



## The level of awareness of the concept of food among Kuwait University students

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**Abstract-** The world has witnessed a great revolution in light of globalization to improve the individual's livelihood and achieve his well-being, so we find that the patterns and volume of consumption have changed, so that commodities have become available in abundance and variety to meet all the needs of consumers who have coped with this change and have come to demand them daily. However, the downside of this diversity is that markets have become. They are subject to unsafe products, which pose real risks to the health of the consumer who owns them while he is ignorant of their production method, hygiene and storage standards.

**Keywords:** globalization, commodities, concept of food

### I. INTRODUCTION

The world has witnessed a great revolution in light of globalization to improve the individual's livelihood and achieve his well-being, so we find that the patterns and volume of consumption have changed, so that commodities have become available in abundance and variety to meet all the needs of consumers who have coped with this change and have come to demand them daily. However, the downside of this diversity is that markets have become. They are subject to unsafe products, which pose real risks to the health of the consumer who owns them while he is ignorant of their production method, hygiene and storage standards.

(WHO 2015 (Shrivastava et al. 2015)) explained that obtaining adequate quantities of safe and nutritious food is the key to life sustainability and the promotion of good health, as many foods contain harmful bacteria, viruses, parasites, or chemicals. They cause more than 200 diseases ranging from diarrhea to cancers, and they indicated that food and water-borne diarrheal diseases kill an estimated 2 million people annually, and the spread of disease and malnutrition affects children, the elderly, and the sick in particular in many developing countries. And developed, and ensuring food safety is closely related to the continuous improvement and promotion of food hygiene practices from production to consumption and through food preparation, eating and storage, as food can be contaminated at any of these stages, but proper preparation of food may be prevented. Most of the diseases that are transmitted through food, so international organizations are keen to educate consumers about their responsibilities and methods of safe handling of food (Kamboj et al 2020).

It is important to cooperate between the poles of the food chain represented by governments, producers and consumers by taking care of public health and national economies, developing foundations and regulatory policies for producers and suppliers alike, and adopting basic health practices when buying and selling food and during its preparation to protect the health of the individual and society. In general (WHO 2002).

### **The subject of the study, and her questions.**

The importance of the study subject lies in the importance of healthy food in terms of the necessity that the foods be safe and not contaminated with bacteria, and free from dangerous levels of pesticides and other chemicals and impurities. Concerns about food safety have grown stronger and more far-reaching, as scientists and stakeholders warn about contamination of water, meat and other fruits and vegetables, concerns about toxic pesticides, and potential problems from genetically modified foods on a large scale (Kar, P. & Meena, H. 2018) Uçar, A. et al. 2016)).

At the level of individuals, it is necessary to be familiar with public hygiene through dealing with food and preparing it, as these practices and behaviors must be strengthened through the various social and educational environments in the State of Kuwait, while countries around the world take educational institutions as a basic pillar in Spread awareness of the concept of food safety and general education of the health of the body and its safety from diseases and epidemics.

Accordingly, this study seeks to identify the awareness of an important segment of society, students of Kuwait University, about the concept of food safety by searching for an answer to the following questions:

- 1) What is the reality of Kuwait University students 'knowledge of the concept of food safety in terms of eating utensils and food?
- 2) What is the reality of Kuwait University students 'knowledge of the concept of food safety in terms of food processing?
- 3) What is the reality of Kuwait University students 'knowledge of the concept of food safety in terms of food storage?
- 4) What is the reality of Kuwait University students 'knowledge of the concept of food safety in terms of food poisoning?
- 5) Are there statistically significant differences due to the college variable?

### **The Importance Of Studying**

The importance of this study lies in two important axes:

- 1) Providing those interested in the subject of food safety and health in general with the details and results of an analytical study that highlight the extent of students' knowledge at Kuwait University with the concept of food safety and how to deal with it.
- 2) Benefiting from the study in developing special curricula for food safety, methods of preparing and storing food, and what is related to food poisoning and health in general can benefit university students.

### **Objectives of the study**

This study seeks to achieve a number of objectives, foremost among which are:

- 1) Identify the reality of Kuwait University students 'knowledge of the concept of food safety in terms of handling tools, preparing food, and storing it.
- 2) Knowing the reality of Kuwait University students 'knowledge of the concept of food safety in terms of food poisoning, and whether it differs according to the faculty variable.

### **Terminology of study**

**Food safety:** is that it is free from all microbiological or environmental pollution factors that turn it into food harmful to the health of the consumer, and this includes the factors of spoilage and self-decomposition (Mosaager, 2008, p. 211)

**Food poisoning:** It is a sudden disease whose symptoms appear within a short period of time on one or several people after eating contaminated food, where the symptoms of food poisoning appear in the form of nausea, vomiting, diarrhea, and cramps in the stomach and intestine, and the symptoms of infection vary and the degree of high The temperature, its intensity, and the time period required for the emergence of disease symptoms according to the causes of food poisoning and the amount of food eaten by the person (Al-Jassas, 2011, p. 77).

