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Title: Food Safety Knowledge, Attitudes and Practices among Post Graduate Students on the Hall of Residence at the St. Augustine Campus at the University of the West Indies

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**FOOD SAFETY KNOWLEDGE, ATTITUDES AND PRACTICES AMONG
POST GRADUATE STUDENTS ON THE HALL OF RESIDENCE AT THE
ST. AUGUSTINE CAMPUS AT THE UNIVERSITY OF THE WEST INDIES**

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PROGRAM: HUMAN NUTRITION AND DIETETICS

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ABSTRACT

OBJECTIVE- Few studies have been conducted on food safety among Postgraduate students. The objective of this study is to assess the food safety knowledge, attitudes and practices and determine the barriers to safe food handling practices of Postgraduate students on the Halls of Residence at the University of the West Indies, St. Augustine.

METHOD- The target population consisted of sixty Postgraduate students living at the two main Halls at the University campus. The students were given a self administered questionnaire incorporating questions of demographics, food safety knowledge and practices, food spoilage, sanitation, storage and thawing of meats, hand washing practices, food safety attitudes and food safety barriers on Hall.

RESULTS- It was found that the students have relatively little knowledge on temperatures but had known much more on food spoilage. The majority of respondents displayed proper sanitation practices and thawed their meat, poultry and fish products in the refrigerator using the correct procedures (90%). Most respondents did not display good hand washing practices, (53.3%) sometimes washed their hands with warm water and soap for twenty seconds before preparing food and eating. It was also found that (53.3%) sometimes purchase food from a vendor who does not display their food badge even though (53.3%) had known that the majority of food borne illness is a result of improper handling of foods in food service establishments. The majority (55%) viewed food safety as being extremely important at the Halls and (65%) would take the responsibility to obtain information on food safety.

CONCLUSION- Even though the sample size was limited, it emphasized the need for consumer and food safety education as it was highlighted in this study that there are gaps in food safety knowledge, attitudes and practices. Imperative food safety education is recommended to reduce the occurrences of food-borne illnesses.

1.0 INTRODUCTION

1.1 Background

Food safety is an increasingly important public health issue and has also emerged as an important global issue with international trade according to the World Health Organization (WHO)¹. They also stated that, Governments all over the world are intensifying their efforts to improve food safety. These efforts are in response to an increasing number of food safety problems and rising consumer concerns. The trend in food borne illnesses has been indicated with sudden increases in reported cases and outbreaks. The increase is due to improved reporting from countries and true increases in occurrence of cases.

Food safety has been described by WHO as, the conditions and measures that is necessary during production, processing, distribution and preparation of food to ensure that it is safe, sound, and wholesome as well as fit for human consumption. The responsibility for food safety is shared by everyone involved with food from production to consumption, including growers, processors, regulators, distributors, retailers and of course, consumers. Food and Drug Administration (FDA)² states that, food safety encompasses actions aimed at ensuring that all food is as safe as possible and that policies and actions cover the entire food chain. Food safety is described by WHO¹ as critical importance to the consumer, economy and the food industry.

Food safety is a scientific discipline describing handling, preparation, and storage of food in ways that prevent food borne illness. This includes a number of routines that should be followed to avoid potentially severe health hazards. According to World Food Programme (WFP)³, 'Food borne illnesses are described as diseases either infectious or toxic in nature and are caused by micro-organisms or agents such as chemical products, that enter the body through the ingestion

of food. Food borne diseases takes a major toll on health, millions of people fall ill and many die as a result of eating unsafe food.’ In developed and developing countries, food borne diseases are widespread and are a growing public health problem, (WHO).

Bacteria in food can pass along or spread a disease from person to person as well as serve as a growth medium for bacteria and cause food poisoning. There are two types of food poisoning, namely, food intoxication and food infection. Food intoxication results from consumption of poisons and toxins produced by bacterial growth in food. The toxins and not the bacteria, causes the illness. The flavor, appearance and odour of the food may not be altered by the toxins. Some common kinds of bacteria that produce toxins include *Clostridium perfringens*, *Clostridium botulinum* and *Staphylococcus aureus*.

Food-borne infection is brought about by bacteria in the food. When the bacteria become numerous and the food is consumed, the bacteria still continues to grow in the intestines and causes illnesses. *Listeria*, hemorrhagic *E. coli*, *Salmonella* and *Campylobacter* are a few of the bacteria that cause food infections. According to World Food Programme, in the year of 2000, 2.1 million people died from diarrheal diseases. A great proportion of these cases can be attributed to contamination of food and drinking water. The high prevalence of diarrheal diseases in many developing countries suggests major underlying food and water safety problems. According to, Surujlal and Badrie (2003)¹⁸, in their study on “Household consumer food safety in Trinidad,” it was indicated that the number of reported cases of food borne diseases reported by Caribbean Epidemiology Center (CAREC)⁴ in 2002 was 2597 and in 2000 and 1905 cases in 2001.

