

## **Evaluation of Knowledge, Attitudes, Practices, and Health Status of Hospital Food Handlers Regarding Food Hygiene in Al-Baha: A Cross-Sectional Study**

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### **ABSTRACT**

Unsanitary practices by food service employees contribute to the spread of foodborne illness, especially in hospitals. Therefore, the aim of this study was to assess workers' knowledge and practices regarding food safety. This retrospective cross-sectional study was conducted in government hospitals in Al-Baha region, Saudi Arabia. A pretested questionnaire was used (n=57), in addition to the results of routine tests taken from the laboratory records of the hospitals concerned (72 samples). The results showed that a high percentage of workers have good knowledge about food health and safety, which is reflected in the laboratory results records of the samples, as evidenced by the significant correlation between the level of education and training and knowledge about food contaminants (pv 0.00). Based on the results of this study, there is good knowledge, attitudes, and practices regarding food safety among hospital food service workers. Therefore, we recommend continuing to provide training for all workers on food safety to reduce foodborne risks.

**KEYWORDS:** Hospital, Food safety , handlers Practices, Knowledge,

### **1. Introduction:**

Those who handle food are A food handler is a person who works in the service industry handling or preparing food or drink, whether it is prepared,

packaged, opened, or served. The food may be exposed to certain toxins as a result of what it goes through during these processes, which raises the possibility of contamination and puts the consumer at risk of illness. illnesses and thereby raises expenses (1). Food handlers should practice good hand hygiene to prevent food contamination and thereby lower the risk of spreading infections. Thus, raising the standard of hospital food services is regarded as one of the most significant tasks. Given that food service involves both material and immaterial components. (2). Because the body provides a good environment for some germs to grow in the majority of which are harmless personal hygiene is important, especially for those who handle food. In actuality, many them are crucial for preserving health. like the bacteria in the intestines that produce vitamin K. However, some of them are dangerous and may make you sick from eating. Furthermore, some healthy individuals may harbour microorganisms that cause disease even when they appear well. (3). Hospitals are thought to be among the key complexes for delivering food services; these are thought to be more complex since they are connected to a number of variables, the most significant of which being the inpatients' clinical demands. In order to give patients excellent care, it is necessary to fully understand the significance of health procedures and to adhere to them. Additionally, food safety is an essential component of the entire food process, especially when preparing and serving meals to hospitalized patients who are more vulnerable to foodborne illness because of their weakened immune systems and general state of health.. (4). One of the most common health issues in the modern world is food-borne illness, which has an impact on both development and health. They include a wide spectrum of illnesses, most of which are toxic or infectious and can be brought on by toxins, chemical pollutants, helminths, bacteria, viruses, or protozoa. (5) . Hospital illnesses caused by contaminated food might occasionally affect inpatients more than others, particularly the elderly and those with weakened immune systems. *Salmonella Spp.*, *Clostridium Botulinum*, *Shiga toxin- Producing E. Coli*, *Vibrio Spp.*, *Listeria Monocytogenes*, *Campylobacter Spp.*, *Norovirus*, *Shigella Spp.*, *Yersinia Enterocolitica*, *Hepatitis A Virus*, *Giardia*, and *Cryptosporidium* are common foodborne pathogens that are easily transmitted through food and can cause severe illness. (6)

The personal cleanliness of those who prepare and serve food is crucial to its safety. Everyone who handles food should practice good personal hygiene

