

Introduction

According to the world health organization, 1.8 million people died from diarrheal diseases in 2005 alone and most of cases were associated with ingestion of contaminated food and drinking water (*WHO,2007*).since food is one of primary source of disease transfer, meals prepared and supplied in schools require great attention because the intended users are young children who are more susceptible to food-borne illnesses with limited choices (*soares et al., 2012*). *Aziz and Dahan (2013)* described school children as captive consumers who are usually not able to buy food from external sources during school hours . Despite the greater care needed ,several food-borne disease outbreak in schools continue to be reported (*Nicholas et al .,2002*). *Marzano and Balzaretto(2013)* reported salmonella outbreak which occurred in schools in france, involve 544 adolescents(<20 years old). Further investigation identified frozen beef burger as cause of the outbreak. *Marzano and Balzaretto(2013)* also reported an outbreak in Germany involving more than 11200 student . The outbreak was described as one of the largest food-borne gastroenteritis in Germany with several hundred schools affected . laboratory analysis on patients showed that many of the victims were infected with noroviruses where the source of the norovirus was identified in deep-frozen Chinese strawberries (*Robert Koch Institute , 2012*) from epidemiological point of view, there are several causes of food-borne disease outbreaks. *Su et al., (2005)* reviewed the food-borne disease outbreaks due to bacteria in Taiwan from 1995 to 2001 and found that most common bacteria were *vibrio para hemolyticus*, *staphylococcus aureus*, and *Bacillus cereus*. *Paulson (2002)* and *Green et al. (2006)* reported that hygiene of food worker could be a critical factor in spreading food-borne illnesses in the food service environments. Therefore, in order to minimize chance of food- borne disease occurrences . *Gibson et al. (2002)* reported that hygienic food preparation and education of those involved in the preparation , processing and serving of meals are crucial. In the kitchen, cutting boards may cause cross - contamination if not adequately sanitized (*Sneed et al., 2004; Staskel et al., 2007*). The sink drain area of the dishwashing sink, the hand-washing sink, spout handles and the handle of garbage fid are also

among the most common sources of bacterial contamination (*Staskel et al.,2007*).

The objectives;

- 1-To generate a general idea about food safety handling and practice in the cafeterias in the college of veterinary medicine.
- 2-To use this information as a base to promote food safety attitudes in the college system in universities in future .

Chapter One

Literature Review

1. Knowledge;-

Knowledge is associated with current practices, which in turn affects willingness to change current practices if it is learned that current practices are unsafe (McIntosh *et al.*, 1994). However, actual food handling practices are known to differ from self-reported practices (Jay, Cormar, and Govenlock, 1999). This is important as studies by Djuretic *et al.* (1996) and Evans *et al.* (1998) who shown that the main factors responsible for the outbreaks of food poisoning in England and Wales during 1992–1994 and 1995–1996, respectively, were inappropriate storage, inadequate cooking or reheating, and cross-contamination. Many consumers are unaware that at least 60% of food poisoning originates in the home, believing that the responsibility lies instead with food manufacturers or restaurants (Worsfold and Griffith, 1997a). Sockett (1995) pointed out that many people do not know the basic rules of food hygiene. In contrast, surveys conducted in 1986 and 1995/1996 illustrated that respondents did know which foods at the high risk from food poisoning, but knowledge about how a food could be made safe to eat was limited (Raab & Woodburn, 1997). Williamson, Gravani, and Lawless (1992) conducted a nation-wide postal survey in the US and showed that there was a lack of consumer knowledge about the types of food poisoning organisms, foods that were at risk from these organisms, the importance of proper cooking, and the need to avoid cross contamination Simillary, Woodburn and Raab (1997) showed that respondents were not good at identifying either the food borne illness or the groups of people particularly at risk for food poisoning. They also found that 40% of the 100 Oregon food preparers either believed that

