


Communication

Food Safety Knowledge, Attitude, and Practice Among English Institute in Wadi Salih – Garsila Central Darfur-Western Sudan

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Abstract

Food-borne diseases have been rising daily, significantly affecting the health and economy of developing countries. Proper preparation and handling can decrease the incidence of foodborne diseases. This study aimed to assess the knowledge, attitude, and practices regarding food safety among students of English institutes in Central Darfur, Sudan. A cross-sectional questionnaire was designed for the study, which was conducted in the city of Garsila. Data were collected through face-to-face interviews and questionnaire administration to 100 students. The majority of respondents were female (61.0%) and aged between 18 and 25 years (92.0%). Most were single (84.0%), with less than half having attended secondary school (48.0%) and 22.0% having pursued higher education. The results revealed that 92.0% of respondents had never attended a course in food safety. The results indicate that 52.0% of respondents incorrectly believe that all bacteria are killed during freezing, while 76.0% disagree that washing hands with only water is sufficient for cleanliness. Most respondents (98.0%) agree that food hygiene training for food workers is crucial in reducing the risk of food contamination, and all respondents (100.0%) agree that food safety knowledge is important for a healthy life. Additionally, 95.0% of respondents reported reheating cooked food. These findings suggest a moderate level of awareness regarding food safety among students at the English institute in Garsila.

Keywords

Food Safety, Food Contamination, Food Course, Food Hygiene, Foodborne Disease

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1. Introduction

Food safety is one problem that paces public health organizations and contributes significantly to healthcare costs [1]. The monitoring and evaluation of good practices in food handling are essential to decrease foodborne diseases [2]. During COVID-19, food safety was the most important section that affected the food system as more preventions were added in each step of food preparation [3]. The last lists estimate that 600 million people are affected by the disease due to eating contaminated food, resulting in 420,000 cases of death every year, especially in third-world countries [4]. These pollutants enter the food system through cross-contamination, pollutant food supplies, inaccurate food handling, inappropriate personal hygiene, proliferating in food due to poor storage conditions, or improper cooking [5]. The eating of contaminated food is of great anxiety in Africa. According to the WHO report (2015) about 1 out of every 10 people is affected by foodborne diseases annually and the high affections of foodborne diseases are in Southeast Asia and sub-Saharan Africa, where 91 million people are ill annually due to foodborne-disease and 137,000 were diets [6]. Many hospitals in Sudan contain special units of food service that are responsible for preparing healthy meals for patients in the hospital. These food service units are prospective to committed to the 'arrangement governing general hygiene needs for food premises, the transport of food and related matters [7].

Food institution, such as restaurants, is a main source of foodborne diseases through different sources, involving chemicals, parasites, bacteria, viruses, and allergens, sources of food pollutants, such as food additives, food handles, and cross-contamination are recognized as the main sources of microorganisms that cause foodborne diseases, and it was reported that inappropriate food practices, involving inadequate personal hygiene and unsuitable cooking temperatures, can lead to disease outbreaks [4]. Food handlers play an essential part in ensuring food safety and protection against food poisoning [8]. Foodborne disease can cause mortality and morbidity of patients in hospitals and lead to increased hospitalization costs for the public health sector [7]. Education of food production staff on hygiene problems has also been recommended to improve food handling practices and food safety [9]. Measurement that is usually recommended to resist foodborne disease involves frequent correct techniques of washing hands, adequate cleansing of kitchen surfaces, storing food at suitable temperatures, and the division of raw and cooked food [10]. The knowledge, attitudes, and practices, of food handlers have been recorded from different countries studies around the world [11]. Food safety KAP is important because inappropriate knowledge, negative attitudes, and pauper hygiene practices by street food sellers can cause significant public health matters with food safety issues [12].

Therefore, most studies propose that although knowing is decisive for food sanitation, weary knowledge alone is not

enough to adopt safe food handling practices [13]. Previous studies have recorded that food consumption at home is the leading to of foodborne disease among consumers, but there is doubt since many examples are often underreported [3]. Maintaining food safety includes establishing international laws that contribute to an agreement between institutions that actualize this program [14]. In recent years, many studies deepened on this theory have been published, most of them in Food safety and there are more than 280 titles in the Science Direct database that use the KAP samples to expound on food safety hygiene [15]. Furthermore, previous studies have explained an association between inappropriate knowledge, attitudes, and practices among food workers and the happening of food poisoning [16]. In addition to that, there was little or no information available on the level of food safety knowledge, attitude, and practice (KAP) relating to lawsuits with abattoir laws among the abattoir workers in Garsila, Sudan. While, these could prevent the development of adequate disease protection and public health intrusion strategies [17]. We hypothesize that there is good information about food safety among the respondents, the present study aimed to assess food safety knowledge, attitude, and practice among English institute students in the study area.