### **The limits of the study**

The study was set in the second semester (2019-2020) and applied to students of Kuwait University, and in particular to students of the College of Education, students of the College of Allied Health Sciences, and students of the College of Life Sciences.

## II. THEORETICAL FRAMEWORK:

Human food is a product rich in nutrients that microorganisms need for growth and reproduction. Exposure of food to contamination during any stage of production and distribution can cause poisoning or transmit dangerous diseases to health, so it is very important to employ science in educational institutions in order to enhance food safety. And access to health education. The following are the most important topics that fall under this context:

### **The relationship between education and health**

Numerous studies have indicated the importance of education and knowledge and what it can provide to a person in order to enjoy good health and the need to pay attention to the process of healthy development because of its positive impact on societies and their development, and it was agreed (Al-Azzam et al., 2012) (Faddah, 2012) (Mahmoud, 2011) On the importance of the availability of health education and the interest of school administrations in its development, which includes personal health, food, medicines, mental health and disease prevention, and these studies emphasized the necessity of using educational and ministerial institutions proper scientific planning in order to achieve the goals of education Health education in the field of education, which helps to eliminate health problems present in schools and also to the success of the plans devised for a sound health upbringing in schools, and on the same side the school administrations must activate the role of health education and activate security, safety, food and sports safety, and it is imperative to There is sufficient awareness among teachers of the importance of these plans and their impact on students' health, as studies have shown that teachers with advanced experience and a high educational level possess tools and faculties who can employ and implement educational policies Relation to health education standards, and (Fadda, 2012) clarified that there is no difference between employees in school administrations in Gaza governorate in terms of gender, job description and years of service about the mechanism of activating food awareness in schools by making booklets, posters and magazines to educate students about the importance of food. Good and avoiding foods harmful to health, holding seminars for parents in the presence of specialized teams dealing with the most important health characteristics of food and how to prepare it, and paying attention to health education for students through nutrition, personal health, oral and dental health, in addition to enhancing knowledge and healthy behaviors of Students and teachers through classroom and extra-curricular activities.

They explained the importance of the educational level of individuals, as the higher the educational level of the individual, the more he was keen on healthy development, and the more illiterate and ignorant a person was, the lower his educational level and reflected negatively on his health, and the witness to this educated mothers are able to deal with health and disease and They are aware of the curative and preventive aspect of their health and the health of their children, and they indicated that the migration of practical and medical competencies has a negative impact on health development, especially in the absence of rare specialties.

In the study (Fonseca et, al. 2019), the researchers pointed to the causal relationship between health outcomes and education, as the higher educational level contributed to a decrease in the poor health of people, especially chronic conditions such as diabetes, heart disease, lung diseases and arthritis, taking into consideration. Family background and genetic factors, which can be associated with education and health, and the research included other health behaviors such as smoking and obesity, and the researchers found that an increase in the years of compulsory education by one year is sufficient to reduce the chances of poor health by a large percentage, so it is important to improve the amount And the quality of education in countries with weak educational laws.

Basch (2011) explained that the good health of students is the main motivation for their pursuit of learning regardless of all other educational preparations, such as the presence of competent teachers, good administrative bodies, or overflowing curricula. Health problems play a serious role in the extent of students' ability to learn and their enthusiasm. For him, the most important of these health problems that the study indicated were asthma, poor eyesight, inattention and hyperactivity.

### **Education and nutrition**

The interest in promoting nutrition education in developed countries began coinciding with the launch of national initiatives to find ways to educate consumers, especially young people and adults who prepare food, and in another matter, customs, traditions, and social and economic factors may have a great impact on

consumers' attitude and behavior in the field of food safety. (Marzouq, 2013) (Przybylska et al. 2014) (Yusof et al. 2018) and previous studies agreed on the importance of nutrition and health education as it is an integral part of promoting health for individuals, and thus for the societies in which they live, and this would lead to Reducing health care costs by focusing on preventive and educational aspects of health care, family medicine, and the comprehensiveness of nutrition courses on transferring and exchanging ideas and accepting or acquiring knowledge, skills, abilities and behaviors to raise the level of nutritional education for male and female students. Dietary habits, behavioral practices, and information transmitted in educational institutions is greater than on food awareness of the impact of the economic and social level of students, and in the study (Yusof et al. 2018) that took our survey in Malaysia, foodborne diseases were reported at a rate of 47.79 per 100. A thousand people in 2009 were of the country's population and it increased by 32% in 2010, due to the unhealthy and safe practice of food and nutrition safety, and most cases were due to poor hygiene in school canteens, hostel kitchens, restaurants and markets, where a The study showed that University of Malaysia students who follow a specific diet have good knowledge in food safety, and the greater percentage of students than female students was in relation to the level of knowledge of food poisoning, despite the presence of poor knowledge regarding the hygiene system and methods of preparing food, and on a similar level, cases were estimated. Foodborne diseases in the United States of America have a rate of 67 million illnesses, including 325,000 hospitalizations and 5,000 deaths each year (Mead et al. 1999), and in England and Wales, the rate was 1.3 million cases of food poisoning, of which 21 thousand people were hospitalized, while the deaths were estimated at 500 cases (Adak et al. 2002).