since the bacteria that might cause food poisoning can spread quickly from the hands and clothing of those who handle it to the food. In addition to hands, clothing, and other body parts, jewelry and hair can harbor bacteria that contaminate food. The health of those handling food is also crucial. Unknowingly, people who are ill or who have wounds such as cuts or scratches might transmit illness through food. The attitudes and knowledge of all food service employees set the stage for good cleanliness. It begins with self-care and cleanliness (7). Despite the greatest efforts of governments worldwide to enhance food safety, food-borne illness continues to be a major public health concern in both developed and developing nations. (8). Any stage of the process—including collecting, processing, storing, distributing, and preparing food—can result in food contamination. Most food-borne illnesses can be avoided with proper food preparation. (9). food preparation fulfilling the dietary needs of patients Hospital foodservice aims to give patients a nutritional model with meals catered to their individual medical circumstances as well as wholesome meals for their recuperation and well-being. The following objectives can be met when meals are thoughtfully prepared and provided, and when patients eat what they are given: The quality of hospital foodservice is deemed good if the nutrients in the meals that the patients eat match their nutritional needs. (10). The hospital food service system involves more than just giving patients food and liquids; it also calls for a strong interdisciplinary team that works to guarantee patients' nutritional needs by establishing guidelines for what meals should be served. Meals chosen by the patient and tailored to his cultural preferences are included in the protocols that organize the patient's meals. (11). A survey assessing the quality of food services in the major hospitals throughout six Middle Eastern nations—Bahrain, Jordan, Kuwait, Lebanon, Saudi Arabia, and Syria—was carried out in some of these institutions. The number of people with training in food services was quite low. There is a discussion of the effects of these shortages and suggestions are given to enhance the food services in those nations. (12). This is also consistent with the findings of another study carried out in Sudan, which showed that there is a strong correlation between obtaining training in food safety and healthy food handling practices. This can result in some incorrect practices, as evidenced by the similarities between some contaminants found in samples taken from food and those taken from workers. (13).

## 2, Materials and methods

From March to June 2024, a cross-sectional study was carried out at a selected public hospitals in the Al-Baha region of Saudi Arabia. The approach was retrospective and cross-sectional. Data were gathered from routine examination results that had already been documented during the study period. A questionnaire completed by 57 out of the 65 workers present during the researchers visits, stool and urine samples collected from food workers, and 73 swabs from food workers and some of the equipment used in food preparation and distribution were included in the results. Numerous questions were included in the questionnaire, some of which dealt with demographic information (gender, age, educational attainment, career, training, etc.) This study excludes all samples that were recorded before starting to collect data, as well as workers who did not want to participate or were not present while filling out the questionnaire. The results of the reported samples were obtained from the hospital laboratory records, focusing on positive samples containing the microorganisms causing food poisoning only, and the data were analyzed using SPSS v.22 software.

## 3.Results

The results were obtained after analysing the questions using SPSS version 22, and taking retrospectives recorded data from the laboratory, which was placed in the following tables and then discussed.

**Table {1}. Demographic data of the participance N=57**

<b>1.1. Age Groups</b>				
Variables	Frequency	Percent	Valid Percent	Cumulative Percent
25-35	33	57.9	57.9	57.9
36-45	20	35.1	35.1	93.0
46-55	4	7.0	7.0	100.0
Total	57	100.0	100.0	
<b>1.2.Level Of Education</b>				
Primary	20	35.1	35.1	35.1
Secondary	23	40.4	40.4	75.4
University	14	24.6	24.6	100.0
Total	57	100.0	100.0	
<b>1.3.Job Title</b>				
food preparation	19	33.3	33.3	33.3
food distribution	21	36.8	36.8	70.2
Cleaner	11	19.3	19.3	89.5

Other	6	10.5	10.5	100.0
Total	57	100.0	100.0	
<b>1.4. Residence</b>				
City	43	75.4	75.4	75.4
Village	14	24.6	24.6	100.0
Total	57	100.0	100.0	
<b>1.5. Experience</b>				
Marriage	27	47.4	47.4	47.4
Single	30	52.6	52.6	100.0
Total	57	100.0	100.0	
<b>1.6.sex</b>				
Male	26	54.2	54.2	54.2
Female	22	45.8	45.8	100.0
Total	48	100.0	100.0	
<b>1.7.Food safety training</b>				
Yes	39	68.4	68.4	68.4
No	18	31.6	31.6	100.0
Total	57	100.0	100.0	
The data presented in Table {1} indicates that the largest proportion of workers, at a rate of 7%, are between the ages of 46 and 55, while the majority, at 57.9%, are between 25 and 35. Additionally, 40.4% of them have completed secondary education, while 24.6% have completed university education. Additionally, it displays that 75.4% of people reside in cities, and 68.4% of people have acquired training.				