2. Materials and Methods

2.1. Study Area



Figure 1. Map Verifying Area of The Study.

This study was conducted in Wadi Salih, Garsila, Central Darfur State, located in western Sudan at 12° 54' 0" north latitude and 23° 29' 0" east longitude (see Figure 1). In 2009, the population was 27,258 people, predominantly Muslim,

with a small Christian community. Most residents have an income of less than \$1,000 per year. The state consists mainly of poor savanna, surrounded by desert sands to the north and the Marra Mountains to the east [18]. The weather is sunny for most of the year and cloudy in autumn, with rain occurring for about 4 to 5 months. The temperature ranges from 31 to 39 degrees Celsius in summer.

2.2. Data Collection

The primary method employed for data collection in this study involved face-to-face interviews with English institute students, each of which took about 10 to 15 minutes. The research took place in Wadi Salih Garsila from February 23 to March 3, 2024, aiming to evaluate the food safety standards, knowledge, and practices among English institute students.

The respondents were given explanations about the questionnaire and study implementation to ensure they understood well before the interviews and observations. Furthermore, they were asked to give their agreement to participate in the interviews. The author conducted both the interview and observations [19].

2.3. Questionnaire Design

The questionnaire was designed after reviewing questions from questionnaires used in previous studies on food safety. All authors discussed and refined the questions to be included in this study. The questionnaire comprises four sections: Section One covers general information about respondents, Section Two assesses food safety knowledge, Section Three evaluates food safety attitude, and Section Four examines

food safety practices [20].

2.4. Data Analysis

The Data were analyzed by using SPSS Version 21.0 (IBM Corporation, NY). A cumulative score was assigned to each variable, representing the total score for each questionnaire item. Percentages and frequency distribution were calculated. The statistical significance of the differences between the students was determined using the frequency table.

3. Result

A total of 100 respondents were interviewed in English institutes in the study area.

3.1. Demographic Characteristics of Respondents

One hundred respondents were interviewed in the present study. The majority of them were female (61.0%), while 39.0% were male. The results indicated that 92.0% of the respondents were aged 18 to 25 years. In terms of marital status, most of the respondents were single (84.0%), and only 14.0% were married. Analysis of the respondents' education levels showed that 23.0% had attended primary school, 48.0% had completed secondary education, and 22.0% had achieved a higher education level. The majority of respondents (92.0%) had not attended any food safety courses, with only a small number (8.0%) having done so, as shown in Table 1.

Table 1. Demographic characteristics of respondents.

Variable	Frequency	Percent (%)	Cumulative percent (%)
Gender			
Male	39(39)	39.0 (39.0)	39.0
Female	61(61)	61.0(61.0)	100.0
Total	100	100.0	
Age			
18 to 25	92(92)	92.0 (92.0)	92.0
26 to 35	7(7)	7.0(7.0)	99.0
36 to 45	1(1)	1.0(1.0)	100.0
Total	100	100.0	
Marital status			
Single	84(84)	84.0(84.0)	84.0
Married	16(16)	16.0(16.0)	100.0
Total	100	100.0	

Variable	Frequency	Percent (%)	Cumulative percent (%)
Educational level			
Primary school	23(23)	23.0(23.0)	23.0
Secondary school	48(48)	48.0(48.0)	71.0
High education	22(22)	22.0(22.0)	93.0
Noneducated	7(7)	7.0(7.0)	100.0
Total	100	100.0	
Ever attended a food safety course.			
Yes	8(8)	8.0(8.0)	8.0
No	92(92)	92.0(92.0)	100.0
Total	100	100.0	

3.2. Food Safety Knowledge

The results indicate that most respondents (63.0%) agreed that wearing a watch and jewelry during food preparation can cause food contamination, while 37.0% disagreed. More than half (52.0%) of respondents agreed that all bacteria should be killed during freezing, whereas less than half (48.0%) disagreed. The majority of respondents (92.0%) agreed that washing hands regularly before cooking is an essential part of personal hygiene. In comparison, 76.0% disagreed with the notion that washing hands with only water is sufficient, and 24.0% agreed. Most respondents

(93.0%) agreed that wearing a mask is part of personal hygiene. Additionally, 97.0% of respondents agreed that proper cleaning and handling of utensils reduces the risk of food contamination. The present study showed that 83.0% of respondents agreed that reusing oil is dangerous to health, while only 17.0% disagreed. Furthermore, 96.0% of respondents agreed that contaminated food always shows some changes in color, odor, or taste, and 98.0% agreed that food workers should not have long nails. Most respondents (74.0%) agreed that eating and drinking in the workplace increases the risk of food contamination, while 26.0% disagreed, as presented in Table 2.

