

Effect of Food Handling Habits on Food Safety in Catering Units in Public University in Kenya

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Abstract

Catering unit employees often washed hands after using the toilet, covered all cuts and burns, always kept their hands off hair, nose and open wounds and did not sneeze in the food areas. Food handling habits significantly influence and predicts food safety. The most important finding of the study is the empirical evidence about existence of statistically significant positive relationship between food handling habits and food safety. This could imply that public university catering units which enhance their food handling habits congruently are likely to increase food safety. However cases of lack of sealed polythene bags and stagnation of liquid waste due to blockage or careless handling were observed. This could explain the sporadic cases of diarrheal outbreaks that are at times reported in universities health units. Conclusively, there is a direct relationship between food handling habits and food safety in public university catering units.

Key words: Food Handling Habits, Food Safety, Catering Units and Public University

INTRODUCTION

Food is an important basic necessity; it is a critical contributor to physical well-being and a major source of pleasure (Rozin *et al.*, 1999). Consequently, its procurement, preparation and consumption are vital for sustenance of life. Over the years, increased cases of cholera, typhoid and diarrhea outbreaks continue to be reported world over. For instance, DeWall (1996) research findings revealed that, in June 1996, 38 people became ill from food contaminated with Salmonella served in a Wendy's restaurant in suburban Boston. Investigators were convinced that the outbreak was caused by employees who ignored proper food handling habits. Again, an outbreak of 95 cases of Hepatitis A was traced to an employee of a Taco Bell restaurant in Salt Lake City in 1995. Elsewhere, in June 1993 a Mexican restaurant in a Chicago suburb served Salmonella-tainted food that sent 25 people to the hospital and sickened 16 others. County investigators attributed the outbreak to prepared food not being held at hot enough temperatures, and to poor food handler hygiene (DeWall, 1996).

According to the latest WHO (2011) data, diarrheal disease deaths in Kenya reached 27,614 or 8.69% of the total deaths. That is a rate of 56.98 per 100,000 of the population. It ranks Kenya at number 41 in the world. Kenya National Statistics for cases of diarrhea indicate that in the year 2011, there were 1,194,167 under five

years, and 859,288 over five years, cases of diarrhea. In the year 2012, there were 1,176,967 under five years, and 904,224 over five years, cases of diarrhea, in Kenya. Most of these cases can be attributed to contaminated food. Some studies have demonstrated that foods play a great role than water in causing food borne infections such as cholera; many foods support the growth of *V. cholera* to disease causing levels and may protect the microorganism from gastric acidity (WHO, 2000). Cholera is endemic in many areas and eating leftover cooked foods and/ or rice meals are some of the reported vehicles of transmission within the African region.

Analyses of food borne disease notifications throughout the world have shown that the majority of outbreaks result from malpractice during food preparation in small food businesses, canteens, residential homes, and human food preparation places (Motarjemi and Mortimore, 2005). While it has long been considered that most cases of diarrhea in developing countries are waterborne, Keferstein (2006) asserted that it is a grave mistake to ignore the role of contaminated food hence the need to put together food safety with water and sanitation programs, as a strategy to thwart diarrhea. Food borne diseases are a global threat as a result of the increase in international travel and trade, microbial adaptation and changes in the food production system, as well as human demographics and behavior (Patil et al., 2005, Schlundt et al., 2003, WHO, 2002). Although numerous control strategies are in place, person to person disease transmission has not ceased. Catering units have become an integral part of University operations. As the number of students and staff increases, the number of diners also continues to escalate and so has the number of food borne illness outbreaks as a result of food prepared in food service operations. Food safety as observed by Scheule *et al.*, (2001) and Badrie *et al.*, (2006) remains a critical issue nowadays among professionals in the food service sector as well as among consumers.

Proper food handling is therefore an essential practice in food borne disease prevention. The Centers for Disease Control and Prevention identified food handling habits as the most important means of infection control in the health care industry (Boyce & Pittet, 2002). Because improper food handling habits are known to transmit diseases, a number of studies have examined food handling habits and attitudes of food workers towards food handling habits in hospitality industry settings. Extensive medical literature on the relationship between hygiene and nosocomial infections is available (Fendler *et al.*, 1998). Approximately 10 to 20% of food borne diseases outbreaks are due to contamination by handlers. Food that is not well handled and ignoring hygienic practices enable contact of pathogens with food which if survive in sufficient numbers cause illness.