contaminated foods could not be made safe to eat or they did not know how to do so. After observing 108 consumers during all stages of the purchase, preparation, cooking and storage of one of four recipes, Worsfold and Griffith (1997b) saw multiple examples of poor food handling practices leading to great potential for cross-contamination and subsequent food poisoning. A total of 58% of the consumers stored chilled ingredients above 5°C, 66% did not wash hands before work, 41% did not wash vegetables, and 60% used a single board for all cutting tasks. On the other hand, a study found that food safety was rated as significantly more important, when food shopping, by main meal planners who had one or more household members belonging to higher risk groups (Woodburn and Raab, 1997). Awareness, knowledge and judgement can also be affected by the habits and other perceptions that result from social, cultural, and economic influences (Rozin and Fallon, 1980). These may develop at an early age and become deeply ingrained. This can sometimes be due to the stereotype behaviour, where attitudes are developed without direct experience with the food in question (Cardello, Bell, and Kramer, 1996). Other examples of influences include food prices, status of hunger, cooking habits that may have developed, and sensory preferences such as taste, texture or tenderness (Lozano, Crites, & Aikman, 1999; McIntosh et al., 1994). Wierenga (1983) interviewed 20 in Copenhagen families and found that personal preferences might serve as a “filter” through which more general views on foods are formed. When foods were liked, no further attention to other quality parameters was needed. Thus, food safety concerns were used mainly to legitimise personal preferences. On the other hand, a discrepancy between consumer preference and choice often seems to result from compromises that people have to make due to personal shortcomings such as a lack of time or money (Worsfold and Griffith, 1997a). Lifestyle changes have also been shown to be influential in consumers’ attitudes towards the safety of food handling. In April 1996, the American Meat Institute commissioned a study of 1000 adults in the US and concluded that lifestyle changes affected food behaviour. These include an increasing number of women in the workforce, limited commitment to food preparation, and a greater number of single heads of households. Consumers appeared to be more interested in convenience and saving time than in proper food handling and preparation (American

Meat Institute ,1996; Collins,1997).Furthermore, according to economic theory, the demand for food safety is determined by consumers' willingness to pay for additional safety, and it is assumed that they are willing to pay less for each successive unit of safety (i.e. increasing marginal costs but diminishing marginal benefits). On the other hand, supply of safety is determined by the cost of producing safety by profit-seeking firms. Thus, the market for food safety will be in equilibrium when the price consumers are willing to pay for increases in safety is equal to the price at which suppliers are able to produce the increases. At such equilibrium, the level of safety supplied by the market will reflect a level of risk which is non-zero but acceptable. Extrapolating from this, it is suggested that consumer demand for food safety is increased when the gross production of a country (gross domestic product) is increased, since the average consumer is equipped with higher purchasing power (Tangermann, 1986).

2. Disparity between knowledge and behavior

Raab and Woodburn (1997) pointed out the disparity between food safety knowledge and selfreported practices. In a study of the knowledge and behaviour of hamburger meat of 1439 consumers in Texas, McIntosh *et al.*, (1994) concluded that while better-educated people tend to choose health and safety as their reason for cooking preference, these respondents are more likely to prefer their hamburgers to be less well cooked. Thus, the reasons for cooking preferences may be unaffected by either knowledge or mass media exposure. Furthermore, many individuals may not associate what they know about the risks of improperly cooked hamburger with their own practices. The correlation between the knowledge of safe practices and that of food borne diseases from the study, was only 0.151. This findings from other work, indicate that the public perceives the main food safety risks they need to worry about are derived from food additives and adulterations that originate in manufacturing (Groth, 1991; Lee, 1989). In a telephone survey of 100 Oregon food preparers, Woodburn and Raab (1997) found that even with high awareness of food-borne illness, 20% of respondents reported unsafe practices in their food preparation. This is despite the fact that 56% of the respondents knew that they could

thoroughly cook food contaminated with *Salmonella* to make it safe to consume and 59% knew this for *E. coli*.

Altekruse, Street, Fein, and Levy (1996) concluded that specific groups of consumers (specifically males, young adults, occasional food preparers, and those with more than 12 years of education) possessed knowledge of food safety issues similar to that of the sample overall, but lower rates of self-reported safe practices. Eighty-six per cent of respondents knew that hand washing reduced the risk of food poisoning, but only 66% washed their hands after handling raw meat or poultry. In addition, 80% were aware that serving steak on a plate that had held the raw steak increased the risk of food poisoning, but only 67% cleaned a cutting board after contact with raw meat or poultry. However, 67% knew that cooking meat until well done reduces the risk of food poisoning, and 71% served adequately cooked hamburgers at home. Thus, only two-thirds of the respondents used safe practices for these three food-handling principles, leaving one-third who did not. This is similar to the data in a recent UK National Food Safety Report, in which 40% of the respondents claimed to store food according to recommended practices and over half of the sample indicated that they did not follow food manufacturers' instructions for preparing and cooking food (Worsfold and Griffith, 1997b). Altekruse *et al.*, (1996) also found that respondents able to specify a food vehicle for the transmission of *Salmonella sp.* were more likely to report taking food safety precautions, suggesting that a basic knowledge of microbiology may motivate consumers to use safe food-handling practices. Johnson *et al.* (1998) showed that only 41% of elderly respondents of 65 years or older who lived at home purchased frozen foods without a clear appreciation of safe storage duration. Within a smaller sub-sample, knowledge of the