**Table {2}. food Handler Practices N=57**

<b>2.1. washing your hands with soap and water before preparing work</b>				
Variables	Frequency	Percent	Valid Percent	Cumulative Percent
some times	48	84.2	84.2	84.2
not need	5	8.8	8.8	93.0
not sure	4	7.0	7.0	100.0
Total	57	100.0	100.0	
<b>2.2.Often wearing gloves when handling food</b>				
al ways	51	89.5	89.5	89.5
some times	6	10.5	10.5	100.0
Total	57	100.0	100.0	
<b>2.3.Using mask</b>				
Some times	16	28.1	28.1	89.5
Not comfortable	6	10.5	10.5	100.0
Total	57	100.0	100.0	
<b>2.4. Wearing a head covering</b>				
Some times	15	26.3	26.3	26.3
during working	40	70.2	70.2	96.5
not comfortable	2	3.5	3.5	100.0
Total	57	100.0	100.0	
<b>2.5.The correct way to wash hands</b>				
worm water	41	71.9	71.9	71.9
cold water	6	10.5	10.5	82.5
6.Water from container	2	3.5	3.5	86.0

not sure	8	14.0	14.0	100.0
Total	57	100.0	100.0	
<b>2.6. The correct way to handle wounds while handling foods</b>				
report the wound	29	50.9	50.9	50.9
cover with suitable plaster	11	19.3	19.3	70.2
weave gloves	1	1.8	1.8	71.9
not sure	16	28.1	28.1	100.0
Total	57	100.0	100.0	
<b>2.7.The type of towel for use in the kitchen</b>				
Disposable	53	93.0	93.0	93.0
frequent use	1	1.8	1.8	94.7
not sure	3	5.3	5.3	100.0
Total	57	100.0	100.0	
<b>2.8. Working clothes</b>				
half apron	9	15.8	15.8	15.8
full apron	45	78.9	78.9	94.7
not sure	3	5.3	5.3	100.0
Total	57	100.0	100.0	
<b>2.9. drying hands after washing</b>				
very important	49	86.0	86.0	86.0
Important	6	10.5	10.5	96.5
not sure	2	3.5	3.5	100.0
Total	57	100.0	100.0	
<b>2.10. smoke while preparing food</b>				
Possible	6	10.5	10.5	10.5
Impossible	44	77.2	77.2	87.7
some times	1	1.8	1.8	89.5
not sure	6	10.5	10.5	100.0
Total	57	100.0	100.0	
<b>2.11.Use single-use dishes</b>				
Yes	44	77.2	77.2	77.2
No	13	22.8	22.8	100.0
Total	57	100.0	100.0	
<b>2.12.Kitchen cleanliness</b>				
after meal	31	54.4	54.4	54.4
all day long	25	43.9	43.9	98.2
not sure	1	1.8	1.8	100.0
Total	57	100.0	100.0	
<b>2.13. care about nail trimming</b>				
Always	55	96.5	96.5	96.5
some times	2	3.5	3.5	100.0
Total	57	100.0	100.0	
<b>2.14.Wear accessories while working</b>				
not wear	49	86.0	86.0	86.0
always wearable	2	3.5	3.5	89.5
not sure	6	10.5	10.5	100.0
Total	57	100.0	100.0	
The table { 2} above demonstrates that most workers wash their hands with soap and water occasionally before preparing food (84.2%), always				

wear gloves before handling food (89.5%), wear masks while working (61.4%), cover their heads while working (70.2%), and know the proper way to wash their hands (71.9%). The table also demonstrates that most workers who know the correct way to treat wounds while handling food report injury at a rate of 50.9%. Additionally, And almost 93.0% of people understand the value of using kitchen towels, as do those who wear full aprons. 78.9%,86.0% of employees are aware of how important it is to dry hands after washing them. The aforementioned table indicates that a significant proportion of laborers, specifically 54.4%, acknowledge the significance of consistently cleaning the kitchen after meals, while 77.2% of them are aware of the value of single-use dishes. As can be seen from the above table, the majority of workers understand the significance of maintaining good personal hygiene, including not wearing accessories when handling food (96.5%) and cutting nails. by 86%.