### **Previous studies**

In the study (Sarayrah and Al-Rashidi, 2012) (Al-Layali, 2007), researchers pointed out the need for important indicators in the level of school health in schools, as principals perform tasks related to school health within the limits of their human and material capabilities and what their granted authority permits By the Ministry of Education, so there will be communication between the administration and parents with regard to school health and concern for the cleanliness of school facilities, and the provision of a first aid box in the nurse's room, and there are specializations that the principals may not be able to provide because it is within the jurisdiction of the Ministry of Health, such as the School Dental Health Program, she added. Teachers need to pay attention to school canteens and health units in schools. The study indicated that the health level classification of schools in the State of Kuwait is above the average level. On the other hand, they clarified that teachers should have high educational qualifications, especially kindergarten teachers, as the high nutritional awareness of the teacher, her desire to educate herself, increase her nutritional information, and the abundance of knowledge and training has a significant impact on the child's nutrition and physical development.

The study (Chaudhuri, D.2015) (Priyadarshini, A. & Jaiswal, A.2017) (Oggiano, G. 2015) agreed that safe and nutritious food is required in sufficient quantities to promote human health, including eating healthy food that does not cause poisoning. Food is so that it is a vector for viruses and parasites as well as toxic chemicals. Unsafe food is responsible for malnutrition diseases, especially for infants, young children and the elderly, and more than 200 types of diseases in particular, ranging from diarrhea to cancer, and an estimated 2 Million people per year around the world suffer from diseases that are transmitted by unclean water and unsafe food, and diseases differ according to the germ that causes it, such as salmonella, campylobacter (Campylobacter), Escherichia coli, listeria disease (circulation disease), and norovirus (winter vomiting virus).

Priyadarshini, A. & Jaiswal, A.2017 added that foodborne illnesses are a burden on public health in Ireland, as the number of infected cases is rising annually, and that one of the main reasons for it is practices related to food safety in the home, and that the people of Ireland have knowledge of Moderate in food safety despite its decline during food preparation and eating, and the study showed that women are more knowledgeable about food safety, and urban residents were more knowledgeable than rural residents because most of them are educated.

(Prashanth, M. &Indranil, C. 2014) (Hassan et al. 2018) indicated in their studies that food poisoning occurs when consuming a food product contaminated with bacteria and related to the intestine to multiply, and cause serious diseases, and that one of the most important causes of food poisoning is a change in patterns Our lives over the past few years, which include increasing reliance on ready meals, eating out instead of cooking at home as a result of the busy life that tends to spend less time preparing

food, and many meals are often prepared and cooked in advance and frozen for a long time. From time, or buy suitable food to be placed in the heating device, and food poisoning lies in the event that the product is poorly stored in the refrigerator, or the food is reheated several times, and the other reason is the global food market where a person is able to access a wide range of types. Foods that are transported by air from all parts of the world from countries may have different food safety standards.

In a study (Shuaib, Y. & Abdalla, M 2018), it indicated that concerns about poor food safety are magnified in light of preparing food, especially in restaurants, and what could in turn cause food poisoning cases, and in a Salalah restaurant, all workers emphasized the necessity. Paying attention to the cleanliness of the place and cooking tools and the importance of washing hands before starting to prepare food and that wearing masks and gloves while preparing food reduces the risk of contamination, but most of them do not do this as part of their daily work routine, but they have made clear their interest in being absent from work in the event of contracting one of the diseases that it may transmit to consumers while preparing food.

### **Commentary on previous studies**

It is evident from my studies (Sarayrah and Al-Rashidi, 2012) and (Al-Layali, 2007) that they stress the importance of spreading awareness of food safety and school health in schools and the keenness to increase the specializations of administrators and teachers in this field, in addition to educating them on the most important points that fall under this. The concept, and this study agrees with (Chaudhuri, D.2015) (Priyadarshini, A. & Jaiswal, A.2017) (Oggiano, G.2015) on the importance of developing policies and legislation on food safety and education and creating awareness of food safety and correct nutrition, and as the study (Prashanth, M. &Indranil, C.2014) (Hassan et al. 2018) indicated an increase in the dangers of contaminated food and food that lead to food poisoning in fast food restaurants and ready-to-eat foods, as confirmed by the Shuaib study. , Y. & Abdalla, M 2018)

### **Study methodology and tools.**

The study used the descriptive and analytical approach to collect information to suit it for the purpose of the study, as it relies on studying the phenomenon as it exists in reality without any attempt to influence or interfere, and the questionnaire was the tool used, with 4 main axes for the most important questions on the subject of knowledge of food safety, which includes. The first axis is eating tools and food twelve items, the second axis is food preparation and includes ten items, and the third axis food storage includes sixteen items, and the fourth axis includes food poisoning and includes nine items, and these axes and their most important items have been extracted. From (Fao, 2017).