“use by” and “sell by” dates of food products was good but 45% of these respondents reported difficulty reading food labels.

3. Food safety practices

Personal hygienic practices are extremely important to ensure that the food produced is safe for the consumer. The respondents' responses in terms of eleven types of practices. It was found that respondents have extremely good personal hygiene practices whereby 96.6% maintained safe practices, such as wearing uniforms and caps. Most of the handlers (95.4%) washed hands after smoking, coughing, sneezing and majority of the respondents (75.9%) removed personal stuffs like watches, rings and jewelry that can contaminate foods while working. Similar results were demonstrated by [Çakiroglu and Uçar \(2008\)](#) that reported 82.9% of their staffs wore caps, masks and gloves while handling food and 84.2% indicated that they did not wear jewelry during food production. In a recent study [Abdul-Mutalib et al. \(2012\)](#) showed high practice levels of general sanitation measures. According to the [Codex Alimentarius Commission \(2003\)](#), improper food handling is a major cause of foodborne diseases and poor hand hygiene is an important risk factor in the occurrence of food contamination. Food handlers should always wash their hands at every stage of food production, particularly before handling foods, after eating, after touching contaminated materials, after using the washroom, etc. High percentage of respondents in this study said that they always wash their hands with soap and water after using toilets and handling wastes. [Sani and Siow \(2014\)](#) who reported around 86% respondents practicing good personal hygiene. [Codex Alimentarius Commission \(2003\)](#) stated that sick food handlers who are known or suspected of having any disease that might be transmitted by food are not allowed to work nor deal with foods.

4. Food safety attitudes

Attitude is also a crucial factor that may influence food safety behavior and practice, thus decrease the occurrence of foodborne diseases and other health hazards. Handling food safely is important to avoid contamination and diseases. High percentage (86.2%) of food handlers were also aware of the contamination caused by personal stuffs like watches, earrings and rings. Comparatively, [Zanin, da Cunha, Stedefeldt, and Capriles \(2015\)](#) found that almost 85% of their food staffs were aware of the danger in touching food with cut hands or fingers and almost 51.5% were aware of danger of wearing adornments. Most of the workers (85%) were aware about the fact that defrosted foods should only be refrozen once. According to [Sani and Siow\(2014\)](#), about 75% of the respondents were certain about refreezing defrosted food. Approximately 78.2% handlers keep raw and cooked food during storage, 82.8% respondents in this study mentioned that they would use separate utensils and cuttings

Chapter Two

Materials and Method

1.Area of the study ;

Four cafeterias in the college of veterinary medicine –sudan university of science and technology – Hailt kuku were randomly selected for the survey. After selection of cafeterias, a letter of consent was written to college administration seeking for approval to participate in the study. The chosen cafeterias provide foods in the form of snacks to their students such as cheese croissants, chips, chocolate and juice. These foods are usually served between 8 to 9 am.

2.Design of the study

The design of the study consisted of two sections. Section one was to observe food safety behavior of college students ,teachers and workers handling food in addition to the assessment of general conditions of cafeteria environment. The second section was designed to evaluate food safety knowledge and practices among students and teachers in the college.

3.Observation of food safety behavior in cafeterias

Observations were made about food safety practices and personal hygiene adopted by students and teachers during their breakfast snack. Conditions of facilities were also observed. In this part, four observable practices were used to evaluate temperature time control during storage and serving food. Seven elements were directed to personal hygiene of food handlers

and students. Two elements evaluated cafeteria design while utensils used for serving food were evaluated in two practices. Pest control method being applied was evaluated in three observable practices.

