

Assessment of Food Safety Knowledge, Attitudes and its Quality in Student Canteens at Duhok University, 2015

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ABSTRACT

Maintaining and improving the health level of college students are important aspects for higher education, where the food security becomes the foundation of the health. The aim of this study was to assess the level of knowledge and attitudes about food safety and to evaluate the quality of food (Physical & Operational Standards) in the student canteen at Duhok University.

To achieve this goal, three questionnaires were developed. Concerning food safety knowledge and attitude for food handles (buying, storage and serving food) data was collected using these self-questionnaires. The study was conducted on (319) respondents. The obtained data were analyzed and statistically tested.

The results have shown that neither age nor education levels have significant impact on the food safety knowledge. However, significant difference between male and female was found for the age >41. For food quality evaluation, the results have also shown that canteen workers lack the physical and operational standards of food safety especially taste and healthy ways of food prepared. The analysis has shown that the positive attitudes of canteen owner toward food handlers were 66.25% for buying, 31.2% for storage and 42.5% for serving food. The overall positive attitude was 46.65% which is insufficient range.

Overall respondents had poor food safety knowledge. There was a significant difference between the mean score of knowledge according to gender for group >41 years. In male only, the age has to impact on safety knowledge. While educational levels had no significant impact. The untrained employees who manage the university canteen made their attitudes toward storage and serving food unwelcome.

Key words: Public Health, Food Safety, Food Security, Food Quality, Environmental Health

INTRODUCTION

The safety and quality of food both are the most important objectives for any country. Nowadays, food safety is becoming one of government preferences. However, universities can also take this issue as one of their preferences independently. This is very logical given the fact that any university may have tens of thousands of students and staff.

Previous several studies were conducted to evaluate the food safety knowledge, attitude and practice of food handlers at universities where students and staff were used as target populations. The level of food safety handling knowledge and practices among 1172 Lebanese university students (mean age 20.0 ± 1.6 SD) was assessed and explored the association between their knowledge/practices and the socio-demographic and academic characteristics [1]. A survey was conducted to assess the self-reported food safety knowledge and food handling practices of Greek young adults (mean age 22.4 ± 3.2 standard deviations, SD) and to explore the relationships between their food safety awareness and population characteristics. Participants were senior

undergraduate students recruited from health related and non-health-related faculties of the Aristotle University of Thessaloniki in Northern Greece [2]. For the academic staff, food safety knowledge and practices of 270 women working in six faculties and institutions of Alexandria University were assessed using a questionnaire including data on personal characteristics, previous attack of prominent food poisoning, and four parameters of food safety knowledge and practices. [3]. Concerning food service workers at the university, their Food safety knowledge was evaluated and explored the relationship between food safety knowledge and their education level, length of employment, using a 40-item food safety questionnaire. [4]

In Kurdistan region of Iraq, the ministry of higher education has established a special directorate for health and safety in each of the regional university. The main objectives of these directorates are to improve the knowledge among the students and staff toward the food safety, workplace safety and other health facilities. As one of the duties, it is important to check and review the safety of food very closely at all the universities canteens. Duhok

university (UoD) is the first major university in Duhok city which allocated in the north of Kurdistan region. UoD was established in October 31st, 1992. Today, the University has nine faculties that include 17 colleges with 75 Departments, 17520 undergraduate students, 1420 academic staff. Duhok University is taken as the place to assess the food safety knowledge, attitude of food handlers for students, staff and canteen owners, and to evaluate food quality in the canteens.

MATERIALS AND METHODS

This work performed a descriptive, cross-sectional study for nine faculties at Duhok University. The study was conducted on 319 respondents (students, university staff, and food safety experts) and 7 canteen owners. The data were collected via three different questionnaires to assess their food safety knowledge, attitudes and practices and to reveal physical and operational standards of food safety. The first questionnaire consisted of 13 questions about the knowledge, and the second questionnaire included 15 questions about the attitude of food safety of canteen owner concerning buying, storage, and serving food, while the last one included 15 questions grading the physical and operational standards on food safety. Questions about the food safety knowledge were applied on 116 students (65 males and 51 females), and 40 staff members (28 males and 12 females). Their responses were analyzed by giving right for the correct answers and wrong for the incorrect answers. Percent of response was determined.