### **Study population and sample**

The study population consisted of Kuwait University students in three colleges with all their specializations in the second semester of the academic year (2019-2020), namely the College of Education, the College of Allied Medical Sciences and the College of Life Sciences, and the sample of the questionnaire reached (410). Access to the study sample due to delinquency, the sample was random and was accessed through the identification of student groups on social networks and through the application (WhatsApp).

## **III. RESULTS**

### **1. The sample**

A sample size of 410 items available for students of the Faculties of Education, Life Sciences and Allied Medical Sciences at Kuwait University was withdrawn by distributing the study questionnaire to them through the Internet and social media.

Table No. (1)

Distribution of the sample according to the demographic variables of the students included in the study

Demographic variable	Sections of the demographic variable	the number	Percentage
1- gender	male	28	%6.8
	female	382	%93.2
	total	410	%100.0
2- college	Education	77	%18.8
	Life Sciences	170	%41.5
	Allied Medical Sciences	163	%39.8
	Total	410	%100.0

It is noticed from the table that approximately 93% of the sample members are females compared to 7% males, and it is also noticed that the highest percentage of students who responded to the questionnaire according to the colleges included in the study was the share of students of the College of Life Sciences, followed by the percentage of students in the College of Allied Medical Sciences as for college students Education, and their percentages reached about one-fifth of the total sample.

## 2. Tests of validity and reliability

Stability Tests:

Table No. (2)

Cronbach's Alpha Coefficient of Research Axes Dimensions (sample size 410)

the hub	Cronbach's Laboratories
The first axis: dealing with tools and food	0.471
The second axis: preparing food	0.491
The third axis: storing food	0.666
Fourth axis: food poisoning	0.613
All hubs	0.811

It is noted that the reliability test for all the questions of the questionnaire axes is equal to 0.811, which indicates that the stability of the resolution was generally high, with a variation in reliability between the study axes.

**Validity Tests:**

### 1. Believe internal consistency

Table No. (3)

Linear correlation coefficients (Pearson) between scale items and the general evaluation at the level of sub-scales, (sample size = 410)

The first axis: dealing with tools and food		The second axis: preparing food		The third axis: storing food		Fourth axis: food poisoning	
Items	Pearson Correlation Coefficient	Items	Pearson Correlation Coefficient	Items	Pearson Correlation Coefficient	Items	Pearson Correlation Coefficient
1	431.0**	1	376.0**	1	418.0**	1	379.0**

2	528.0**	2	347.0**	2	384.0**	2	297.0**
3	507.0**	3	147.0**	3	259.0**	3	411.0**
4	515.0**	4	486.0**	4	510.0**	4	534.0**
5	519.0**	5	495.0**	5	464.0**	5	379.0**
6	491.0**	6	371.0**	6	512.0**	6	417.0**
7	393.0**	7	437.0**	7	474.0**	7	403.0**
8	559.0**	8	451.0**	8	464.0**	8	437.0**
9	460.0**	9	303.0**	9	435.0**	9	424.0**
		10	264.0**	10	337.0**	10	519.0**
		11	336.0**				
		12	458.0**				
		13	542.0**				
		14	535.0**				
		15	503.0**				

\*\* Correlation D at the level of statistical significance 1%

It is noticed from the above table that all the correlations of Pearson correlation between each item and the total score of the axis were positive and ranged between 147.0 and 559.0, and all of them are statistically significant at the significance level of 1%, which indicates the realization of the internal consistency of the sample vocabulary response to the questionnaire questions.

### Validate content consistency

Table No. (4)

Linear correlation coefficients (Pearson) between the dimensions of the axes of research and general evaluation at the level of the total score of the questionnaire (sample size = 410)

the hub	Correlation coefficients between items and the overall evaluation
The first axis: dealing with tools and food	713**.
The second axis: preparing food	674**.
The third axis: storing food	856**.
Fourth axis: food poisoning	744**.

\*\* Correlation D at the level of statistical significance 1%

It is noticed from the above table that all Pearson correlation relationships between the dimensions of the axes and the overall degree of the resolution are positive and range between 674.0 and 0.856, and all of them are statistically significant at the significance level of 1%, which indicates the validity of the content consistency of the resolution.

### 3. Methods of data analysis

1. The answers to the questions of the study axes were coded in the statistical program as follows: 1 for the correct answer and 0 for the wrong answer or the answer, I don't know.
2. Relative descriptive analysis of the questions of the dimensions of axes.
3. A test of two independent samples, to test for differences in the study axes according to the gender variable.