4.Assessment of food safety knowledge and practices ;

Based on the recommended food handling practices, a set of questionnaire was prepared and administered in college by a team of three female and one male students. The questionnaire consisted of demographic information, interest in acquiring food safety knowledge, attitude towards hand washing and adopted food-handling practices.

5.Statistical analysis;

The data were analyzed with SPSS software (Statistical Package for the Social Sciences, version 11.5, SSPS Inc and Chicago, IL, USA).

Analysis of variance (ANOVA) is a collection of statistical model used to analyze the difference among the group means and there associated procedure (such as "variation" among and between groups), developed by statistician and evolutionary biologist Ronald Fisher.

Chapter Three

Results and Discussion

As shown in Table 1, refrigeratable foods were held at 5°C or below only in 2 cafeteria (50%). With respect to cleanliness of refrigerators, 3 out of 4 cafeteria visited had unacceptable level of dirt in their refrigerators. Failure to keep food at the appropriate temperature and the inability to keep the refrigerators clean suggest that participants have limited knowledge about the relationship between temperature and microbial proliferation and cross contamination. This observation is in agreement with what have been reported by *Ovca et al. (2014)*. In a study to evaluate food safety awareness, knowledge and practices among students in Slovenia, the researchers reported that 57.2% of respondents do not pay adequate attention to the effect of temperature on microbial growth. When prepared food is not consumed immediately, considerable number of respondents in the above-mentioned study (48.8%) reported that they do not keep the leftover food in refrigerator. In the event that the leftover food is to be re-heated in the kitchen, the process is far from ideal and most of them do not do it to the recommended temperature (*Ovca et al., 2014*). In a previous study conducted by *JevŠnik et al., (2008)* to evaluate consumer awareness of food safety, it was found that 43.7% of

respondents do not know the temperature of their home refrigerator. From the data shown in Table 1, it is clear that 2 out of the 4 cafeteria selected do not keep refrigeratable food at right temperature. Although they have refrigerators, but three cafeteria do not keep refrigerators clean. With regard to availability of storage facilities, it was observed that 3 out of 4 schools visited were found to be storing foods in proper conditions. With respect to distance of food from the floor in store, table 1 showed that in 2 cafeterias, food is kept at least 6 inches above the ground level. However, there are 2 cafeterias which do not apply this practice. For personal hygiene, also about 62.5% of the people observed are washing their hands after using the toilet. However, there are 37.5% who do not adhere to this important practice. Even those who are doing it need to be trained on how to do it properly. For the evaluation of cleanliness of workers, results showed that 62.5% of them were not only wearing unclean uniform but also were not changing gloves and utensils when needed. This observation is relatively lower than what had been reported by *Santana et al., (2009)* who found that 86.7% of the workers in the schools who participated in their study failed to have proper personal hygiene practices and did not use hair restraints or proper uniforms. With respect to location and cafeterias-design (Table 1), four out of the eight schools visited had suitable location area which was free from unsanitary vicinity such as trash collection sites or exposed to roaming animal, pets and rodents. The other four schools were without proper location and exposed to various physical hazards. Similarly, the fixtures such as doors, windows and surfaces of working area in the cafeteria were not suitable in many schools. In a similar study conducted by *Santana et al. (2009)* in Brazil, the researchers found that the main food safety related problems of the schools were improper location, improper ventilation, free access by people who do not work in the cafeteria and areas of food contact

surfaces not properly cleaned. The researchers also observed that poor lighting and unprotected window screen against insects were part of the identified problems. In the schools visited, foods are served to students in dishes. Most of the time these dishes are not adequately clean to ensure that cross contamination is avoided. As an example, Table 1 showed that in four out of the eight schools visited, dishes were washed and dried in a proper way; however, there were four schools in which this activity was not a routine. Regarding the appropriateness of material used for making contact surfaces, results showed that 5 out of eight 75% of cafeteria do not have smooth benches that can be easily washed and maintained properly. For pest control system, results indicated that the pest control system adopted by these cafeterias is not robust enough to eliminate the potential source of pest invasion Table 1. In 3 cafeteria s out of the 4, evidence of the presence of pest is vivid. The proximity of some serving site of the cafeteria s to waste collection is also a real concern. In order to have a clear understanding about food safety knowledge and practice of the population under investigation, the present study investigated where these people eat their school meals during the break time. Results have shown that the majority of the respondents 60.3% eat their meal in school playground (Table 2). The college playground is an open place where students run and play during their break. The physical activity and big number of students moving around may expose the area to more dust and serve as a potential source of contamination. Therefore; from food safety point of view, the school playground may not be an ideal place to eat meal. The fact that majority of students eat their meal in an open place suggesting limited knowledge of food safety. In a study conducted by *Ovca et al., (2014)* in Slovenia to evaluate food safety awareness, knowledge and practice among students, it was found that only 65.8% of the students were able to give correct answers to the questions asked.