According to the Caribbean Epidemiology Center (CAREC)⁴ on a report concerning, food borne illnesses in the Caribbean, it stated that food and water borne diseases continue to be a very serious cause of human illness in the Caribbean, as reflected by the number of reported cases of gastroenteritis. With reference to, Jevsnik M, et al, (2006)⁶, “Food contamination creates an enormous social and economic burden on communities and their health systems.”

There is a great amount of food borne diseases and illnesses and this is due to the considerable amount of improper and unsafe practices in kitchens. In May 2010 WHO noted that, “Each day millions of people become ill and thousands die from a preventable food-borne disease. Even though food contamination can occur at any stage of the food production chain, a high proportion of food-borne disease is caused by foods improperly prepared or handled at home or in food service establishments." Many individuals do not understand the magnitude of control they have in their own kitchen to reduce the risk of contracting microbial food borne diseases and illnesses. In reality, food mishandling causes a highly expressive amount of food borne illnesses, and simple food safety practices can aid in avoiding the outbreak of a food borne disease.

With reference to Mead, et al (1999)⁷, in an article titled, “Food related illness and death in the United States,” it was reported that ‘More than 200 known diseases are transmitted through food.’ The causes of food borne illnesses include bacteria, viruses, toxins and metals. In the United States, food borne diseases have been estimated to cause 6 million to 81 million illnesses and up to 9,000 deaths each year. Food borne illnesses can cause symptoms like fever, vomiting, diarrhea, abdominal cramps and dehydration.

As indicated by WHO (2010)¹, Public Health Officials emphasize and highlight the severity of food borne illness, there is an imperative need to improve food hygiene and practices. This research is being carried out due to the severity and threat that a food borne disease can bring to human beings. Each individual has diverse attitudes toward food safety. At the University of the West Indies, the practice of proper hand washing practices is seldom observed. As a result, such behavior opens a window for a food borne illness. The researcher found it absolutely necessary to identify and recognize the students' knowledge, attitudes and practices to food safety so that an assessment can be made. The University of the West Indies, St Augustine has a total of 16,029 students at the campus for the academic year 2010/2011. (See Appendix A). From this number, 4,078 students are pursuing their Postgraduate degree.

1.1 Rationale

Little is known on the food safety knowledge, attitudes and practices among Postgraduate students on the Halls of the St. Augustine Campus of the University of the West Indies. Scientific research indicates that improper food handling and practices may lead to an increase of food borne illnesses and diseases. Due to the increasing incidences of food borne diseases worldwide, among college students as indicated in a study done at a major American University, by Abbot J. M, et al (2007)¹² on, "The comparison of food safety cognitions and self-reported food-handling behaviors with observed food safety behaviors of young adults," which resulted in the knowledge of these young adults on food safety is relatively limited as they carry out less than half of the recommended food safety practices. Therefore there is a need to investigate the factors that influence food safety knowledge, attitudes and practices of Postgraduate students. Understanding the factors that influence food safety knowledge, attitudes and practices will

provide valuable information for health organizations and officials to improve food handling and practices.

1.2 Research question- Food safety knowledge, attitudes and practices among Post graduate students on the Hall of residence at the St. Augustine Campus at the University of the West Indies.

1.3 Aim

The aim of this study is to evaluate the food safety knowledge, attitudes and practices of Postgraduate students on the Halls of Residence at the University of the West Indies, St. Augustine.

1.4 Objectives

- To assess the knowledge, attitudes and practices of the Postgraduate students towards food safety.
- To determine the barriers to safe food handling practices on the Halls of Residence.

2.0 LITERATURE REVIEW

The aim of the study is to investigate the knowledge, attitudes and practices of food safety among Postgraduate students on the Halls of Residence at the St. Augustine Campus at the University of the West Indies.

Food safety is a growing and serious public health issue. All over the world, governments are deepening their efforts to improve food safety. According to World Health Organization (WHO)¹, these efforts are in response to an increasing number of food safety problems and rising consumer concerns. The trend in food borne illnesses indicates sudden increases in reported outbreaks and cases.