Table 2. Food safety knowledge.

Variable	Frequency	Percent (%)	Cumulative percent (%)
Wearing of watch and jewelry during the preparation of food can cause food contamination.			
Agree	63(63)	63.0(63.0)	63.0
Disagree	37(37)	37.0(37.0)	100.0
Total	100	100.0	
All bacteria should be killed during freezing.			
Agree	52(52)	52.0(52.0)	
Disagree	48(48)	48.0(48.0)	
Total	100	100.0	
Washing hands regularly before working is one part of personal hygiene.			
Agree	98(98)	98.0(98.0)	98.0
Disagree	2(2)	2.0(2.0)	100.0
Total	100	100.0	
Washing hands with only water can't clean enough.			

Variable	Frequency	Percent (%)	Cumulative percent (%)
Agree	24(24)	24.0(24.0)	24.0
Disagree	76(76)	76.0(76.0)	100.0
Total	100	100.0	
Wearing a mask is one part of personal hygiene.			
Agree	93(93)	93.0(93.0)	93.0
Disagree	7(7)	7.0(7.0)	100.0
Total	100	100.0	
Proper cleaning and handling of instruments reduce the risk of food contamination.			
Agree	97(97)	97.0(97.0)	97.0
Disagree	3(3)	3.0(3.0)	100.0
Total	100	100.0	
Reuse of oil is dangerous for health.			
Agree	83(83)	83.0(83.0)	83.0
Disagree	17(17)	17.0(17.0)	100.0
Total	100	100.0	
Contaminated food always has some change in color and odor or taste.			
Agree	96(96)	96.0(96.0)	96.0
Disagree	4(4)	4.0(4.0)	100.0
Total	100	100.0	
Food workers can't have long nails.			
Agree	98(98)	98.0(98.0)	98.0
Disagree	2(2)	2.0(2.0)	100.0
Total	100	100.0	
Eating and drinking in the workplace increases the risk of food contamination.			
Agree	74(74)	74.0(74.0)	74.0
Disagree	26(26)	26.0(26.0)	100.0
Total	100	100.0	

3.3. Food Safety Attitude

According to the present findings, most of the respondents (96.0%) agree that properly cooked food is free from contamination. In terms of food-borne disease about (90.0%) of the respondents agreed that cleaning their hands can prevent food-borne disease, therefore, (98.0%) of respondents agree

that food Contamination and hygiene training for food workers are important issues in reducing the risk of food contamination. Moreover, the majority of respondents (94.0%) agreed that protective clothing reduces the risk of food contamination. The current study found that all respondents (100.0%) agreed that food safety knowledge is essential for a healthy life (see [Table 3](#)).

Table 3. Food safety attitude.

Variable	Frequency	Percent (%)	Cumulative percent (%)
Properly cooked food is free from contamination.			
Agree	96(96)	96.0(96.0)	96.0
Disagree	4(4)	4.0(4.0)	100.0
Total	100	100.0	
Cleaning hands can prevent food-borne disease.			
Agree	90(90)	90.0(90.0)	90.0
Disagree	10(10)	10.0(10.0)	100.0
Total	100	100.0	
Food hygiene training for food workers is an important issue in reducing the risk of food contamination.			
Agree	98(98)	98.0(98.0)	98.0
Disagree	2(2)	2.0(2.0)	100.0
Total	100	100.0	
Protective clothing reduces the risk of food contamination.			
Agree	94(94)	94.0(94.0)	94.0
Disagree	6(6)	6.0(6.0)	100.0
Total	100	100.0	
Food safety knowledge is important for a healthy life.			
Agree	100(100)	100.0(100.0)	100.0
Disagree			100.0
Total	100	100.0	

3.4. Food Safety Practice

The results indicated that approximately 98.0% of respondents washed their hands before and after handling food. According to the findings of this study, all respondents (100.0%) kept their nails short and clean. Moreover, the majority of respondents (95.0%) reheated cooked food, while a small percentage (5.0%) did not. Additionally, 94.0% of re-

spondents of the respondents washed their hands before processing food. The results showed that 97.0% of respondents used clean instruments during food preparation, and all respondents (100.0%) used detergents when washing food instruments. Our study found that all respondents (100.0%) properly cleaned the food storage area before storing new products. The majority of respondents (94.0%) dried their hands with a towel after washing, while 6.0% did not dry their hands after washing, (table 4).