These questions fell within the range of self-reported knowledge of respondents in this study. In another study conducted by [Tan *et al.* \(2013\)](#) to assess hand hygiene knowledge, attitudes and practices among food handlers at primary schools in Hulu Langat district, Selangor (Malaysia), the researchers reported 85.4% of the respondents under study have good hand hygiene knowledge, which is a critical part in food safety. A population of 94% was reported for cross contamination, followed by personal hygiene with a population of 79.9%. For the frequency of occurrence of food poisoning in this study, 73% reported that they never had suffered from food poisoning while 26.8% said they had suffered from the problem before and this percentage was twofold of what had been reported by [Ovca *et al.*, \(2014\)](#).

With respect to source of information about knowledge of food safety, the majority of the respondents (80%) reported that they read article, magazine or books to enrich their food safety knowledge, which is a good practice. For the assessment of hand washing practices, results are presented in Table 3. A population of 96% of the respondents said they washed their hands after using a washroom. This value is much higher than what has been observed by the team of visitors who conducted this study(62.5%) (Table 1). To find out whether water and soap were used to washing hands, Table 3 showed that about 84% of the respondents confirmed that they used water and soap during hand washing. This value is comparable to what has been reported by [Hassan and Dimassi \(2014\)](#). In an assessment of Food safety and handling knowledge and practices of Lebanese University students, these researchers reported that 86.7% of the study population mentioned they wash their hands with water and soap. The proportion that uses only water to wash hands was 4.5% relatively lower than what has been found in this study (14.8%), (Table 3). When the respondents were asked to what extent, they have agreed

with the statement that meals should not be left more than four hours at room temperature, 74.6% of them agreed (Table 4). However, in reality, the percentage reported by [Abushelaibi *et al.* \(2015\)](#) is much lower than that. In an evaluation of the effect of person-in-charge training program which was conducted by the Dubai Municipality, the researchers found that when a similar question was asked to food handlers, only 35.4% of them were able to give correct answer. For proper keep up of food establishment, 95.2% of the people who answered the questionnaire of this study, they hate insects and cockroaches in particular in food serving areas. When asked where they keep food, only 42% of those who answered the questionnaire they kept food in refrigerator. The remaining 58% leaving their food on the counter in the cafeteria at room temperature. Considering the high temperature in the United Arab Emirates which sometimes reaches 48°C, this practice could be very dangerous resulting in disease causing microbial proliferation. With respect to food handling practices, the self-reported hand hygiene finding is shown in Table 4. As it can be seen, only 16.7% of food handlers wearing gloves while handling foods. This implies that more than 80% of them handle food with bare hands. Handling foods without proper gloves could be an important means of transmitting foodborne illness especially if hand hygiene practices are inadequate. In a similar study conducted by [Tan *et al.* \(2013\)](#) in Malaysia, who reported that more than 90% of the participants wore gloves when touching ready to eat foods. This percentage is much higher than what has been found in our study. Therefore, the need to educate people on hand hygiene knowledge and practices in our schools is evident. Like any other business, food sale is not same every day. Sometimes food prepared is not sold at the same day and is stored until used. Therefore, proper actions are needed to be taken to ensure food being sold to consumers is fit for consumption. In order to

have an idea about how food handlers manage the leftover food, the food sellers were asked what action they usually take when food is not all sold. The answers received showed that 65.3% of sellers throw away the remaining food while 26.5% of them give it free to students. Only 8.2% reported they store it for the next day (Table 4). Regarding the cause of food poisoning, the study investigated the understanding of college students and teachers about the major causes. The results are stipulated in Table 4. Here, it can be seen that people interviewed had different understanding about the causes of food poisoning. Some of them said exposing food to the external environment for long time is one of the problems associated with food poisoning. Others reported that inadequate cooking time or temperature is an issue. However, the majority of them 48.1% believed that contaminations and microbial agents like bacteria are the main causes. For the general comments on the meals that were being sold at the school, 86.3% of the people surveyed felt that meals were clean while 13.7% believed the meals were not clean enough. As far as the cleanliness of the serving windows are concerned, 46.7% thought the windows through which foods were served to students and teachers were clean while 53.3% held opposite view.