In the Caribbean Epidemiology Center (CAREC)⁴ Annual Report 2008, it was stated that, food and water-borne diseases, especially gastro-enteritis, continued to be a major cause of illness in the region with the number of gastro-enteritis cases increasing from 93,852 in 2007 to 126, 405 in 2008. Salmonella has been the most commonly reported cause of food-borne disease illness and outbreaks in the Caribbean since 1985. During 2008, a total of 428 laboratory-confirmed Salmonella samples were isolated from 15 CAREC member countries. These pathogens included Non-typhoidal Salmonella, Shigella, Campylobacter, pathogenic Escherichia coli, Norovirus and Salmonella Typhi. The majority, more than 83% of Salmonella samples were from six countries, namely Barbados, Bermuda, Jamaica, St. Lucia, Suriname and Trinidad and Tobago. Four of these countries, Barbados, Bermuda, Jamaica and Suriname accounted for 86% of the reported cases.

Places in which outbreaks occurred included, restaurants, hotels, cruise ships, mass gathering events and day care centers. Suspected food sources included eggs, milk products, poultry, beef, pork, fish, pudding, souse, and fecal contaminated water and food. Laboratory surveillance data indicated that more outbreaks are occurring than are reported and many small family and community outbreaks go unnoticed and unreported.

With regards to an article on “Food safety knowledge and the safe food handling behaviours of male and female consumers” by Nevin Sanlier (2010)⁸, it was indicated that, “As a result of the failure to observe sufficient food hygiene rules, food borne illnesses occur amongst 50% and 87% of the world population. It has been estimated that as many as one in twelve people suffer from food borne diseases in the United Kingdom and the United States of America each year. A total of 84,340 and 77,515 cases of food borne diseases were notified in 1999 and 2000 respectively in Turkey. A 2003 WHO report, concluded that about 40% of reported food poisoning outbreaks in the European Region. There are 76 million cases of food borne illnesses leading to 325,000 hospitalizations and 5000 deaths annually in the USA.

Food borne illness can be severe or even fatal but milder cases are not often detected through routine surveillance. Many pathogens are transmitted through food, water or person to person. Some of the pathogens that are of greatest interest today are *Campylobacter jejuni*, *Escherichia coli*, *Listeria monocytogenes* and *Cyclospora cayetanensis*. Sporadic illnesses caused by pathogens are namely, *Bacillus cereus*, *Clostridium perfringens* and *Staphylococcus aureus*. In relation to a CAREC Surveillance Report (2010)⁴, during weeks 1- 40, laboratory-confirmed aetiologic reports received from countries and CAREC laboratory data indicated that there were

811 reported laboratory-confirmed samples of food and water borne related pathogens identified from humans. These pathogens, in order of frequency were Salmonella, Shigella and Campylobacter.

According to the article by Mead P. S, et al (1999)⁷ on “Food related illness and death in the United States,” it states that known pathogens account for an estimated 38.6 million illnesses each year, including 5.2 million (13%) due to bacteria, 2.5 million (7%) due to parasites and 30.9 million (80%) due to viruses. Excluding diseases caused by Listeria, Taxoplasma and Hepatitis A that typically cause non gastrointestinal illnesses, 38.3 million cases of gastroenteritis are caused by known pathogens and 13.6 million (36%) of these are to food borne transmission. Among all these attributable to food borne transmission, 30% are caused by bacteria, 3% by parasites and 67% by viruses. These food borne illnesses arise from a breach of food safety practices and this can be detrimental to a person’s health. Hence the reason why there is an urgent need for individuals to be aware of the correct food safety hygiene and practices.

Knowledge is associated with current practices, even though if it may be unsafe or incorrect. According to an article on, “Consumer attitudes, knowledge and behavior, a review of food safety issues,” done by Wilcock A, et al (2003)⁹, it was noted that the main reasons for food poisoning occurring in England and Wales during 1992 – 1996, were in appropriate storage, inadequate cooking or reheating and cross contamination. The article also outlined that 60% of food poisoning originates in the home and many consumers continue to believe that food safety responsibility lies in the hands of manufacturers and restaurants.

With regards to an article, “Food safety practices and dietary intake of female students in self-catering residences at the Cape Technikon,” done by Dorothea du Toit L (2004)¹⁴, an investigation on purchasing, storage, food preparation practices and dietary intake of students were done. Sixty students participated and to determine whether food practices were complied with food safety guidelines, a structured interview and direct observation using an observational checklist was used. The reported food safety behavior was compared with the observed behavior.

Results indicated that some but not all food safety guidelines were followed, positive and negative practices were observed. Students reported safe food purchasing guidelines and storing ingredients and leftover food items safely. General hygiene practices, for example avoidance of cross contamination between raw and cooked food items and personal hygiene practices, for example washing hands with soap and water were neglected. Students cooked food thoroughly but leftovers were not reheated sufficiently. Observed behavior was less positive than reported behavior. Significant differences were found between the observed and self reported behavior regarding the washing and drying of hands after handling raw meat, the use of the same knife for slicing raw and ready-to-eat food items and the use of the same chopping board for raw and ready-to-eat food items. With regards to causes of food borne disease, high-risk food items and cross-contamination students showed lack of awareness.