4. The ANOVA test, to test the presence of differences in the study axes according to the variables of the college and the preferred food

5. Scheffe's Multiple Comparisons Test, in order to test the differences between the sections of the study axes if the ANOVA test was statistically significant.

**Note:** The tests in the study will be carried out at a statistical significance level of 5%.

View results

The first question: What is the reality of Kuwait University students' knowledge of the concept of food safety in terms of eating tools and food? This question included a set of themes:

**First: the use of clean water and fresh materials**

Table (5)

The relative distribution of correct answers to the questions of the first axis, dealing with tools and food - the first dimension: the use of clean water and fresh materials

items		The number of correct answers	The number of wrong answers	Total	Sorted by the number of correct answers
.1Is it possible to disinfect vegetables with chlorinated water?	the number	28	382	410	5
	%	6.8%	93.3%	%100	
.2Should you eat vegetables and fruits immediately after they are prepared?	the number	143	267	410	4
	%	34.9%	65.1%	%100	
.3During the purchase of meat (carcass) it is necessary to be sealed?	the number	196	214	410	3
	%	47.8%	29.7%	%100	
.4Do not eat canned food if the package is bulging or retort?	the number	252	158	410	1
	%	61.5%	38.5%	%100	
5 .The important thing about buying eggs is that the eggshell should not be broken?	the number	222	188	410	2
	%	54.1%	45.9%	%100	
Total	the number	841	1209	2050	
	%	%100	59%	41%	

It is noticed from the above table that the percentage of correct answers for the first dimension of using clean water from the axis of eating tools and food is 41% against 59% of wrong answers, meaning that the majority of the answers of the sample members on this dimension were not correct. The highest correct answers for this dimension were the question of the necessity to eat foods if the package was swollen or



crooked (approximately 62%) and then the special question regarding the importance of not having the eggshell broken while buying eggs (approximately 54%), while the percentage of answers was The correct answer to the question regarding the need for the purchased meat to be sealed is approximately 48%, and the percentage of correct answers to the question about the necessity to eat vegetables and fruits immediately after preparing them was approximately 35%, while the percentage of correct answers did not exceed the special question about the possibility of disinfecting vegetables with chlorinated water. Vegetables with chlorinated water 7%.

### Second: Cook the materials properly

Table (6)

The proportional distribution of correct answers to the questions of the first question - the second dimension: cooking the materials correctly

item		The number of correct answers	The number of wrong answers	total	Sorted by the number of correct answers
.1The cooking pots should be made of stainless steel.	the number	279	131	410	1
	%	68.0%	32.0%	%100	
.2Eating raw eggs may lead to food poisoning.	the number	193	217	410	2
	%	47.1%	52.9%	%100	
.3You can find out if the meat has been cooked properly by measuring the temperature of the meat with a thermometer.	the number	166	244	410	3
	%	40.5%	59.5%	%100	
Total	the number	638	592	1230	
	%	51.9%	48.1%	%100	

It is noticed from the above table that the percentage of correct answers for the second dimension of cooking materials correctly from the axis of eating utensils and food is approximately 52% compared to 48% of wrong answers, meaning that a simple majority of the sample members answered the correct answers to the questions of the dimension. The highest correct answers for this dimension were the question of the necessity for cooking pots to be made of stainless steel, where the percentage was 68%, and then the question regarding the probability of food poisoning when eating raw eggs with correct answers of approximately 47%, and finally the answers to the question regarding the possibility of Find out if the meat has been cooked properly by measuring the temperature of the meat using a thermometer with approximately 41% correct answers.

### Third: Preserving the food at a suitable temperature after cooking

Table (7)

The proportional distribution of correct answers to the questions of the first question - the third dimension: preserving food after cooking at an appropriate temperature

Item		The number of correct answers	The number of wrong answers	total	Sorted by the number of correct answers
1 .Cooked food should be kept hot to 60 ° C in the	the number	77	333	410	2

absence of presentation and eat it immediately after cooking.	%	18.8%	81.2%	%100	
.2Eating cooked food stored at room temperature for 12-24 hours may lead to the risk of food poisoning.	the number	166	244	410	1
	%	40.5%	59.5%	%100	
Total	the number	243	577	820	
	%	29.6%	70.3%	%100	

It is noticed from the above table that the percentage of correct answers for the second dimension of food preservation after cooking at an appropriate temperature from the axis of eating utensils and food is approximately 30% only against 70% of wrong answers, meaning that the majority of the responses of the sample members were wrong on the axis questions.