**Table {3}: food Handler's , practices , health information's**

<b>{3:1} a valid health card</b>					
N=57		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	yes	48	85.7	85.7	85.7
	no	7	12.5	12.5	98.2
	not sure	1	1.8	1.8	100.0
	Total	56	100.0	100.0	
<b>{3:2} The times in the year is the health card extracted</b>					
		once	18	32.1	32.1
		twice/year	19	33.9	66.1
		three times	19	33.9	100.0
		Total	56	100.0	100.0
<b>{3:3} all the necessary vaccinations for work?</b>					
		yes	40	71.4	71.4
		no	6	10.7	82.1
		not sure	10	17.9	100.0
		Total	56	100.0	100.0
<b>{3:4} suffer from any skin diseases</b>					
		yes	3	5.4	5.4
		no	53	94.6	100.0
		Total	56	100.0	100.0
<b>{3:5} experiencing these symptoms during the week</b>					
		yes	6	10.7	10.7
		no.	50	89.3	100.0
		Total	56	100.0	100.0
<b>{3:6} previously isolated from work due to illness</b>					
		yes	15	26.8	26.8
		no	41	73.2	100.0
		Total	56	100.0	100.0
<b>{3:7} Having had food poisoning before</b>					
		yes	10	17.9	17.9

	no	46	82.1	82.1	100.0
	Total	56	100.0	100.0	

As can be seen in Table {3} above, 85.7% of workers have a valid health card, and 33.9% of workers receive one annually. As the above table demonstrates, it also demonstrates that the majority of workers 71.4% have the vaccines required for their line of work. At 94.6%, the majority of workers do not have skin disorders, and those who do typically get sick within a week. 26.8% of them were absent from work due to illness, the lowest percentage being 89.%, and 73.2% of those who had not previously been isolated because of the ailment. Eighty-two percent of them said they had never experienced food sickness.

**Table:{4} food handlers knowledge, practices , health related to food hygiene.**

<b>4:1 food contamination Knowledge</b>					
N=57		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	yes	37	64.9	64.9	64.9
	not sure	1	1.8	1.8	66.7
	don't know	18	31.6	31.6	98.2
	don't know	1	1.8	1.8	100.0
	Total	57	100.0	100.0	
<b>4;2 important factors to control bacterial growth.</b>					
	long term food retention	5	8.8	8.8	8.8
	temperature	18	31.6	31.6	40.4
	not covering food	1	1.8	1.8	42.1
	food left over	4	7.0	7.0	49.1
	all mention	22	38.6	38.6	87.7
	don't know	7	12.3	12.3	100.0
	Total	57	100.0	100.0	
<b>4.3. Knowledge of food contamination bacteria</b>					
	yes	18	31.6	31.6	31.6
	no	32	56.1	56.1	87.7
	not sure	7	12.3	12.3	100.0
	Total	57	100.0	100.0	
<b>4.4. Knowledge of food contamination sign</b>					
	smell	3	5.3	5.3	5.3
	shape	3	5.3	5.3	10.5
	taste	2	3.5	3.5	14.0
	all mention	41	71.9	71.9	86.0
	don't know	8	14.0	14.0	100.0
	Total	57	100.0	100.0	
<b>4.5.Knowledge of How microbes can be transmitted to foods</b>					
	from workers	9	15.8	15.8	15.8
	other food	3	5.3	5.3	21.1
	from environment	15	26.3	26.3	47.4
	don't know	30	52.6	52.6	100.0
	Total	57	100.0	100.0	