Studies were also conducted to assess the role consumers had to play in preventing food borne diseases. The article done by Kennedy J, et al (2005)²⁰ on “Consumer food safety knowledge,” conducted in Ireland, highlighted that consumers could be segmented based on their

food safety knowledge and practice and could also differ according to demographic and socio economic factors such as gender, age, educational level and economic status.

The Principal Component Analysis (PCA) and Hierarchical Cluster Analysis (HCA) were applied to data on food safety knowledge and practice, collected by face to face questionnaires with 1020 domestic food preparers. Based on their findings, the HCA identified three groups of consumers based on knowledge factors. These were the 'Conscientious' (21%), 'Cavalier' (25.4%) and 'Careful' (53.3%) food handlers. Pertaining to food safety knowledge, the Cavalier food handler group was the higher risk consumers. They were also involved in less hygienic food handling practices. Unlike the other two groups, this group were male respondents under 45 years of age, resided in urban areas, and had a higher level of formal education.

An article by Badrie N, Gobin A, Dookeran S, and Duncan R (2005)¹¹, based on "Consumer awareness and perception to food safety hazards in Trinidad, aimed at highlighting the gaps in food safety knowledge and improper food handling practices. A survey was conducted with 121 consumers who handle meat, to measure consumer's knowledge and practices in food safety in the Caribbean. The findings revealed that although consumers were aware of the correct safety practices, many still did not attribute certain illnesses to being food borne.

Most consumers felt that food safety was a very important issue at home while others felt it was not and there was no distinct food safety hazard which was most feared. Escherichia Coli and Salmonella were most known. The restaurant was regarded to be the most likely place where food poisoning could occur. Most consumers were not knowledgeable of the temperature of their

home refrigerator, using the thermometer to check safe internal temperature when cooking meats and cross-contamination. Gender had no influence on the responses.

An article by Abbot J.M, et al (2007)¹² on “The comparison of food safety cognitions and self-reported food-handling behaviors with observed food safety behaviors of young adults,” outlined a research consisting of 153 young adults attending a major American university. In a controlled laboratory setting, each prepared a meal under observation. Researchers observed their kitchen and completed an online survey assessing food safety knowledge, behavior and psychosocial measures. Descriptive statistics were generated for participants' self-reported food-handling behaviors, psychosocial characteristics, knowledge, food preparation observations and kitchen observations. Determinants of compliance with safe food-handling procedures while preparing a meal and food storage/rotation practices were identified using backward regression models.

Participants engaged in less than half of the recommended safe food-handling practices evaluated and correctly answered only two-thirds of the food safety knowledge items. They reported positive food safety beliefs and high food safety self-efficacy. Self-reported compliance with cross-contamination prevention, disinfection procedures and knowledge of groups at greatest risk for food borne diseases were the best measures for predicting compliance with established safe food-handling practices. From these results shown, it can be seen that the knowledge of these young adults on food safety is relatively limited as they carry out less than half of the recommended food safety practices.

In a study conducted by Brewer M.S, and Rojas M (2008)¹³, in the Department of Food Science and Human Nutrition, on Consumer Attitudes toward Issues in Food Safety, a survey

was done with four hundred and fifty persons face to face. The evaluation on consumer attitudes was done regarding the safety of the food supply, relating food safety concern levels with groups of specific items, regulatory issues and prioritization of food safety funding areas, and attitude and behaviors toward specific food safety issues.

It was seen that consumers are concerned about food safety issues, to the extent that they either reject foods or become willing to pay more to avoid the specific food safety concerns. Understanding factors such as pesticides, food borne illness, additives, livestock diseases and health issues are currently major consumer concerns. Consumers were also concerned about the inspection of imported goods and restaurant sanitation.

An article on “The Segmentation of US consumers based on food safety attitudes” by Kennedy J, et al (2008)¹⁵, explored the attitudes towards food safety and demographically characterized each segment so that effective risk communication strategies and outreach programs would be developed.

Factor analysis and hierarchical cluster analysis were applied to data on consumer food safety attitudes of a probability sample of US adults, collected by telephone questionnaires of 1014 persons. Segmentation of consumers attitudes was done on the basis of concern, trust, desire for a high level of regulation, acceptance for the number of people who are ill, hospitalized or die from food borne illness, and preference for the right to purchase foods that are not guaranteed to be safe. The consumer segments identified from these factors were classified as ‘confident,’ ‘independent,’ ‘trusting,’ ‘cautious,’ or ‘apprehensive’. Socio-demographic characteristics such as education, income, person with allergy in the household and person under the age of six living in the household varied significantly between each consumer segment.