The second question: What is the reality of Kuwait University students' knowledge of the concept of food safety in terms of food processing? This question included a set of themes:

First: Hand washing and sterilization

Table (8)

The proportional distribution of correct answers to the questions of the second question - the first dimension: hand washing and sterilization

Item		The number of correct answers	The number of wrong answers	total	Sorted by the number of correct answers
.1Hands should be washed with warm water and soap in a way to include the wrists.	the number	351	59	410	4
	%	85.6%	14.4%	%100	
.2Always wash hands after coughing or sneezing.	the number	378	32	410	3
	%	92.2%	7.8%	%100	
.3Hands should be washed after handling waste.	the number	405	5	410	1
	%	98.8%	1.2%	%100	
4. There is no need to wash hands after touching the face.	the number	229	181	410	5
	%	55.9%	44.1%	%100	
.5Hands should be washed before and after handling raw foods.	the number	383	27	410	2
	%	93.4%	6.6%	%100	
Total	the number	1746	304	2050	
	%	85.1%	14.9%	%100	

It is noted from the above table that the vast majority of the answers from the sample members on this axis were correct by approximately 85%. The highest correct answers for this dimension were the question regarding the necessity of washing hands after dealing with waste (approximately 99%), and then the question regarding the necessity of washing hands before and after dealing with raw foods

(approximately 93%). The percentage of correct answers to the question of necessity was Always wash hands after coughing or sneezing, about 92%. The least correct answers were about the question of not having to wash hands after touching the face.

## Second: Cleanliness and readiness of food processing halls

Table (9)

The proportional distribution of correct answers to the questions of the second question - The second dimension: Cleanliness and readiness of food processing halls

Item		The number of correct answers	The number of wrong answers	total	Sorted by the number of correct answers
.1The same cutting board can be used for raw and cooked foods available if it looks clean.	the number	305	105	410	3
	%	74.4%	25.6%	%100	
.2The kitchen sink and drainage should be disinfected every week.	the number	316	94	410	2
	%	77.1%	22.9%	%100	
.3It is sufficient to clean the fresh meat cutting board with a clean towel to prevent the growth of bacteria.	the number	298	112	410	4
	%	72.7%	27.3%	%100	
.4Most microorganisms grow well between 5 ° C and 65 ° C.	the number	296	114	410	5
	%	72.2%	27.8%	%100	
.5Disinfectants and detergents are good for killing most bacteria.	the number	321	89	410	1
	%	78.3%	21.7%	%100	
Total	the number	1536	514	2050	
	%	74.9%	25.1%	%100	

It is noted from the above table that the majority of the answers of this axis were correct by approximately 75% against 25% of the wrong answers. The highest correct answers for this dimension were to the question about the efficiency of disinfectants and detergents to kill most bacteria. And the question about the necessity to disinfect the kitchen sink and drainage every week, and the question about the possibility of using the same cutting board for raw and cooked foods available if it appears clean.

The third question: What is the reality of Kuwait University students 'knowledge of the concept of food safety in terms of food storage? This question included a set of themes:

**First: Preserving food and storing it in the refrigerator or freezer**

Table (10)

The proportional distribution of answers to the questions of the third question - the first dimension: preserving food and storing it in the refrigerator or freezer

Item		The number of correct answers	The number of wrong answers	total	Sorted by the number of correct answers
.1Chicken, fish and raw meat can be placed in the same place.	the number	183	227	410	3
	%	44.6%	55.4%	%100	
.2Food cannot be frozen again after thawing it.	the number	218	192	410	2
	%	53.2%	46.8%	%100	
.3Canned food can be eaten if the tin foil is oversized or stretched.	the number	96	314	410	7
	%	23.4%	76.6%	%100	
.4The process of freezing food does not kill bacteria, but it does slow down its growth.	the number	255	155	410	1
	%	62.2%	37.8%	%100	
5Cooling food only slows the growth of bacteria.	the number	177	233	410	4
	%	43.2%	56.8%	%100	
.6Eggs can be stored for up to a month after they are stored	the number	132	278	410	5
	%	32.2%	67.8%	%100	
.7The process of cooling food after cooking for the purpose of preservation should be completed within two hours	the number	126	284	410	6
	%	30.7%	69.3%	%100	
Total	the number	1187	1683	2870	
	%	41.4%	58.6%	%100	

It is noted from the above table that the majority of the answers of the respondents on this axis were wrong by about 59% compared to 41% for correct answers. The highest correct answers for this axis were to the question that the process of freezing food does not kill bacteria, but it slows down its growth (approximately 62%) and then the question regarding the inability to freeze food again after thawing it (approximately 53%), while the least correct answers It was in clauses (3-6-7):

**Second: Preserving cooked food**

Table (11)

The proportional distribution of answers to the questions of the third question - the second dimension of preservation of cooked food

Item		The number of correct answers	The number of wrong answers	total	Sorted by the number of correct answers
.1Raw food should be stored separately from cooked food.	the number	323	87	410	1
	%	78.8%	21.2%	%100	

.2Leftover cooked food can be eaten in the refrigerator for two or three days.	the number	258	152	410	2
	%	62.9%	37.1%	%100	
.3Milk or pasteurized milk can be stored in the refrigerator for a maximum of three days in an unopened container.	the number	141	269	410	3
	%	34.4%	65.6%	%100	
Total	the number	722	508	1230	1230
	%	58.7%	41.3%	%100	

It is noticed from the above table that the percentage of correct answers for this axis was about 60%. And the question regarding the possibility of storing milk or pasteurized milk in the refrigerator for a maximum of three days in an unopened carton, the correct answers did not exceed 34%.