Questions about physical and operational standards on food safety that has been answered by the experts on food safety were scored on a four-point scale (3 to 0) with options of totally agrees, agree, disagree or totally disagree. The number of respondents for each option was multiplied by its point scale (i.e. $3 \times \text{No. of respondents} + 2 \times \text{No. of respondents} + \dots$) and summed together with other options for each question. These scores were categorized as insufficient monitoring standards when it is less than 137 points for male and less than 108 for female. While, scores greater than 137

for male and 108 for female regarded as good monitoring standards. These limits (137 and 108) are the half value of the total scores (summation of all point scales multiplied by the total number of respondents) for male and female respectively). The canteen owner's attitude was assessed by 15 questions divided to three parts (eight questions about buying food, five questions about food storage and two questions about serving food). The percent of positive and negative attitude was determined by evaluating the frequency of the responses multiplied by 100%.

Statistical Analysis

Data was analyzed statistically by Microsoft-Excel, Version 13. Descriptive statistical (means, percent, standard deviations) were used for all variables. The t-test has been used to explain the relation between gender and the level of food safety knowledge and also to compare the knowledge with educational levels. Results with a p-value ≤ 0.05 were considered statistically significant. Split half method was used to estimate the coefficient of internal consistency reliability of the questionnaire. The correlation coefficient was 0.798.

RESULTS

A total of 319 respondents (students, staff, and food safety experts) and 7 canteen owners were included in this study as showed in table 1. There were thirteen questions to assess Food Safety knowledge applied on 156 persons including students and staff. Table 2 shows the percent of correct and incorrect answers for both genders. For comparison, Food safety knowledge results were divided based on three groups of different age ranges. These groups were group 1 ranges 20-30, group 2 ranges 31-40 and group 3 for 41 years and older. The response toward food safety knowledge was 38.46 % for male and 37.25 % for female in group 1. For group 2, knowledge on food safety was 35.71 % for male and 40 % for female. While this ratio goes down for the group 3 especially for male which was 28.57 % and 40 % for female as shown in table 3.

Table 1: Demographic characteristics of respondents

Characteristics				
		Male (n)	Female(n)	Total(n)
No. of respondents	Students & BSc	65	51	116
	University Staff	28	12	40
	Experts	91	72	163
	Canteen owner	7	-	7
Educational level of respondents for food safety knowledge	Students	43	36	79
	BSc	22	15	37
	MSc	17	9	26
	PhD	11	3	14
Age (yrs)	20-30	65	51	116
	31-40	14	5	19
	>41	14	7	21

Table 2: Responses to food safety knowledge questions (N = 156)