Table 1. Food safety and hygienic practices observed in the College of veterinary medicine – Hailt kuku .

| Observed practice | Yes | % of yes | No | % of no |
|--|------------|-----------------|-----------|----------------|
| (A)Temperature time control | | | | |
| Cold food held at 5°C or below | 2 | 50 | 2 | 50 |
| Refrigerator freed from dirt | 1 | 25 | 3 | 75 |
| Food stored in proper containers | 3 | 75 | 1 | 25 |
| Food is stored at least 6 inches off the floor | 2 | 50 | 2 | 50 |
| (B)Personal hygiene of workers | | | | |
| Hands washed after use of the toilet | 40.0 | 24.0 | 62.5 | 37.5 |

| | | | | |
|---|------|------|------|------|
| Workers wear clean and appropriate uniform | 24.0 | 40.0 | 37.5 | 62.5 |
| Gloves/utensils used/changed as needed | 24.0 | 40.0 | 37.5 | 62.5 |
| Worker observed washing hands as needed | 32.0 | 32.0 | 50.0 | 50.0 |
| Students wash their hands before and after meal | 40.0 | 24.0 | 62.5 | 37.5 |
| Worker take appropriate action when coughing or sneezing | 40.0 | 24.0 | 62.5 | 37.5 |
| Perfect conditions of hygiene, cleanliness and With suitable products for personal hygiene | 32.0 | 32.0 | 50.0 | 50.0 |
| (C) Cafeteria design | | | | |
| Suitable localization: Area free of unsanitary condition; absence of trash, old objects, pets, insects, animals, rodents. | 2.0 | 2.0 | 50.0 | 50.0 |
| Suitable door, windows: Smooth surface ,impermeable ,washable ,easy to clean | 2.0 | 2.0 | 50.0 | 50.0 |
| (D) Services | | | | |
| Dishes are dry and clean | 2.0 | 2.0 | 50.0 | 50.0 |
| Smooth surface, easy to clean and disinfect and properly maintained in good working order | 1.0 | 3.0 | 25.0 | 75.0 |
| Dishes are dry and clean | 2.0 | 2.0 | 50.0 | 50.0 |
| (E) Pest control | | | | |
| Screens are on open windows and doors in good condition | 3.0 | 1.0 | 75.0 | 25.0 |
| Evidence of presence of pest | 1.0 | 3.0 | 25.0 | 75.0 |
| Foods protected against waste, spit ,insects and rodents | 3.0 | 1.0 | 75.0 | 25.0 |

Table 2. Eating place, time and source of information of food safety knowledge in cafeterias

| Food safety knowledge | Score | % |
|---|--------------|--------------|
| Where are you eating your meal? n =110 | | |
| Class | 17 | 15.8 |
| School ground | 66 | 60.3 |
| Cafeteria | 10 | 8.9 |
| Teachers room | 17 | 15.1 |
| Total | 110 | 100.0 |
| When you eat your meal? n =110 | | |

| | | |
|---|-----|-------|
| 8-9 AM | 12 | 11.0 |
| 9-10 Am | 21 | 19.2 |
| 10-11 AM | 77 | 69.9 |
| Total | 110 | 100.0 |
| Have you ever read an article, magazines, or books on food safety? n = 110 | | |
| Yes | 88 | 79.7 |
| No | 22 | 20.3 |
| Total | 110 | 100.0 |
| Have you ever been suffered from food poisoning? n=110 | | |
| Yes | 29 | 26.8 |
| No | 81 | 73.2 |
| Total | 110 | 100.0 |

Table 3 . Hand washing attitude of students and teachers in cafeterias of college of veterinary medicine .