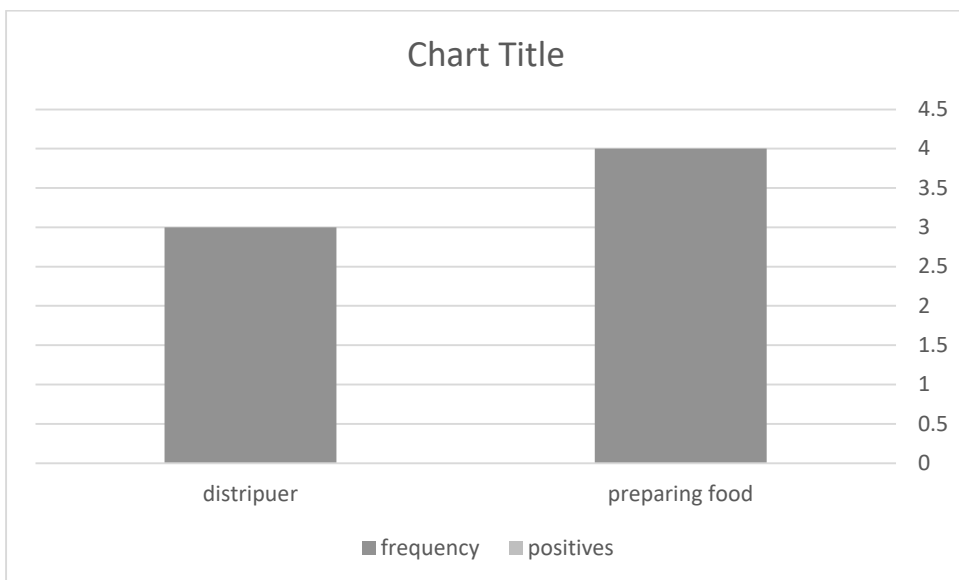
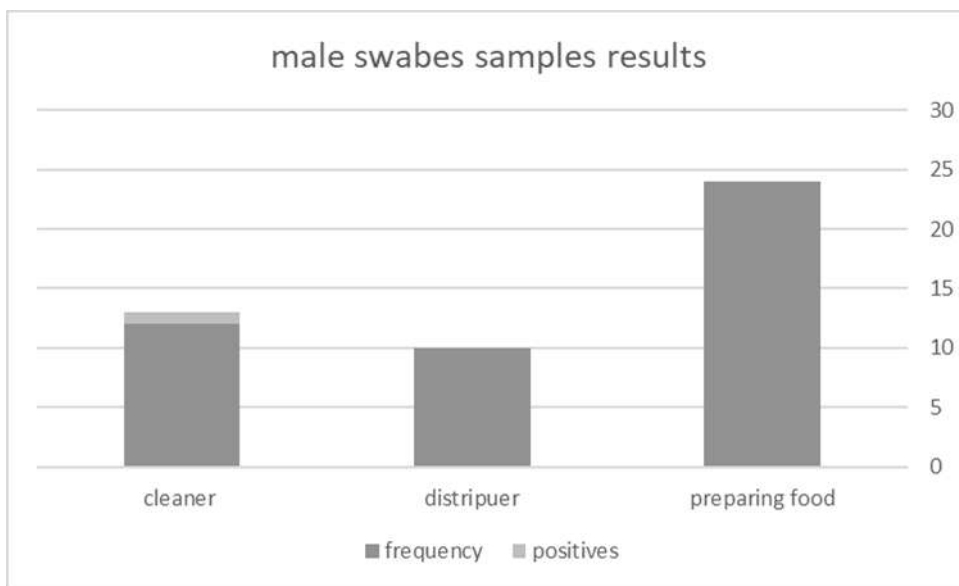
<b>4.6.Knowledge of the importance of washing hands</b>					
	Very important	47	82.5	82.5	82.5
	important	3	5.3	5.3	87.7
	not sure	7	12.3	12.3	100.0
	Total	57	100.0	100.0	
<b>4.7. The importance of wearing gloves while preparing foods</b>					
	important some times	2	3.5	3.5	3.5
	important	49	86.0	86.0	89.5
	don't sure	6	10.5	10.5	100.0
	Total	57	100.0	100.0	
<b>4.8.The importance of separating cutting boards</b>					
	important	19	33.3	33.3	33.3
	important some time	21	36.8	36.8	70.1
	not important	17	29.8	29.8	100.0
	Total	57	100.0	100.0	
<b>4.9 the appropriate degree to keep food in the freezer</b>					
	12C	2	3.5	3.5	3.5
	4C	9	15.8	15.8	19.3
	1C	6	10.5	10.5	29.8
	below 0 c	28	49.1	49.1	78.9
	not sure	12	21.1	21.1	100.0
	Total	57	100.0	100.0	
<b>4.10.Effect of cold on bacteria</b>					
	stop activity	18	31.6	31.6	31.6
	kill bacteria	12	21.1	21.1	52.6
	lilt effects	5	8.8	8.8	61.4
	not sure	22	38.6	38.6	100.0
	Total	57	100.0	100.0	
<b>4.11. Vegetables can be stored in</b>					
	Fridge	30	52.6	52.6	52.6
	Freezer	11	19.3	10.3	63.9
	not sure	16	28.1	28.1	100.0
	Total	57	100.0	100.0	
<b>4.12.Proper storage of meat in</b>					
	refrigerator	12	21.1	21.1	21.1
	freezer	33	57.9	57.9	78.9
	all mention	7	12.3	12.3	91.2
	not sure	5	8.8	8.8	100.0
	Total	57	100.0	100.0	
<b>4.13. Repeated thawing of frozen meat</b>					
	good	11	19.3	19.3	19.3
	not good	28	49.1	49.1	68.4
	not sure	18	31.6	31.6	100.0
	Total	57	100.0	100.0	
<b>4.14. unpasteurized milk the most suitable in preparing foods</b>					
	no	9	15.8	15.8	15.8
	yes	21	36.8	36.8	52.6
	not sure	27	47.4	47.4	100.0