Questions	Male (n)		Female (n)	
	Correct (%)	Incorrect (%)	Correct (%)	Incorrect (%)
1. Which of the following sentences is true about bacteria a. All types of bacteria poison food b. Freezing makes food with longer life because of killing bacteria c. Bacteria grow faster when it get warm d. All kinds of bacteria need air to survive	37.63	62.37	41.27	58.73
2. What is the recommended temperature for fridges? a. (10 °C) b. (4 °C) c. (0 °C) d. (-2 °C)	43.01	56.99	52.38	47.62
3. Which of the following foods are supposed to have high amounts of bacteria? a. Fried chicken b. cream c. freezing chicken d. mayonnaise	32.26	67.74	42.86	57.14
4. Usually, bacteria multiply at temperature a. 0 °C – (-18) °C b. (-5 °C) – 0 °C c. (5 °C) – (63 °C) d. (63 °C) – (90 °C)	45.16	54.84	46.03	53.97
5. What is the recommended temperature for freezers? a. (-2 °C) b. (-9 °C) c. (-12 °C) d. (-18 °C)	30.11	69.89	26.98	73.02
6. On campus, how do you dry your hands after washing them? a. Hot air electrical dryer b. by hands c. towels d. paper towels	41.94	58.06	42.86	57.14
7. A food when get waste or poison by a bacteria, its poison will a. Get smell b. color will change c. its color and taste will be normal d. food will be bitter and with a foam	9.68	90.32	12.70	87.30
8. Food poisoning occurs because of the bad using of..... a. Restaurants b. Markets c. Home kitchens d. all of them	54.84	45.16	46.03	53.97
9. When you cut your food on cutting board, the best way to clean the board is..... a. By a piece of sponge b. washing with soap and warm water c. wash with warm water and soap, then clean with water and then cleaned with chlorine water d. all of them	39.78	60.22	44.44	55.56
10. For reusing, the remaining food should be warmed until..... (50 °C) b. (60 °C) c. (65 °C) d. (75 °C)	30.11	69.89	26.98	73.02
11. The best way of thawing freezing food is..... a. Fridge b. on a board c. Microwave d. Fridge or microwave	36.56	63.44	28.57	71.43
12. Before starting a work, you should wash your hands for at least a. 10 s b. 20 s c. 1 min d. don't know	34.41	65.59	26.98	73.02
13. Why should you dry your hand after washing them? a. Avoid water drops to spread b. bacteria spread faster when hands are wet c. It will be difficult to handle stuffs d. bacteria grow faster when hands are wet	34.41	65.59	33.33	66.67

Table 3: Average percentage of food safety knowledge in both genders for the three age groups.

Age/ years	Male	Female	P-value
20-30	38.46	37.25	NS
31-40	35.71	40	NS
>41	28.57	40	$P \leq 0.05^*$

* $P \leq 0.05$ significant, NS: Not Significant

Slight differences were observed for mean knowledge percent among the three groups for male while no differences were noticed for female. Table 3 and figure 1 showed that for food knowledge the significant difference between the male and female exists only for group 3. However, for both genders, no significant difference was observed between the mean score of knowledge and educational levels of respondents as shown in table (4). This means that education levels have no significant impact on food safety knowledge. In terms of faculties, the upper levels of food knowledge percent were shown in the faculty of engineering. However, this level was still unacceptable (below 50%) showed in figure (2).

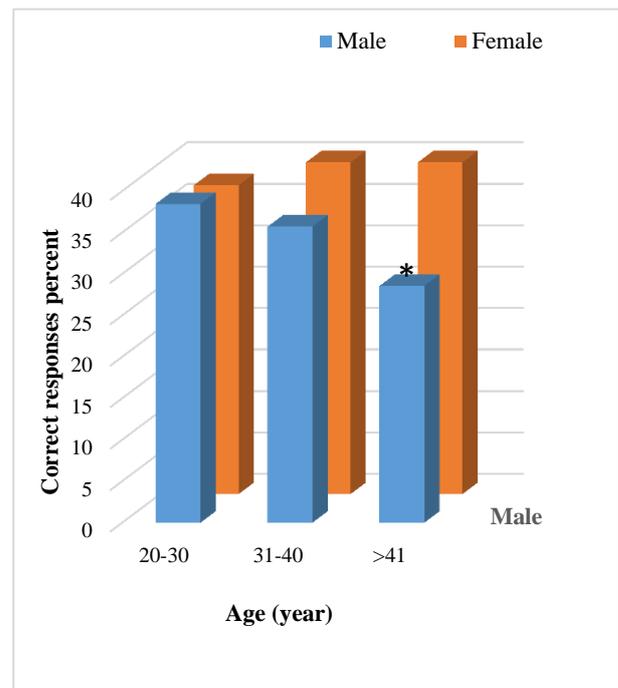


Fig.1. correct responses percent of food safety knowledge in male and female in term of age groups.