According to Muhonja and Kimathi (2014) in Kenyatta National Hospital opportunities for contaminating food existed amongst all the sample food handlers mostly due to their negligence on some of the vital hygiene habits. Vital habits like

covering food, treatment of drinking water, washing hands with soap in running water, have also been compromised. Although the consequences of poor food hygiene and poor food handling habits can be very costly or even lethal as documented, research providing information on food handling habits at production (cooking), during service, as well as the general food handling habits is lacking. This study therefore aims to bridge this gap adding to knowledge in this area by studying food handling habits and food safety in public universities.

Poor food handling habits and unclean kitchen environments make good habitat for microorganisms which lead to illness, unhappy customers and even fines, summons and law suits, besides, food spoilage and raising food costs. Studies undertaken by Githiri *et al.*, (2009) indicate possible contamination of food served to patients by food handlers. In particular, there is a paucity of knowledge of food safety in special setting especially the university cafeteria that prepares meals for students and staff. The scope of burden and costs emanating from unsafe food remains unknown in Kenya (WHO, 2008). Statistics available in Kenya on food borne diseases are poorly analyzed and skimpy in documentation (Oloo, 2010). Moreover, there is no separate documentation in records of disease burden making it intricate to segregate the intensity of food borne diseases from other diseases. However, food borne diseases continue to burden the Kenyan population.

In the year 2008, 56 cases of diarrheal disease outbreaks were reported in Moi University, main campus, (Moi University Health Unit records). This could be attributed to improper food handling habits. The purpose of this study was to investigate the perceived effects of food handling habits on food safety in the Catering Units of Moi University. Food handling habits were categorized in terms of the different stages of the production cycle and also the food handling habits by the kitchen personnel. This study targeted food handlers because they are directly responsible for the hygiene of the food served in university cafeteria. This study investigated the perceived effects of food handling habits on food safety in Moi University catering units. It also tested a null hypothesis: There is no significant relationship between food handling habits and food safety in University catering Units.

LITERATURE REVIEW

Food Handling Habits

The prevention of food borne illness through being aware and practicing appropriate food handling habits must be stressed by establishment to employees. Pilling, Brannon, Shanklin, Howells and Roberts (2008) noted that the three most significant contributors to food borne illnesses in restaurants include time-temperature abuse, personal hygiene, and cross contamination. Such factors lead vulnerable members of the society such as the elderly, young children, people who are ill, people taking medication, and pregnant women to be highly susceptible and

more likely to contract a food borne illness from unsafe food. Daniels, *et al.*, (2000) assert that good food handling habits prevent food handlers from contaminating equipment with enteric pathogens which are otherwise transmitted through poor hand hygiene. Establishments that handle food must be knowledgeable and adhere to food handling habits that include proper hand hygiene and sanitation; it begins with the employees and their own personal hygiene. Good hygiene and food handling habits are the foundations upon which food borne illnesses can be prevented.

Insufficient food safety habits contribute to the transmission of food borne illness (Mitchel, Fraser, & Bearon, 2007). Food handling behaviors include: inadequate washing of hands, using cutting boards to cut fruits and vegetables after contact with raw meat and chicken, eating undercooked hamburgers and eggs, and eating raw oysters (Altekruse, *et al.*, 1999; Klontz, *et al.*, 1995; Li-Cohen & Bruhn, 2002; Morrone & Rathbun, 2003). Altekruse *et al.* (1999) pointed out that food mishandling is thought to be more acute among young adults and men. They ignore hazards associated with food borne illness because of the common misconception that food borne illness does not frequently occur in the home. Even if it does, it would affect just a small number of people and in most cases it would not be reported or detected by public-health surveillance system (Jay & Gvenlock, 1999).