	Total	57	100.0	100.0	
<b>4.15.the most suitable for checking the validity of foods</b>					
	daily	34	59.6	59.6	59.6
	monthly	5	8.8	8.8	68.4
	just by the liable	18	31.6	31.6	100
	Total	57	100.0	100.0	
<b>4.16The importance of the course on food health</b>					
	very important	17	29.8	29.8	29.8
	important	31	54.4	54.4	84.2
	not sure	9	15.8	15.8	100.0
	Total	57	100.0	100.0	
<p>A higher As indicated by Table {4}, 64.9% of food handling workers who were surveyed knew about food contamination; 38.6% knew about the contributing factors, while 12.3% said they had no idea. Furthermore, the majority of them—56.1%—did not know anything about the different kinds of bacteria that cause pollution. When asked if they knew that, 31.6% of them said yes. Given that 71.9% of the workers indicated they are aware of the warning indications of food contamination, the table above also demonstrates the workers' awareness of these indicators. One in every fourteen people were in the dark. Although 52.6% of them are unaware of various methods by which contaminants can be transferred to food, the table above demonstrates that most workers are aware of the , Similarly, 36.8% of respondents indicated that it is occasionally applicable to separate cutting boards when asked about its significance. The table also revealed that 49% of them are aware of food preservation techniques and temperature. The table also reveals that 57.9% of workers said that freezing meat is the best way to store it. 49.1% of them claimed that frying meat again and again produces subpar results. Likewise, 47.4% of them indicated they were unsure of the significance of pasteurized milk when questioned about it..</p>					

Table 5: "Correlation Between Education Level, Training, and Knowledge about Food Contaminants"

Correlation tables	Percent	Percent	Percent
Education level * food contaminants knowledge	100.0%	0.0%	100.0%
Received training * food contaminants knowledge	100.0%	0.0%	100.0%
Correlation is significant at the 0.00 level (2-tailed).			

Figure 1&2, Recorded laboratory results ( types and results of swabs from food handlers N=53 )



Figures 1 & 2 above show the results of 53 samples of swabs taken from the fingernails and nose of workers in the various food preparation and distribution areas in the hospitals concerned. The result was that there were no food poisoning. Pathogen .

Figur 3&4,Recorded laboratory results (Urine & stool sample taken from food handlers N=13