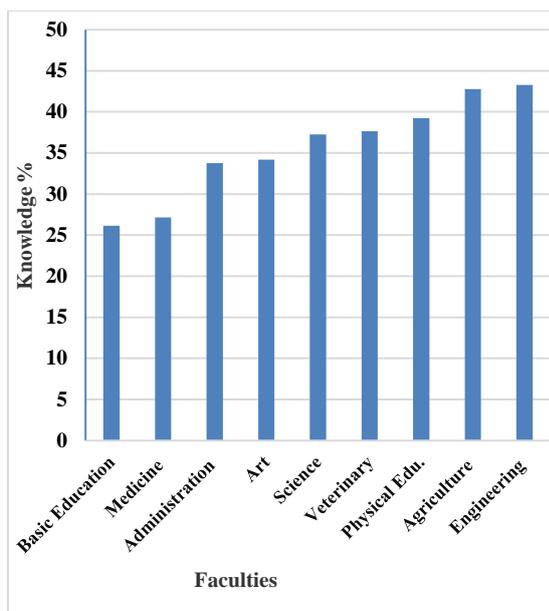


Fig.2. Knowledge percent in terms of faculties.

Table 4. Percent of food safety knowledge in term of educational levels

Education Levels	No.of Respondents	Knowledge percent	P-value
Students	79	34.85%	NS
BSc	37	32.30%	NS
MSc	26	41.78%	NS
PhD	14	36.63%	NS

To cover all aspects of food safety and how to maintain the standards of food safety at high levels, the opinions of 163 experts about physical and operational standards were considered. In each Faculty, an Expert Committee on Food Safety was set up. This Committee consisted of academics, professionals, food experts and students. The duties of these committees are to manage for the food safety process at the canteens. The experts were asked to answer questions about these standards in food safety. Opinions for both genders about the food tastes and healthy ways in preparing food were less half score which can be regarded as “insufficient” properties. However, the female expert’s opinion showed that questions (from 8 to 15) did not match the international standards as showed in table (5). While, the two questions (14 and 15) that had the lowest scale was those related to personal hygiene, personal appearance and protective clothing. Finally, in table (6), the attitude of canteen owner toward buying fresh and healthy food was 66.25%, and toward storage food was 31.2%. While their attitude toward serving food in the student canteen was 42.5%. The overall positive attitudes of canteen owner toward food handlers (buying, storage and serving) were 46.65 % which is lower the expected.

Table :. Experts (91 male and 72 female) opinion toward food safety (Physical and Operational Standards)

Standards	Total score	
	Male	Female
Is canteen’s atmosphere good?	152	116
Is canteen’s walls and Floor are clean healthy?	166	119
Is TV and Music sounds are too loud?	128*	116
Is Canteen’s chairs and tables are good?	143	103
Is the space between tables are good enough?	170	117
Does the staff serving good?	140	113
Is food serving fast by canteen’s staff?	143	100
Is food tastes good?	133*	100*
Is food prepared in healthy ways?	130*	91*
Is food prices are suitable for students?	152	98*
Is food stored in appropriate ways?	152	105*
Is canteen’s kitchen healthy?	165	92*
Is canteen’s staffs are healthy and hygiene?	158	101*
Is food preparation tools are hygiene and healthy?	146	86*
Is Personal protection equipment are used by the canteen’s staff (Coat “Restaurant Aprons“, Headwear, Footwear...etc.)?	137	89*

* stand for less than half value of total score “insufficient” properties

Table 1. Level of canteen owner's attitude toward buying, storage and serving food.