Li-Cohen and Bruhn (2002) examined consumer handling of fresh fruits and vegetables on college students and concluded that they were more likely to practice risky produce handling behavior, compared to those with less formal education. According to Green & Selman (2005), the most common source of contamination is humans more specifically food contact with hands. This echoed the views of McSwane, Rue, & Linton (2003) that if those charged with food handling are not clean, the food can become contaminated. If the food handlers hands are contaminated with organisms from their gastrointestinal tract, they may transmit pathogens to food through hand contact with prepared food (Guzewich& Ross, 1999). As a result of transmission of pathogens from food worker hands to food contributes to spread of food borne illness outbreaks, it is crucial that food worker hand washing habits be improved (Green *et al.*, 2006). This therefore requires that personnel responsible for food handling be shown how to properly wash hands and at the appropriate instances of when to wash their hands. It is necessary to note that simply touching human skin can transfer *Staphylococcus aureus*, a dangerous bacteria causing Staph infection, from one surface to another; the simple action of touching human skin and then handling food can pass *Staphylococcus aureus* from skin to food making food potentially hazardous. According to the National Restaurant Association Educational Foundation (2004), to ensure proper hand washing, one must wet his/her hands under running water of at least 100°F, apply soap, vigorously scrub hands and arms for at least 20 seconds, clean under fingernails and between fingers, rinse thoroughly under running water of at least 100°F, then dry hands and arms with single-use paper towels. Personnel should not

be allowed at any time to think or be given the impression that gloves and gel hand sanitizer are adequate substitutes for washing one's hands with soap and hot water. Food handlers should therefore wash their hands frequently and in the proper manner. However, research has shown that as many as 60% of food handlers do not wash their hands properly or often enough (Roberts, 2008). In a study by Clayton & Griffith, (2004), on catering food safety, malpractices of hand hygiene were found to be frequent than those for cleaning surfaces, equipment and washing utensils. Furthermore, Clayton & Griffith's (2004) also found that after touching their face/hair and on entering the kitchen, food handlers poorly washed hands. Food handlers need to be made aware of the appropriate instances in which they need to wash their hands.

The FDA Food Code (2009) stated that food handlers should immediately wash their hands before engaging in food preparation and working with cooked food, clean equipment, and clean utensils. Food handlers should wash hands after touching bare human body parts, after using the restroom, after caring for or handling service animals or aquatic animals, after coughing and sneezing among other undesirable habits. As observed by the National Restaurant Association Educational Foundation (2004), Managers must train food handlers when and how to wash their hands properly, and then must monitor hand washing frequency. The Center for Disease Control and Prevention (2002) also recommended that vigorous hand washing with soap, performed consistently at appropriate intervals, is necessary to control the spread of all enteric pathogens. There is need for food workers to also consider hand care in conjunction with proper hand washing to help prevent the transmission of microorganisms.

A food handler should have short, clean fingernails while false fingernails should never be worn. False or acrylic fingernails trap debris and could become a physical hazard as they may lose their adhesiveness and break off into the food being prepared, thus contaminating the food and causing injury when eaten (WSDH, 2005). Fingernails harbor different types and amounts of bacteria. A 2007 study on public health implications of false fingernails in the food service industry found that artificial fingernails housed *Staphylococcus aureus*, *Escherichia coli*, *Proteus sp.*, and *Pseudomonas aeruginosa*. The study stated that out of 350 subjects, *Staphylococcus aureus* was found in 41.7% of participants, 7.4% of participants were found with *Escherichia coli*, 1.7% housed *Proteus sp.*, and 1.4% was found with *Pseudomonas aeruginosa* (Wachukwu, Abbey, Ollor, & Obilor, 2007). Another physical hazard that could contaminate food is nail polish. Nail polish is also forbidden as it can disguise dirt under the nails and may flake off into food (NRAEF, 2004). Food handlers must also be aware of cuts and abrasions since they could be likely sources of bacteria. Any food worker who has infected wounds on the hands should not work with food, touch utensils, or equipment as this can transfer harmful bacteria such as *Streptococcus A* and *Staphylococcus aureus* from the infected wound to food or equipment. An epidemiological study discovered a

food handler at a restaurant, who had been examined for severe cellulitis of the left hand, had prepared egg salad for a group of people. Food workers who have wounds or sores on the hands must wear finger cots or bandages to contain the wounds then place clean gloves on their hands to cover the bandages and protect food from any transfer of dangerous bacteria.

Cross-Contamination

One of the most common causes of food borne illness is cross contamination: the transfer of bacteria from food to food, hand to food, or equipment to food (Zain & Naing, 2002). Storing directly adjacent to or above ready-to-eat foods can cause cross contamination. A review by Djuretic, Wall, Ryan, et al. (1995) identified cross-contamination as an important contributory factor in 36.3% (147/405) outbreaks of food-borne disease. Allwood et al., (2004) and Ryan, et al., (1996) found that food preparers' hands contribute up to 39% of food borne illness outbreaks in domestic setups. To minimize cross contamination, cooked and ready-to-eat foods should be kept separate from raw products while shopping, preparing, and storing food items. Food preparation equipment such as knives, chopping boards and surfaces should be washed with soapy hot water after use. Use of separate cutting boards for uncooked meats, fish, or poultry, vegetables and cooked food such as bread should be stressed (Medeiros *et al.*, 2001).