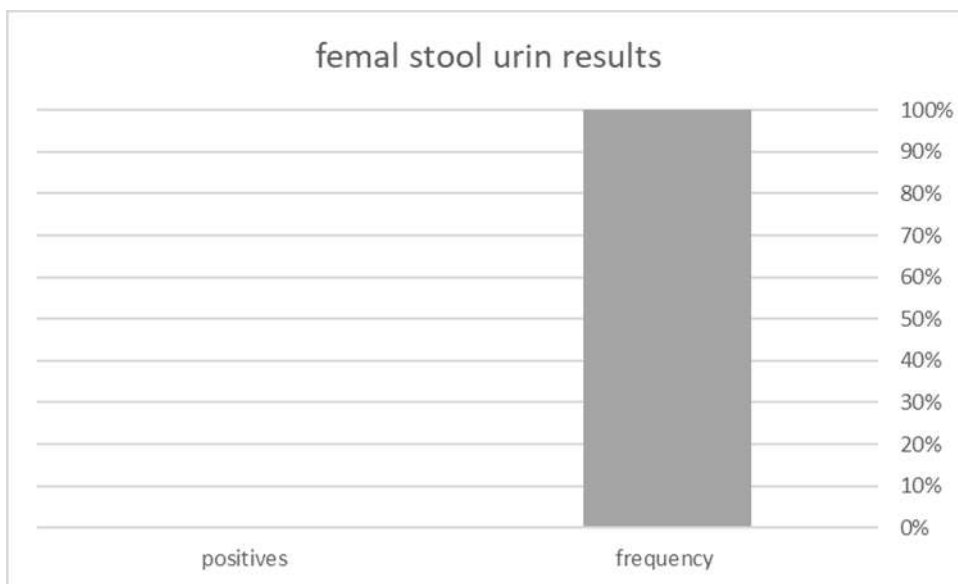
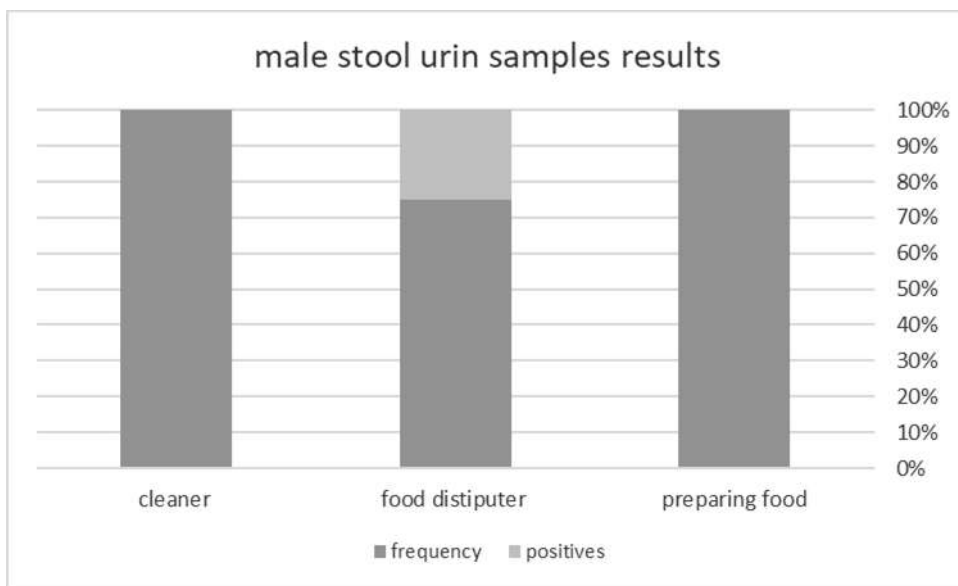


Figure 3& 4 above presents the results of 13 stool and urine samples taken from food handlers, showing a 7.7% positive food poisoning result which is *E coli*

Figure 5: Recorded laboratory results ( Equipment’s swabs samples )

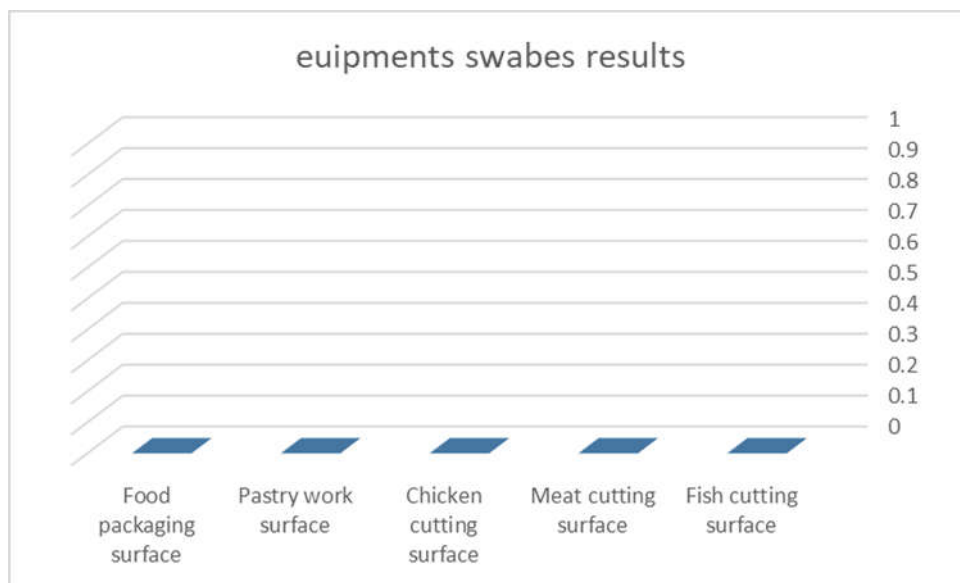


figure above 5, displays the results of testing five samples from the food preparation and distribution equipment. Results for all five samples were no food poisoning pathogens 100% negative.