With regards to an article done by Surujlal M et al (2003)¹⁸ on “Household consumer food safety in Trinidad,” questions were asked pertaining to demographic characteristics of eighty four respondents, reporting of food – borne illness, hand washing practices, purchase of foods, cooking, thawing and cooling of foods.

The study found that 52.4% experienced some form of food borne illness and only 23.85 of these persons seek medical treatment. If a food was found to be tampered or contaminated, most consumers did not report it to relevant authorities. Most respondents washed their hands with soap and water before preparation of meals, after handling raw foods and after using toilet facilities. The minority of persons purchased foods from vendors who did not display food badges. When consumers were asked whether they looked at food labels and expiry dates before purchase, 61.9% responded positively. A minority of the consumers did not separate cooked or ready to eat foods from raw foods but the majority thawed frozen foods at room temperature. A significant percentage of consumers allowed hot foods to be cooled at ambient temperature also.

Many food materials may be contaminated by pathogenic bacteria at almost every stage of the food production, processing, retail and service chain, placing consumers at considerable risks of contracting food borne illness. Knowledge about the risk of unsafe food handling practices is an essential element in preventing a food borne illness. A person’s behaviour is a good reflection of their knowledge or at least what they believe is important to maintain proper food safety practices. The data provided in this study will be indicative of food safety knowledge and food safety practices of the Postgraduate students on the Halls of Residence at the University of the West Indies, St. Augustine.

3.0 METHODOLOGY

3.1 Subjects / Participants

The aim of the study is to evaluate the food safety knowledge, attitudes and practices of Postgraduate students at the University of the West Indies, St Augustine. The sample consisted of sixty (60) respondents, twenty males (33.3%) and forty females (66.7%). The ages ranged from 18-35 years and over.

All Postgraduate students residing at the Sir Arthur Lewis' Hall (n=30) and Milner Hall (n=40) were identified to participate in the study. The participants were from various faculties on campus, namely the Faculty of Engineering (n=16), Humanities and Education (n=3), Law (n=1), Medical Sciences (n=2), Science and Agriculture (n= 10) and Social Sciences (n=28). Permission to conduct the study was granted by each Hall supervisor.

3.2 Study Design and Procedure

The study was conducted as a census using a questionnaire as the method of data collection. The questionnaire was self administered thus, there were no personal interviews in the study. The questionnaire was pretested prior to distribution with three Postgraduate and two Undergraduate students who did not live on the Halls. This was done to determine the wording and sequence of the questions to ensure clarity and validity. Adjustments were made to some questions so participants would better understand the questions. (See Appendix C)

The questionnaire consisted of forty three questions which were divided into sections such as –

- Demographic- the sex, age, ethnicity, faculty, degree / programme and nationality

- Knowledge – fifteen multiple choice questions testing the knowledge of the respondents in areas of food borne illness, awareness of food pathogens, food handling and food safety practices were asked. Students were asked to circle the answer of their choice.
- Attitude questions - fourteen attitude questions, nine had yes and no responses, four had always, most times, sometimes and never responses, one question respondents had to rank food safety as an issue on Hall and the other they had to choose who was most responsible for food safety, all were based on food safety attitudes.
- Practice questions – fourteen questions on food safety practices were included, thirteen were checklist list questions with one open ended question, seven were multiple choice, two yes and no questions and three always, most times, sometimes and never questions all pertaining to food safety practices and barriers to safe food handling practices on Hall.

The questionnaires were given to the Secretary's at each Hall on the 29th of March 2011, who assisted in giving them to the Hall representative living in the Hall who then distributed them to the respondents. The questionnaires were then collected on the 5th April 2011 at the Secretary's desk.

3.3 Statistical Analysis

Results were analyzed using the Statistical Package for the Social Sciences (SPSS) Software, version 12.0 for Windows. Cross tabulations as well as frequency and percentages of response in each category were computed.

Frequency and percentages distributions were utilized for each category and cross tabulations were used to compare gender and hand washing practices.

Fifteen knowledge questions were provided with a score of 0 – 15. Correct responses received one (1) point each, wrong responses received zero (0). The maximum score was fifteen (15).

4.0 RESULTS

The aim of this study is to evaluate the food safety knowledge, attitudes and practices of Postgraduate students on the Halls of Residence at the University of the West Indies, St. Augustine.

4.1 Demographic Characteristics

The demographic characteristics of the sixty respondents revealed that the majority consisted of 66.7% females (n=40) and 33.3% males (n=20).