When raw food products come in contact with any surface, piece of equipment, utensils, or even the foodservice employees' hands, those surfaces become contaminated with microorganisms. According to Roberts (2008), cross-contamination is the point where microorganisms are transferred from one surface to another. Cross-contamination can occur when raw contaminated ingredients are added to food that receives no further cooking; cleaning of surfaces are not well done; raw food-contact surfaces are not sanitized; raw food allowed to touch or drip fluids onto cooked food (NRAEF, 2004). However, contamination of food can be prevented as long as food handlers are trained to distinguish where microorganisms lie and how they are transferred.

Personal Hygiene

Personal hygiene is critical in preventing contamination of food and food borne illness. Consumers should wash their hands prior to preparing or consuming food and after using the toilet, changing diapers, and touching pets. Food items should be washed in running potable water just before cooking. Fruits and fresh vegetables should be washed before eating. Proper hand washing includes using water at a temperature of at least 100°F, applying enough soap to build a good lather, vigorously scrubbing hands together for a minimum of 20 seconds assuring that you scrub under your nails and between fingers, rinsing thoroughly under running water, and drying with a single use paper towel or warm air dryer (Snyder, 1998). Hand washing should always be completed after using the restroom; touching raw foods; touching hair, face or body; sneezing, coughing, or using tissue; smoking,

eating, or chewing gum; handling chemicals that are hazardous; handling kitchen trash; cleaning tables; touching cloths and anything else that may contaminate hands (National Restaurant Association Educational Foundation (NRAEF, 2004). Food safety relies on the roles of food handlers who may introduce pathogenic microbes to food during preparation, distribution and serving (Green *et al.*, 2007). Hence in such circumstances contamination and eventual health consequences are caused by food handlers (Kaferstein, 2003).

Research findings from the food industry suggest that hands may play the role of a vehicle in the transmission of enteric pathogens. Food handlers with poor personal hygiene (i.e. no hand washing) especially after visiting the restrooms pose the risk of carrying high loads of microbes such as *E. coli* and *S. aureus* on their hands (Shojoei *et al.*, 2006). Negligence and lack of knowledge among food handlers and consumers contribute to unhygienic practices (WHO, 2002). However, other studies have shown that improved knowledge of food hygiene practices does not always result to the required transformation in food handling behavior (Howes *et al.*, 1996a). Food handlers need to ensure a high level of personal cleanliness and wear the necessary protective clothing. People involved in food handling should refrain from smoking, spitting, chewing and sneezing or coughing over unprotected food. Personal effects like jewellery, pins and other adornments should not be brought into food handling areas. A food handler implicated to be a carrier of a disease illness should neither be allowed to go into food handling areas or handle food. Food handlers should undergo full medical examinations and issued with a certificate before being allowed to handle food. Training food handlers on hygiene practices is crucial in equipping them with the necessary knowledge and skills to handle food safely. Regular appraisals of the effectiveness of training and instruction activities should be made together with periodic supervision to enforce adherence to hygienic procedures (WHO, 2001). The source of an infecting organisms on food may be endogenous (i.e. the source is the patient's own flora) or exogenous (Jarvis, 2004).

In exogenous contamination, the source of food contamination includes the hospital staff or the inanimate environment within the hospital. Polluted water, insects such as rodents, flies, rats and cockroaches in addition to unclean utensils, dust and dirt are sources of food contamination (Gudeta, 2007). Equipment and containers that come into contact with food should be designed to enable easy cleaning and disinfection. The materials used for making the equipment should not have a toxic effect on food. Adequate facilities should be made available for the different core functions in food handling. The working area within the production area should be maintained clean to prevent contamination. All sinks, dish washing machines and other equipment should be so constructed to be easily cleaned and to be kept in good repair (WHO, 2001). Cross contamination cannot be ignored and underestimated as a concept in food safety. Raw food, particularly meat, should be successfully separated, either physically or by time, from ready to eat and cooked