Table 4. Food safety practice.

Variable	Frequency	Percent (%)	Cumulative percent (%)
Do you wash your hands before and after handling?			
Yes	98(98)	98.0(98.0)	98.0
No	2(2)	2.0(2.0)	100.0
Total	100	100.0	
Do you keep your nails short and clean?			

Variable	Frequency	Percent (%)	Cumulative percent (%)
Yes	100(100)	100.0(100.0)	100.0
No			100.0
Total	100	100.0	
Do you reheat a cooked food?			
Yes	95(95)	95.0(95.0)	95.0
No	5(5)	5.0(5.0)	100.0
Total	100	100.0	
Do you wash your hands before processing food?			
Yes	94(94)	94.0(94.0)	94.0
No	6(6)	6.0(6.0)	100.0
Total	100	100.0	
Do you use clean instruments during processing food?			
Yes	97(97)	97.0(97.0)	97.0
No	3(3)	3.0(3.0)	100.0
Total	100	100.0	
Do you use detergents when washing food instruments?			
Yes	100(100)	100.0(100.0)	100.0
No			100.0
Total	100	100.0	
Do you properly clean the food storage area before storing new products?			
Yes	100(100)	100.0(100.0)	100.0
No			100.0
Total	100	100.0	
Do you dry your hands after washing them with a towel?			
Yes	94(94)	94.0(94.0)	94.0
No	6(6)	6.0(6.0)	100.0
Total	100	100.0	

Questionnaire sheet of Food safety knowledge, attitude, and practice Among English institutes in Garsila Wadi Salih – Central Darfur – Sudan.

Demographic characteristics of respondents

- 1\ Gender
a – male () b- female ()
- 2\ Age
a – 15 to 25 () b- 26 to 35() c- 36 to 45 () d- above than 46 ()
- 3\ marital status
a_ Single () b- married () c- others ()
- 4\ Educational level
a_ primary school () b- secondary school ()
d- high education () c- noneducated ()
- 5\ Ever attended a food handling and/or safety course
Yes () No ()

Food safety attitude

- 1\ proper cooked food is free from contamination?
Agree () Disagree ()
- 2\ Cleaning hands can prevent food-borne disease
Agree () Disagree ()
- 3\ Food hygiene training for food workers is an important issue in reducing the risk of food contamination.
Agree () Disagree ()
- 4\ Does protective clothing reduce the risk of food contamination?
Agree () Disagree ()
- 5\ Food safety knowledge is important for a healthy life?
Agree () Disagree ()

food safety knowledge

1\ Wearing of watch and jewelry during the preparation of food can cause food contamination.

agree () Disagree ()

2\ All bacteria should be killed during freezing?

Agree () Disagree ()

3\ Washing hands regularly before working is one part of personal hygiene.

Agree () Disagree ()

4\ Washing hands with only water can't clean enough?

Agree () Disagree ()

5\ Wearing a mask is one part of personal hygiene.

Agree () Disagree ()

6\ Proper cleaning and handling of instruments reduce the risk of food contamination.

Agree () Disagree ()

7\ Reuse of oil is dangerous for health?

Agree () Disagree ()

8\ contaminated food always have some change in color and odor or taste?

Agree () Disagree ()

9\ Food worker can't have long nails?

Agree () Disagree ()

10\ Eating and drinking in the workplace increases the risk of food contamination.

Agree () Disagree ()

Food safety practices

1\ Do you wash your hands before and after handling?

Yes () No ()

2\ Do you keep your nails short and clean?

Yes () No ()

3\ Do you reheat cooked food?

Yes () No ()

4\ Do you wash your hands before processing food?

Yes () No ()

5\ Do you use clean instruments during processing food?

Yes () No ()

6\ Do you use detergents when washing food instruments?

Yes () No ()

7\ Do you properly clean the food storage area before storing new products?

Yes () No ()

8\ Do you drying hands after washing them with a towel?