The majority of the respondents 71.7% (n=43) were between the age group of 18-25, 26.7% (n=16) were between 26- 35 and 1.7% (n=1) were 35 years or older.

The ethnic composition of the sample consisted of 46.7% (n=28) African, 31.7% (n=19) East Indians, 0% Chinese, 16.7% (n=10) Mixed and 5% (n=3) were other.

The sample comprised of 26.7% (n=16) of the participants from the Faculty of Engineering, 5% (n= 3) from Humanities and Education, 1.7% (n=1) from Law, 3.3% (n= 2) from Medical Sciences, 16.7% (n=10) from Science and Agriculture, 46.7% (n= 28) from Faculty of Social Sciences.

The majority of the participants of 58.3% (n=35) were Trinidadian, 18.3% (n= 11) Jamaican, 3.3% (n=2) Bahamian, 11.7% (n= 7) St Vincentian, 3.3% (n=2) Guyanese, 1.7% (n=1) St Lucian, 1.7% (n=1) Surinamese and 1.7% (n=1) Martiniquan.

Table 1- The Demographic profile of respondents (n=60)

Characteristics	Categories	Frequency	Valid Percent
Sex	Male	20	33.3
	Female	40	66.7
Age	18 - 25	43	71.7
	25-35	16	26.7
	>35	1	1.7
Ethnicity	African	28	46.7
	East Indian	19	31.7
	Chinese	0	0
	Mixed	10	16.7
	Other	3	5.0
Faculty	Engineering	16	26.7
	Humanities And Education	3	5.0
	Law	1	1.7
	Medical sciences	2	3.3
	Science & Agriculture	10	16.7
	Social Sciences	28	46.7
Nationality	Trinidadian	35	58.3
	Jamaican	11	18.3
	Bahamian	2	3.3
	St. Vincentian	7	11.7
	Guyanese	2	3.3
	St. Lucian	1	1.7
	Surinamese	1	1.7
	Martiniquan	1	1.7

4.2 Knowledge on food borne illnesses

The majority of respondents 53.3%, eight males (n=8) and twenty four females (n=24) indicated that the cause of the majority of food borne illness, was improper handling of foods in restaurants or food service establishments.

Only 5% of the respondents, which was comprised of three females (n=3) reported that *Campylobacter* is the most common food borne bacterium.

With regards to the food that is associated with the most cases of food borne illness due to the *Salmonella* bacteria, 43.3%, eleven males (n=11) and fifteen females (n=15) indicated, raw chicken.

The majority, a total of 73.3% sixteen males (n=16) and twenty eight females (n=28) stated that cross contamination is indicated by raw foods coming into contact with cooked foods.

4.3 Knowledge on food safety and temperatures

Respondents which comprised of 33.3%, thirteen males (n=13) and seven females (n=7), indicated that the temperature a refrigerator should be maintained is 40 F (4.4 C).

With regards to the temperature leftovers are reheated before serving, 6.7%, both two males and females each (n=4) reported 165 F (73.9 C).

Respondents which comprised of 35%, seven males (n=7) and fourteen females (n=14) indicated that perishable foods can be left out of at room temperature for 2hours.

With regards to, how soon should perishable goods be refrigerated after purchase, 26.7%, six males (n=6) and ten females (n=10) answered immediately after purchase.

4.4 Knowledge on Food Spoilage

Respondents, 66.7% which comprised of eleven males (n=11) and twenty nine females (n=29) reported that you can tell when food is longer suitable for consumption by; it has molds, smells bad and tastes sour.

The response to, what would you do with leftover food at lunch, 65%, fourteen males (n=14) and twenty five females (n=25) selected, put it in the refrigerator right away.

4.5 Knowledge on Sanitation

With regards to, storage of canned foods, 100%, twenty males (n=20) and forty females (n=40) indicated, a cool dry cupboard and 50%, eleven males (n=11) and twenty one females (n=21) reported a plastic cutting board as being the safest.

Respondents, 91.7% eighteen males (n=18) and thirty seven (n=37) stated if a cutting board was used to cut raw meat and it was used to chop another food, it should be washed with soap and hot water and then sanitized.

Seventy five percent, 75% of the respondents, twelve males (n=12) and thirty three females (n=33), reported, hot water and soap then a sanitizing agent, should be used to clean a dirty kitchen counter.

4.6 Knowledge on storage and thawing of meats

With regards to, how are meat, fish and poultry stored in the refrigerator when thawing, 90%, seventeen males (n=17) and thirty seven females (n=37) selected in sealable containers at the bottom of the refrigerator so they do not drip onto other foods.

Table 2 and 3, and Graph 1 show a summary of scores for participants in the knowledge questions.