**Discussion** The demographic data result revealed that most workers 57.9% are between the ages of 25 and 35. Additionally, it seemed that 40.4% of the workforce had completed secondary education, which qualifies them for a variety of food safety courses. Of these, 54.2% had taken advantage of the opportunity, as demonstrated by the practice of food hygiene, wherein most workers (84.2%) wash their hands before preparing food. 89.5% of them said they put on gloves before handling food. In addition to clothing appropriately for work (78.9%) and covering their hair (70.2%), most employees are also knowledgeable on how to handle food. Regarding health information for food handlers, most employees (71.4%) and those with valid health cards (85.7%) have received immunizations that are necessary for their line of work. This demonstrates the facility's desire to make sure that only individuals who belong there work there. Furthermore, most workers (94.6%) and those who have not been excluded from work (73.2%) do not have skin illnesses, which might be attributed to their concern for personal hygiene. Furthermore, most of the employees (82.1%) reported never having experienced food poisoning, demonstrating their concern for healthy eating and personal hygiene. Regarding the section on knowledge for food handlers, The findings indicated that most employees are aware of tainted food. Yes was the response given by 64.9%. When asked if they knew that germs may contaminate food, most workers (56.1%) said that they did not. hence more training is required. Apart from their awareness of the warning indicators of tainted food,

71.9% of the workers responded negatively. This suggests that employees should learn more about the different kinds of bacteria and how infected microorganisms get into food. Additionally, 36.8% of respondents said that the chopping board should occasionally be separated. Regarding the right temperature to store food, consider the impact of cold. In relation to bacteria, 38.6% of workers were uncertain as to whether the cold affected microorganisms. Furthermore, 52.6% of employees responded that veggies may be kept in the refrigerator. Some workers therefore require further education. All the questionnaire analysis's results showed that employees knew the proper techniques for food preservation and protection. Other results we acquired from the laboratory record of some samples were taken from the workers, cooking equipment, surfaces, and other sources were in addition to the results from the questionnaire. Their findings were one positive result, this indicates the degree to which employees are aware of appropriate handling food preparation and distribution. A related study was carried out in 2013 among hospital food service employees in the Kingdom of Saudi Arabia. As a result, food service workers who had not taken instructional courses on food hygiene and food-borne illnesses had a poorer degree of understanding of food-borne pathogens. Most workers in the food service industry usually wore gloves, and those who had taken training were more likely to do so. Those who worked in hospitals with fewer beds and those who continued their education (14). These results are also similar to the results of another study conducted in Medina hospitals in the Kingdom of Saudi Arabia, where the results showed that participants in general had good knowledge of food safety, with the highest success rate reaching 77.9% in knowing about cross-contamination, followed by 52.8% in knowing about food poisoning, and 49.7% in knowing By storing food. Food safety practices were also strongly observed in hospitals, with a success rate of 92.6%. Food safety knowledge among hospital food service employees varied with education level, age, and receipt of food hygiene/safety practices and training, while food safety practices had a significant association with the level of education and training in food hygiene/safety practices for food safety personnel. Staff. (15).

#### **4. Conclusion**

This study found that food service employees in hospitals demonstrated good knowledge, attitudes, and practices related to food safety. Additionally, their work was well-organized, they cooperated effectively, followed protocols, and understood the importance and fundamentals of their roles according to their kitchen classifications. These positive practices were reflected in the laboratory analysis results of samples taken from the workers and kitchen equipment. However, some responses to the questions indicated gaps in knowledge about the causes of food spoilage, such as microbes, highlighting the need for ongoing and intensified training.

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#### **Recommendations:**

Continue providing training to all workers on food safety to minimize the risks of foodborne illnesses. This study should be used to identify the knowledge gaps among employees, and based on these findings, develop a system of educational programs focused on food hygiene and safety. Additionally, it is essential to conduct regular reviews throughout the day to monitor and evaluate employees' performance according to their specific job roles.

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**Ethical consideration:**

The study was allowed to be conducted after presenting the research

objectives and type of questions to the Ministry of Health office, provided that the results were presented after obtaining them, and this was done

**Authors contributions:** Participants in number (1) collected, reviewed, and analyzed the data, supervised and published it in the journal. Participants in numbers 2 and 3 reviewed the manuscript.

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