### Third: The description and place of storage

Table (12)

The proportional distribution of answers to the questions of the third question - the third dimension: description and place of storage

Item		The number of correct answers	The number of wrong answers	total	Sorted by the number of correct answers
.1Cooked food should be stored in the lower shelves in the refrigerator.	the number	101	309	410	6
	%	24.6%	75.4%	%100	
.2In dry storage, the store should be exposed directly to sunlight.	the number	132	278	410	4
	%	32.2%	67.8%	%100	
.3Cold storage places must be opened and ventilated periodically.	the number	142	268	410	3
	%	34.6%	65.4%	%100	
.4The water and heating pipes that run through the storage areas will not cause any problem if they are well insulated.	the number	217	193	410	1
	%	52.9%	47.1%	%100	
.5The refrigeration temperature in the refrigerator should be between 0 and 5 degrees Celsius.	the number	174	236	410	2
	%	42.4%	57.6%	%100	
.6The minimum temperature for freezing should be -18 ° C.	the number	120	290	410	5
	%	29.3%	70.7%	%100	

Total	the number	886	1574	2460	
	%	36.0%	64.0%	%100	

It is noticed from the above table that the majority of the answers of this axis were wrong by about 64%. The highest correct answers for this dimension were the question that the water and heating pipes that pass through the storage areas will not cause any problem if they are well insulated, and then the question regarding the necessity for the refrigeration temperature in the refrigerator to range between 0 and 5 degrees Celsius, and the question regarding the need to save Food cooked in the lower shelves in the refrigerator, only a quarter of the respondents answered correctly.

The fourth question: What is the reality of Kuwait University students 'knowledge of the concept of food safety in terms of food poisoning? This question included a set of themes:

**First: Preserving food and storing it in the refrigerator or freezer**

Table (14)

The relative distribution of answers to the questions of the fourth question: food poisoning

Item		The number of correct answers	The number of wrong answers	total	Sorted by the number of correct answers
.1Food handlers are a major source of food poisoning.	the number	287	287	410	7
	%	70.0%	70.0%	%100	
.2Food poisoning is caused by pathogenic microbes.	the number	129	129	410	4
	%	31.5%	31.5%	%100	
.3White cheese made from unpasteurized raw milk may cause food poisoning.	the number	292	292	410	8
	%	71.2%	71.2%	%100	
.4Drinking unpasteurized milk may cause food poisoning.	the number	292	292	410	8
	%	71.2%	71.2%	%100	
5Fish and chicken are usually associated with contamination with salmonella (a bacterium that causes food poisoning.(	the number	105	105	410	3
	%	25.6%	25.6%	%100	
.6Bread and rice are usually associated with salmonella contamination.	the number	172	172	410	5
	%	42.0%	42.0%	%100	
.7Taste contaminated food can be detected	the number	215	215	410	6
	%	52.3%	52.3%	%100	
.8Common symptoms of food poisoning are diarrhea and headache	the number	358	52	410	1
	%	87.3%	12.7%	%100	
.9Flies transmit diseases to exposed foods.	the number	320	90	410	2
	%	78.0%	22.0%	%100	
total	the number	2056	1634	3690	
	%	55.7%	44.3%	%100	

It is noticed from the above table that the majority of the answers of the sample members were correct to this question, and the highest correct answers for this axis were for the special question about the

common symptoms of food poisoning diarrhea and headache, and then the special question about flies and their transmission of diseases to exposed foods, then the extent of the correlation Fish and chicken were contaminated with salmonella (a bacterium that causes food poisoning) by a percentage, while the two items (1-3) were the least among the correct answers by no more than 30%.

Table (15)  
The proportional distribution of correct answers on the four study axes

Item		The number of correct answers	The number of wrong answers	total	Sorted by the number of correct answers
The first axis: dealing with tools and food	the number	1722	2378	4100	4
	%	42.0%	58.0%	%100	
The second axis: preparing food	the number	3282	818	4100	1
	%	80.0%	20.0%	%100	
The third axis: storing food	the number	2795	3765	6560	3
	%	42.6%	57.4%	%100	
Fourth axis: food poisoning	the number	2056	1634	3690	2
	%	55.7%	44.3%	%100	
Total	the number	9855	8595	18450	
	%	53.4%	46.6%	%100	

It is noted from the above table that the general awareness of the concept of food safety among Kuwait University students was not at the desired level, as the percentage of correct answers for all the questionnaire questions was approximately 53%, while the percentage of incorrect answers was approximately 47%.