There were, seven males (n=7) and fourteen females (n=14) scored 0 – 49%, nine males (n=9) and twenty three females (n=23) scored 50-69%, four males (n=4) and three females scored 70-89% and zero respondents scored 90-100% in the knowledge questions.

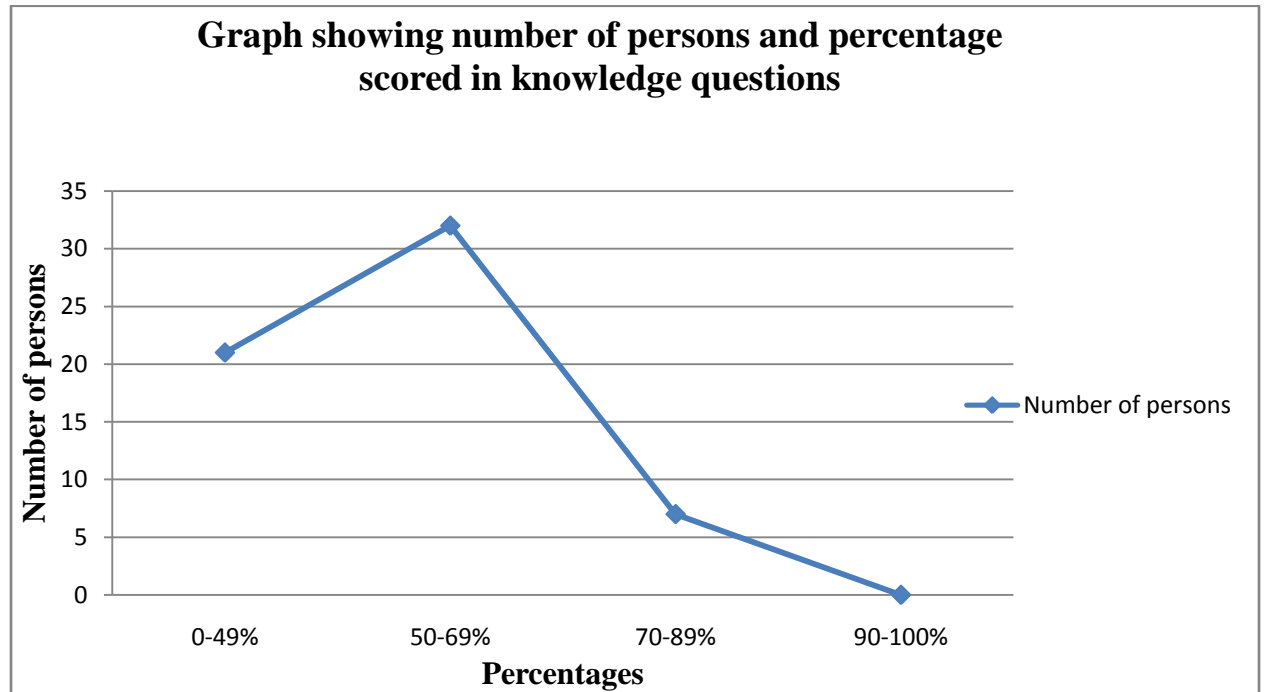
Table 2- Males and Females Scores for knowledge questions

Percentages based on correct answers for knowledge questions												
	20 %	27 %	34 %	40 %	47 %	53 %	60 %	67 %	73 %	80 %	87 %	Total
Male	1	0	1	1	4	4	4	1	2	2	0	20
%	1.7	0	1.7	1.7	6.7	6.7	6.7	1.7	3.3	3.3	0	33.3
Female	0	1	4	4	5	11	4	8	1	1	1	40
%	0	1.7	6.7	6.7	8.3	18.3	6.7	13.3	1.7	1.7	1.7	66.7
Total count	1	1	5	5	9	15	8	9	3	3	1	60
% of Total	1.7	1.7	8.3	8.3	15	25	13.3	15	5	5	1.7	100

Table 3- Summary of Male and Female Scores

<u>Males and Females Scores</u>				
%	0-49%	50-69%	70-89%	90-100%
Male	7	9	4	0
Female	14	23	3	0
Total	21	32	7	0

Graph 1- Scores of the Respondents based on number of persons and percentages



4.7 Attitudes towards Food Safety

Table 4(a) and Graph 2 shows respondent's attitudes to food safety.

The majority of respondents, 85% (n=51) indicated yes to seek medical treatment if they ever experience a food borne illness, 10% (n=6) said no and 5% (n=3) said they do not know.

With regards to considering spoilage of food a threat to food safety, the majority 93.3% (n=56) answered yes followed by 3.3% each (n=4) who both said no and do not know, respectively.