foods, with transitional cleaning or disinfection where essential. Utensils, equipment and kitchen surfaces that are not cleaned well harbor and encourage spread of pathogens. Equipment and utensils used in the hospitals (e.g. aluminum plates) need to be cleaned with warm water and detergent followed by disinfection (Brougham, 1998). Suitable cooking procedures and recommendations need be observed in order to prevent the growth of pathogens (WHO, 2002). Furthermore, if food is not chilled or frozen during storage; and heated to temperatures between 70 and 80⁰ before consumption, then there are high chances of growth and subsequent ingestion of pathogens. Sufficient natural or artificial lighting should be enhanced to enable operations in a hygienic manner. Moreover, adequate means of natural or mechanical ventilation should also be provided. Ventilation systems are made in a way not to allow for air circulation from contaminated areas to clean areas (WHO, 2001).

METHODOLOGY

Moi University Catering Units was used for the study. Explanatory research design was adopted for the study. The target population was 220 employees with a sample size of 140 employees and 24 management staff working in the catering units. Census sampling, purposive sampling and simple random sampling techniques were used to select the Catering Units, management staff and employees as respondents respectively. Questionnaires, interview and observation schedules were used to collect data. Descriptive and inferential statistics were used to analyze the data collected.

RESULTS AND DISCUSSION

Food handling habits were measured using a nine item scale reflecting on food handling habits. The management and employees views were sought in order to establish their perception on effects of food handling habits on food safety. From the study a majority of the respondents reported that food handling habits are being practiced often or always as presented in Table 1. Majority of the employees rated habits they practiced always to include; hands are washed after using the toilet (78.4%), cuts and burns are well covered (70.9%), staff wear clean working clothes (70.1%), staff maintain short nails (67.2%), staff keep hands off hair, nose and open wounds (67.2%) and personnel do not sneeze in food areas (64.2%). The means scores were high (all above 4) and it was clear that the staff perceives highly their food handling habits.

Table 1: Catering employees' perception of food handling habits

Statement	Never	Rarely	Often	V.Often	Always	Mean
Staff maintain short nails	0.0	1.5	8.2	23.1	67.2	4.56
Hands are washed after using the toilets	0.0	0.7	8.2	12.7	78.4	4.69
Personnel do not sneeze in food areas	4.5	7.5	9.7	14.2	64.2	4.26
Burns and cuts are well covered	0.7	5.2	5.2	17.9	70.9	4.53
Staff don't work when they have coughs and colds	3.7	14.9	9.7	19.4	52.2	4.01
Staff change uniforms daily	4.5	4.5	15.7	20.1	55.2	4.17
Staff wear clean working clothes	0.7	3.0	9.0	17.2	70.1	4.53
Staff handle food as little as possible	4.5	6.7	11.2	20.1	57.5	4.19
Staff keep hands off hair, nose & open wounds	2.2	4.5	10.4	15.7	67.2	4.41

Managers' perceptions of food handling habits

Regarding food handling habits within the catering units, managers interviewed expressed satisfaction with the habits prevailing within their units. Majority (87.5%) managers provide appropriate refuse receptacles so as to manage waste and had adequate toilets that are always kept clean. In addition, an operational drainage system, storage of both cooked and uncooked food was done separately and employees practice basic hygiene practices.

Sanitary Facilities and Water Supply

The conditions of sanitary facilities and water supply were established during the study through observation schedule. Source of water in all the catering units was tap water. A tank for storage of water in shortage times was observed in six (85.7%) of the units. All the catering units have a flush type toilet and all the toilets were in working condition at the time of observation. The toilets in five (71.4%) of the units were clean and comfortable at the time of visit, no fly infestation was observed in any of the catering units and in all (100%), the hand wash basin provided for use after visiting the toilet is near the toilet.

Hypothesis: There is no significant relationship between perceived effects of food handling habits and food safety

Hypothesis postulated that there was no relationship between food handling habits and food safety in Moi University catering units. The F- ratio of food handling habits was 20.97 which was likely to happen by chance and was significant ($P < .05$). The model significantly improved the ability to predict the food safety. The regression coefficient indicated that there is a positive and significant relationship

between food handling habits and food safety in Moi University catering units. The hypothesis was not supported.