Questions	%
1-Attitude toward buying fresh and healthy food (8-Questions)	
<i>Negative</i>	33.75
<i>Positive</i>	66.25
2- Attitude toward storage food (5-Questions)	
<i>Negative</i>	68.8
<i>Positive</i>	31.2
3- Attitude toward serving food (2-Questions)	
<i>Negative</i>	57.5
<i>Positive</i>	42.5

DISCUSSION

The main question that may frequently arise is, why Food Safety in student canteens is so important? The answer obviously is that students are surrounded by food every day so it can be dangerous if not handled, prepared and stored properly. Bacteria can grow in food and causes illness. Results showed that a low level of food safety knowledge was observed by both genders. This may be due to two things; first, the lack of training course and awareness program among students and staff. Secondly, the fact that most students are not used to prepare their own meals so they have no idea about food safety and environmental health issue. In addition, students may have not enough time to consider the food safety, because they are already overloaded by study duties. Therefore, they look for the easiest and quickest way for getting meals. They didn't learn how to grade the food safety levels. In groups 1 and 2, there was no significant difference between females and males toward food safety knowledge. This agrees with other previous studies [5, 6]. While in group 3, females showed higher scores (significant difference) than males. This result is comparable with that obtained by [7]. This could be attributed to the woman's education on food safety at the home level at this age. In addition, this leads to the conclusion that males must to be given more attention for food safety training.

The results of table 3 also indicated that food safety knowledge tends to decrease with age in the male which in agreement with a Malaysian study [8]. The reason is that younger adults especially in male are more familiar than older with the modern facilities and communication technologies concerning health issues through which they can enhance their awareness for food borne hazards to consumers which also implied by [9, 10]. Table 4 showed that no real impact of the educational levels on food safety knowledge was existing among students and staff. This results in full agreements with what have been founded by [4, 11,

12]. Even though, this is in contradiction with the study done by [13]. This contradiction can be attributed to the social cultural variations including demographics and socio-economic status.

Concerning expert opinions, there was an agreement between males and females evaluations about food-taste and healthy ways of food preparation. This confirms that most of food handlers were less experienced and food practiced which were insufficient. This conclusion was also been reached by Labib Sharif *et al.* [14] it must be noticed that in UOD, the canteen contract is made only for two years, so the owner and the workers have no enough time to gain experiences.

Other arguments appeared among males and females about the other questions. Females were more likely to disagree with males about food prices, health issues of canteen and food hygiene. Female experts were more likely to have a sensitivity point of view about personal hygiene, personal appearance and protective clothing than males. Females always are auditing the hands, nails as well as white coats of the canteen staff.

To achieve the final goal that meets the safety, quality of food, attitudes of the canteen owners toward buying, storage and serving food were self-reported. Nearly positive attitude of buying fresh and healthy food was observed, while their attitudes toward storage and serving food were unfavorable. This could be attributed to that although the food handlers have good knowledge regarding food safety, but they did not always apply this knowledge they have learned when handling foods. [15]. The potential reason is that the canteen owner usually seeks for pursuit of economic benefits, without paying attention to technical training or to obtain level certificate for employees. The negative attitude of canteen owner could be managed by food safety training programs as mentioned by many researchers [16, 17]. Although, the recent studies showed no significant correlation between the food safety attitudes and training [4]. Therefore, training course shouldn't be the only choice to improve the positive attitudes of

food handles but the program should be covered through a periodic internal auditing to keep minimum good behaviors of food safety.

CONCLUSION

Overall respondents had poor food safety knowledge. There was a significant difference between the mean score of knowledge according to gender. In male only, the age has to impact on safety knowledge. While educational levels had no significant impact. The untrained employees who manage the university canteen made their attitudes toward storage and serving food unwelcome. An appropriate action must be taken to meet the physical and operational standards and a detailed action plan promote the Food Safety System at the university should be proposed.

ETHICAL ISSUE

Concerning the ethical aspects, all information about participates in this study have been treated in strict confidence (without mane) and used solely for research purposes and will not be raised in any other written work.

COMPETING INTEREST

The authors declare that there is no conflict of interests regarding the publication of this paper.

AUTHORS' CONTRIBUTIONS

The authors Aldosky and Tahir conceived the study idea, designed the study, wrote the protocol, (introduction, methodology, discussion), and proof read the drafts of the manuscript. The management of data analyses was done by them as well. Author Yousif contributed in the design of the study and did the data collection, part of the statistical analysis, in addition to literature search. All authors read and approved the final manuscript.

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