Disease Control and Prevention (CDC) update in 2017, each year about 50 million people succumb to food-based ailments, leading to the death of an estimated 3,000 people (Webb & Morancie, 2015 & Alqurashi et al., 2019).

The current study aimed to evaluate the impact of the educational program regarding food safety measures among food services employees at Assiut University restaurants.

According to personal data of participants; more than two fifths of them were had >20 years of experiences and had basic education. This findings was consistent with (Wahdan et al., 2019) who carried out a study to assess the effect of an educational program on food safety practices in food preparation and handling procedures in governmental hospitals of an Egyptian Governorate and reported that more than two-thirds of the studied group had >5 years of experiences and had below university level of education.

In referral to gender of the participants; the current study revealed that more than two-thirds of them were male. In contrast, (Teffo & Tabit, 2020) who carried out a study entitled "An assessment of the food safety knowledge and attitudes of food handlers in hospitals" and (Alqurashi et al., 2019) who carried out a study to evaluating food safety knowledge and practices among food service staff in Al Madinah Hospitals, Saudi Arabia and recorded that majority of handlers were females. This can be attributed that in our community in Upper-Egypt the majority of occupations like food handling services are performed by men by default.

The current study showed that food services employees had positive attitude and proper practice regarding food safety measures before the application of education program with mean score of attitude and practice  $47.05 \pm 4.43$  and  $51.45 \pm 6.11$  respectively. This observation was at the same line with (Azanaw et al., 2019) who studied factors associated with food safety practices among food handlers: facility-based cross-sectional study and (Meleko et al., 2015) who study assessment of the sanitary conditions of catering establishments and food safety knowledge and practices of food handlers in Addis Ababa University Students' Cafeteria.

Also, the same results reported by (Tessema et al., 2014) who assess factors affecting food handling practices among food handlers of Dangila town food and drink establishments, North West Ethiopia and (Iwu et al., 2017) who study knowledge, attitude and

practices of food hygiene among food vendors in Owerri, Imo State, Nigeria.

In the present study the studied food services employees had poor knowledge regarding food safety measures before the educational intervention. This finding was incongruent with (Akabanda et al., 2017), who assessed food safety knowledge, attitudes and practices of institutional food-handlers in Ghana and recorded that the food-handlers were knowledgeable about safety food handling practices. The results of current study reported that there was improvement of food services employees' knowledge regarding food safety measures after application of the education program. This observation was at the same line with (Young et al., 2019) who conducted a systematic review and meta-analysis to investigate the effectiveness of food handler training and education interventions and found that food safety training and education interventions are effective to improve food handler knowledge.

The present study recorded that there was positive correlation between food services employees' knowledge and their practice and attitude score at Assiut University restaurants, this observation was congruent with (Teffo & Tabit, 2020) who reported that food safety knowledge level of food handlers has positive effect on food safety practices and attitudes.

The same observation reported by (Yusuf & Chege, 2019) who studied the awareness of food hygiene practices and practices among street food vendors in Nasarawa State, Nigeria, and noted positive association of vendor's awareness level and hygiene practices.

There weren't relationship between food services s employees' age and their knowledge regarding food handling measures after the education program (p-value= 0.219). This observation can be attributed by that in the current study; there weren't notable variations in the participants' age group. This result was inconsistent with (Nkhebenyane & Lues, 2020) who performed a study to assess knowledge, attitude and practices of food handlers in central South African hospices and recorded that age had a notable effect on the knowledge of food handling. Moreover, the results of both study agreed that the participant years of experiences had positive effect on workers level of knowledge regarding food handling measures.

While, (Alqurashi et al., 2019) observed that years of experiences had no effect on knowledge of food handling practices.

In the present research it was observed that food services s employees' gender and educational level weren't effect on their knowledge after the education program (0.912 and 0.857 respectively) at Assiut

University restaurants. It was due to that they were male and had basic education

In the current study there weren't relationship between the participants' gender and educational level with their attitude and practice regarding food safety measures (P-values= 0.276, 0.388, 0.515 and 0.905 respectively). This result was in agreement with (Hamed & Mohammed, 2019) who performed a study to assess food safety knowledge, attitude and self-reported practices among food handlers in Sohag Governorate, Egypt and recorded that practice scores of both sexes were not significantly different.

Otherwise, this findings was in contrast with (Afolaranmi et al., 2015) who carried out a study entitled "Knowledge and practice of food safety and hygiene among food vendors in primary schools in Jos, Plateau State, North Central Nigeria" and found that educational level of participants had positive impact on their practice. Also, (Akabanda et al., 2017) reported that educational level had positive effect.

Also, (Anuradha & Dandekar, 2014) who assess knowledge, attitude and practice among food handlers on food borne diseases: A Hospital Based Study in Tertiary Care Hospital and reported that gender influences the participants' attitude. Moreover; Ababio & Adi, 2012; who found that, the education was effective on the hygienic practices of food handlers in Ghana.

### Conclusion

This study confirmed that the design of education and training programs leads to improvement of their knowledge about food safety measures among food services employees in Assiut University restaurants. Also, they had proper practices and positive attitude regarding food safety measures.

### Recommendations

1. Continuous education and supporting program for food service employees to improvement their food safety knowledge and safer food practices.
2. Further researches are needed to upgrade the individuals' knowledge about food safety.
3. Larger sample size for generalization of the findings.

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