Relationship between Food Handling Habits and Food Safety

The study found that general food handling habits were being observed in the Moi University catering units. This was important since the regression results clearly indicated that food handling habits positively and significantly predicted food safety ($\beta = 0.648$, $p < 0.001$). In particular, it was found that the catering unit employees often washed hands after using the toilet; often covered all cuts and burns; always kept their hands off hair, nose and open wounds; and did not sneeze in food areas. These findings support a plethora of other findings which underscore the importance of food handling habits in the hospitality industry (Daniels, Bergmire-Sweat, Schwab, Hendricks, Reddy, Rowe, Fankhauser, Monroe, Atmar, Glass, & Mead, 2000; Parker, 2003; NRAEF, 2004; Sethi, 2008). The importance of good food handling habits has been corroborated in the laboratory where it has been shown that if food handlers become infected and/or equipment becomes contaminated with enteric pathogens, poor hand hygiene could transmit pathogens to customers (Daniels, Bergmire-Sweat, Schwab, Hendricks, Reddy, Rowe, Fankhauser, Monroe, Atmar, Glass, & Mead, 2000). Establishments that handle food must be knowledgeable and adhere to food handling habits that include proper hand hygiene and sanitation; it begins with the employees and their own personal hygiene. Good hygiene and food handling habits are the foundations upon which food borne illnesses can be prevented.

Findings regarding catering unit employees practice of washing hands before touching food items is consistent with the FDA Food Code (2009) which stated that food handlers should immediately wash their hands before engaging in food preparation and working with cooked food, clean equipment, and clean utensils. Food handlers should wash hands after touching bare human body parts, after using the restroom, after coughing, sneezing, using a handkerchief or tissue paper, smoking, eating or drinking, after handling dirty equipment or utensils, during food preparation, when removing soil and to prevent cross contamination when changing tasks, when working with either raw or ready food, before putting on gloves for working with food, and lastly, after engaging in other activities that contaminate the hands. In addition, finding regarding catering unit employees trimming of finger nails is as a result of the notion that false and acrylic fingernails can harbor significant types and amounts of bacteria. A 2007 study on public health implications of false fingernails in the food service industry found that artificial fingernails housed *Staphylococcus aureus*, *Escherichia coli*, *Proteus sp.*, and *Pseudomonas aeruginosa*. The study stated that out of 350 subjects, *Staphylococcus aureus* was found in 41.7% of participants, 7.4% of participants were found with *Escherichia coli*, 1.7% housed *Proteus sp.*, and 1.4% was found with *Pseudomonas aeruginosa* (Wachukwu, Abbey, Ollor, & Obilor, 2007). The National Restaurant Association Educational Foundation report of 2004 further

noted that another physical hazard that could contaminate food is nail polish. Dirt under nails can be disguised by nail polish and may flake off into food hence should be avoided.

According to the National Restaurant Association Educational Foundation (2004), food handlers must be aware of cuts and abrasions since they could be likely sources of bacteria. Any food worker who has infected wounds on the hands should not work with food, touch utensils, or equipment as this can transfer harmful bacteria such as *Streptococcus A* and *Staphylococcus aureus* from the infected wound to food or equipment. An epidemiological study discovered a food handler at a restaurant, who had been examined for severe cellulitis of the left hand, had prepared egg salad for a group of people. Food workers who have wounds or sores on the hands must wear finger cots or bandages to contain the wounds then place clean gloves on their hands to cover the bandages and protect food from any transfer of dangerous bacteria. According to Parker (2003), the principles of sanitation need to be applied right from the point of receiving food and other materials till the final product is cooked, served and tables cleared of waste or droppings. A strict check of quality of food will go a long way to provide a wholesome food to the customer. The quality particularly needs to be checked for every category of items, in terms of any signs of predisposing factors to contamination by microorganisms, accidental chemical additives due to pesticide residues or insect infestation.

CONCLUSION

Catering unit employees often washed hands after using the toilet, covered all cuts and burns, always kept their hands off hair, nose and open wounds and did not sneeze in the food areas. Food handling habits significantly influence and predicts food safety. The most important finding of the study is the empirical evidence about existence of statistically significant positive relationship between food handling habits and food safety. This could imply that public university catering units which enhance their food handling habits congruently are likely to increase food safety. However cases of lack of sealed polythene bags and stagnation of liquid waste due to blockage or careless handling were observed. This could explain the sporadic cases of diarrheal outbreaks that are at times reported in universities health units. Conclusively, there is a direct relationship between food handling habits and food safety in public university catering units.

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