The dimensions of the food preparation axis came first in the percentage of healthy answers answered by the respondents, with a percentage of 80%, and the second came with a difference in the axis of food poisoning with correct answers of approximately 56%.

**The fifth question: Are there statistically significant differences due to the college variable?**

Table No. (16)

Anova test to test the presence of differences in the averages of the study axes according to the variable of the college

the hub		Sum of squares	Degrees of freedom	Average of squares	The value of the p test	Statistical significance (p-value(
The first axis: dealing with tools and food	Between groups	52.356	2	26.178	**7.291	0.001
	Within groups	1461.244	407	3.590		
	total	1513.600	409			
The second axis: preparing	Between groups	11.665	2	5.833	2.249	0.107

food	Within groups	1055.310	407	2.593		
	total	1066.976	409			
The third axis: storing food	Between groups	78.770	2	39.385	*4.233	0.015
	Within groups	3786.510	407	9.303		
	total	3865.280	409			
Fourth axis: food poisoning	Between groups	11.601	2	5.800	1.464	0.232
	Within groups	1612.311	407	3.961		
	total	1623.912	409			
Total	Between groups	487.478	2	243.739	**5.774	0.003
	Within groups	17181.500	407	42.215		
	Total	17669.978	409			

\* Test is D at a significance level of 5%.

\*\* Test is D at a 1% significance level.

From the table it is clear that the ANOVA test is statistically significant for the mean of correct answers for the first and third axes on the total number of axes.

Using the Scheffet test for multiple comparisons, the following is clear:

Table No. (17)

Schiffie test for significant differences between the colleges covered by the study of the axis of eating utensils

the hub	Number of comparisons	the college	Average difference	Statistical significance
Eat utensils	1	College of Life Sciences	0.972**	0.001
		Allied Medical Sciences		

\*\* Test is D at a 1% significance level.

It was noted from the Sheffet test of comparisons that the average correct answers for students of the College of Life Sciences for the axis of eating utensils was higher than the average of correct answers for students of the College of Education with approximately one question and a statistical significance of 0.001.



Table No. (18)

Schiffie test for significant differences between the faculties of the study for the food storage axis

the hub	Number of comparisons	the college	Average difference	Statistical significance
Food storage	1	College of Life Sciences	0.940*	0.034
		Allied Medical Sciences		

\* Test is D at a significance level of 5%.

It is noted from the Scheffet test for multiple comparisons that the average correct answers for students of the College of Life Sciences on the axis of food storage was higher than the average correct answers for students of the College of Allied Medical Sciences with one question approximately 0.034.

### The grand total of the axes

Table No. (19)

Schiffie test for the significant differences between the faculties included in the study for the total questions of the study axes

the hub	Number of comparisons	the college	Average difference	Statistical significance
Total questions of the study axes	1	College of Life Sciences	2.840**	0.007
		Allied Medical Sciences		

\*\* Test is D at a 1% significance level.

It is noted from the Sheffet exam for multiple comparisons that the average correct answers of the College of Life Sciences students for the total questions of the study axes was higher than the average correct answers for the students of the College of Education with approximately three questions and with a statistical significance of 0.007.

### Discuss results.

The study indicated that there is a weakness of Kuwait University students in the concept of awareness of food safety in general and the secondary topics it includes, such as those included in the study axes, which are eating tools and food, food preparation, and storage, and the axis of food poisoning. One of the reasons for this weakness may be the lack of interest of university students in the concept of safety Food as they depend on the parents or domestic workers, they are the ones who buy food from shopping centers and they are the ones who prepare it and provide it to them, or their dependence on fast restaurant orders of various kinds may be a result of the accelerated lifestyle, and it is also likely that the effects of community life such as the work of parents require the use of Various amenities and also it may be most of the time eating in restaurants, which leads to less interest in learning the different life skills related to preparing food and procedures for safe handling with it, as these practices are transmitted from parents to children informally at home or officially transmitted. Through some academic subjects in schools and universities, and it may be due to the poverty of educational curricula for topics related to food safety and dealing with it, As well as the lack of media awareness through television and radio programs, government awareness campaigns, and the civil society, which must contribute to spreading the health culture related to food safety and clarifying the pathogenic factors: such as issues of contamination of raw food, insufficient cooking and consumption of food from an unsafe source. And improper preparation of food, and what causes food poisoning, such as the defect that occurs during the food industry and malpractice during the preparation and handling of food.

The College of Life Sciences was better in terms of awareness of the concept of food safety at the level of the rest of the colleges, and the reason for that is that it is a scientific college and is interested in the specialties of dietetics and food science, and the connection of these disciplines with knowledge of food, its safety and methods of dealing with it.

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