Yes () No ()

4. Discussion

In third-world countries, a street food business provides meals for the people and creates an informal sector of income for marginal people [19]. The safety of street food in third-world countries was found to be without maintaining their hygienic conditions. Appropriate knowledge, negative attitudes, and poor hygiene practices of street food sellers toward food safety can cause significant public health matters for consumers [12]. Shortage of knowledge on food safety and poor food handling practices are the essential reasons for food-borne disease and diarrheal-related morbidity in Sudan [21].

According to socio-demographics, the present study found that (61.0%) of respondents were female, this finding agrees with a study done in Ghana that found (76.6%) of respondents were female [11], this similar finding might be due to that females care about food safety more than males. The present study showed that the majority of respondents (92.0%) were between 18 to 25 years old, this finding disagrees with the study done in Indonesia that showed (26.40%) of respondents were 41 to 47 years old [22], this disagreement may be due to

the different cultures of respondents in this nation. In terms of married our study found that (84.0%) of respondents were single, this finding disagrees with a study done in Maldives found (53.1%) of respondents were married [4], this disagreement might be due to the different economic states and customs of these people. The present study showed that the majority of respondents (92.0%) never attended a food safety course, this finding agrees with a study done in Turkey that showed (47.8%) of participants had not taken food safety training [23], this agreement may be due to the lack of information about food safety training courses.

The majority of respondents (52.0%) agreed that all bacteria should be killed during freezing, this finding disagreed with the study showed that (39.6%) of respondents thought refrigeration and freezing do not destroy most bacteria [24], this disagreement might be due to different awareness about food safety between these respondents. Our study found that the most of respondents (98.0%) agree that washing hands regularly before working is one part of personal hygiene, this finding agrees with a study done in South Africa found that all respondents (100.0%) agreed that it was essential to wash their hands before handling food [25], this agreement may be due to the same food safety information.

The present study found that the majority of respondents

(97.0%) agreed that proper cleaning and handling of instruments reduce the risk of food contamination, this finding agrees with the study done in Bangladesh that found (76.0%) of respondents thought washing farming/cooking equipment is important [26], this agreement may be due to the same awareness among respondents about food source contamination. A high proportion of respondents (98.0%) agree that food workers can't have long nails, this finding agrees with the study showed that (52.0%) of respondents had well-kept nails [27]. This agreement may be due to the same awareness that long nails can be the source of germs. The most of respondents (98.0%) agreed that washing hands regularly before working is one part of personal hygiene, this finding agrees with the study found that (99.7%) of respondents agreed that regular hand cleaning was needful [28], this agreement might be due to good information about food safety between these nations.

The result showed that the most of respondents (98.0%) agree that food hygiene training for food workers is an important issue in reducing the risk of food contamination, this finding disagrees with a study done in Egypt that found (42.9%) of respondents thought that food safety training courses are necessary [16], his disagree might be due to different awareness about important of food safety courses. The current study finding showed that all respondents (100.0%) kept their nails clean and short, this finding agrees with the study that found (84.3%) of respondents Clean their fingers throughout meal cooking [14], this may be due to the same good information about personal hygiene. The present study found that the majority of respondents (94.0%) answered yes to washing hands before processing food, this finding agrees with a study that found all respondents (100.0%) had positively answered for washing hands with water and soap before preparing foods [29], this agree may be due to some awareness information about foodborne disease between these respondents. The current study showed that the majority of respondents (94.0%) were drying their hands after washing them with a towel, this finding agrees with the study found that (84.3%) of respondents strongly agreed that food handlers should use clean hand towels to wipe their hands after washing them [30], this agreed may be due to good information about self-hygiene.

5. Conclusion

We conclude that there is a moderate level of knowledge, attitudes, and practices related to food safety among English institute students. It is recommended that food safety training courses, educational extensions, and personal hygiene practices be emphasized in the study area.

Abbreviations

SPSS Statistical Packages for Social Sciences

WHO World Health Organization
SMEs Small and Medium-sized Enterprises

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Author Contributions

Mudathir Yahia Abdulrahman and Saber Yaseen Adam designed the questionnaire, collected samples, conducted the statistical analysis, and wrote the original draft, whereas Ahmed Abdalmutalab provided the publication fee. Abdel Kareem Abdalla Ahmed and Hamza Abdalla Eltaher supervised, reviewed, and edited the manuscript. All authors read and approved the final version of the manuscript.

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Data Availability Statement

All available data have been presented in the manuscript.

Conflicts of Interest

The authors declare no conflicts of interest.

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