| Hand washing attitude | Score | % |
|--|--------------|----------|
| Do you wash your hands after coming out from toilet | | |
| Yes | 105 | 96.0 |
| No | 1 | 0.7 |
| Sometimes | 3 | 2.7 |
| Often | 1 | 0.7 |
| Total | 110 | 100.0 |
| Do you wash your hand with water only | | |
| Yes | 16 | 14.8 |
| No | 71 | 64.4 |
| Sometimes | 22 | 20.1 |
| Often | 1 | 0.7 |
| Total | 110 | 100.0 |
| Do you wash your hand with water and soap | | |
| Yes | 92 | 83.9 |
| No | 2 | 2.0 |
| Sometimes | 15 | 13.4 |
| Often | 1 | 0.7 |
| Total | 110 | 100.0 |

Table 4. Food safety knowledge of students, teachers and sellers in college of veterinary medicine

| Food safety knowledge | Score | % |
|--|--------------|--------------|
| Meal should not be left more than 4 h at room temperature | | |
| Accept | 82 | 74.6 |
| Do not Accept | 7 | 6.0 |
| I do not know | 21 | 19.4 |
| Total | 110 | 100.0 |
| Insects and cockroaches are food contaminants. | | |
| Accept | 104 | 95.2 |
| Do not accept | 4 | 3.4 |
| I do not know | 2 | 1.4 |
| Total | 110 | 100.0 |
| Meal handling practices | | |
| 6-7 AM | 7 | 6.1 |
| 7-8 AM | 9 | 8.2 |
| 8-9 AM | 94 | 85.7 |
| Total | 110 | 100.0 |
| Where do you store the meal? | | |
| Cafeteria | 62 | 56.1 |
| Refrigerator | 46 | 42.1 |
| Closet | 2 | 1.8 |
| Total | 110 | 100.0 |
| Do you wear gloves in the process of selling? | | |
| Yes | 18 | 16.7 |

| | | |
|---|-----|-------|
| No | 86 | 78.3 |
| Sometimes | 6 | 5.0 |
| Total | 110 | 100.0 |
| What action do you take on remaining meal? | | |
| Throw it | 72 | 65.3 |
| Give it to students | 29 | 26.5 |
| Store it for next day | 9 | 8.2 |
| Total | 110 | 100.0 |
| Response of students and teachers to the descriptive questions | | |
| What are the causes of food poisoning? | | |
| Uncovered food | 7 | 6.3 |
| Uncooked food | 4 | 3.8 |
| Expired food | 14 | 12.7 |
| Unclean tools | 7 | 6.3 |
| Bad storage | 15 | 13.9 |
| Personal hygiene | 8 | 7.6 |
| Contaminated food | 35 | 31.6 |
| Bacteria and microorganisms | 18 | 16.5 |
| No food control | 1 | 1.3 |
| Total | 110 | 100.0 |
| Comments about meals | | |
| Clean | 95 | 86.3 |
| Unclean | 15 | 13.7 |
| Total | 110 | 100.0 |
| Comments about serving | | |
| Clean | 51 | 46.7 |
| Unclean | 59 | 53.3 |
| Total | 110 | 100.0 |

Conclusion and recommendation

Conclusion

From the preliminary findings in the first part of the study, it can be noted that 37.5% of respondents did not wash their hands properly after using toilet. This revelation showed that proper personal hygiene is not adequately maintained in the school visited. For the evaluation of cleanliness of workers, it was found that 62% of those who serve food were not only wearing unclean uniform but also were not changing gloves as recommended. This finding also is another important setback that needs attention. With respect to cleanliness of refrigerators, the majority of the schools (75%) do not keep their refrigerators clean enough. For the second part, results showed that 60.3% of respondents were eating their meal in school playground. Utilization of playground for eating and physical activity simultaneously may expose the area to more dust, which serves as a potential source of contamination. For the appreciation of the importance of food safety, it was found that 87% of those who participated in the study appreciated the importance of food safety in maintaining good health, which means they are prepared to actively participate in future food safety intervention programs. Therefore, it can be concluded that there is a need of food safety intervention in the schools. The information gathers from this study suggests that, personal hygiene and keeping food at proper temperature

should be the points of focus in any future food safety intervention activity

Recommendation ;

1-People in college should be wash their hands after using a toilet.

2-The workers should be wear clean uniform.

3-The workers should be keep the refrigerators clean enough.

4- The food must be storage in proper temperature .

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