The majority 65% (n=39) indicated yes to take the responsibility upon themselves to get information on food safety, whilst 26.7% (n=16) said no and 8.3% (n=5) said they do not care.

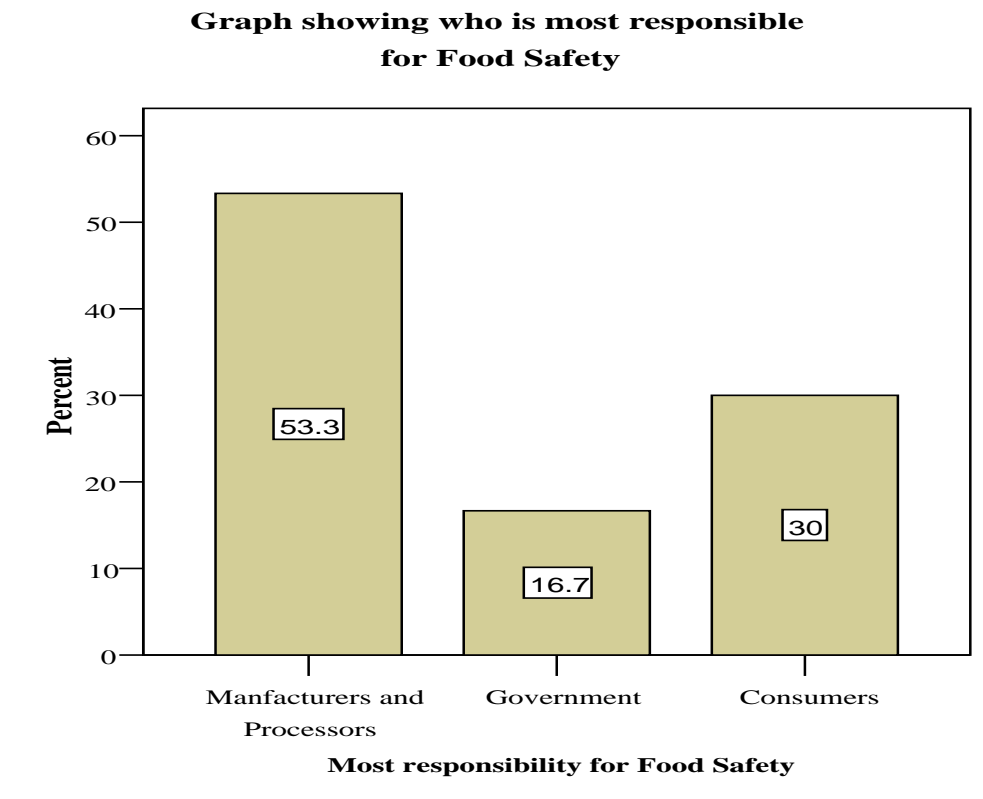
The responses to, who is the most responsible for food safety was indicated by the majority, 53.3% (n=32) who reported manufacturers and processors, 30% (n=18) suggested consumers whilst 16.7% selected government.

With regards to, ranking food safety as an issue on the Hall, 55% (n=33) indicated extremely important, 23.3% (n=14) said moderately important, 15% (n=9) stated fairly important followed by 6.7% (n=4) suggested not important.

Table 4(a) - Respondent's attitudes to food safety

<u>Questions and options</u>	<u>Frequency</u>	<u>Percent</u>
<u>If you ever experience a food borne illness would you seek medical treatment?</u>		
No	6	10
yes	51	85
Do not know	3	5
<u>Do you consider spoilage of food a threat to food safety?</u>		
No	2	3.3
Yes	56	93.3
Do not know	2	3.3
<u>Would you take the responsibility upon yourself to get information on food safety?</u>		
No	16	26.7
Yes	39	65
Do not care	5	8.3
<u>How will you rank food safety as an issue on Hall?</u>		
Extremely important	33	55
Moderately important	14	23.3
Fairly important	9	15
Not important	4	6.7

Graph 2 – Respondents view on who they thought is most responsible for food safety.



4.8 Attitudes on Food Safety Habits

Table 4(b) and Graph 3 shows respondent’s view on their attitudes towards food safety habits.

With regards to, usage of canned food item that has a dent or is bloated, the majority 55% (n=33) indicated never, 43.3% (n=26) said sometimes, 1.7% stated always whilst 0% said most times.

When asked if they will purchase food from a vendor who does not display their food badge, the majority 53.3% (n=32) said sometimes, 36.7% (n=22) stated never, 6.7% (n=4) indicated most times and 3.3% (n=2) said always.

Responses regarding the question, do you think bottled water is always safe, the majority 60% (n=36) indicated most times, 26.7% (n=16) for sometimes, 10% (n=6) for always and 3.3% (n=2) said never.

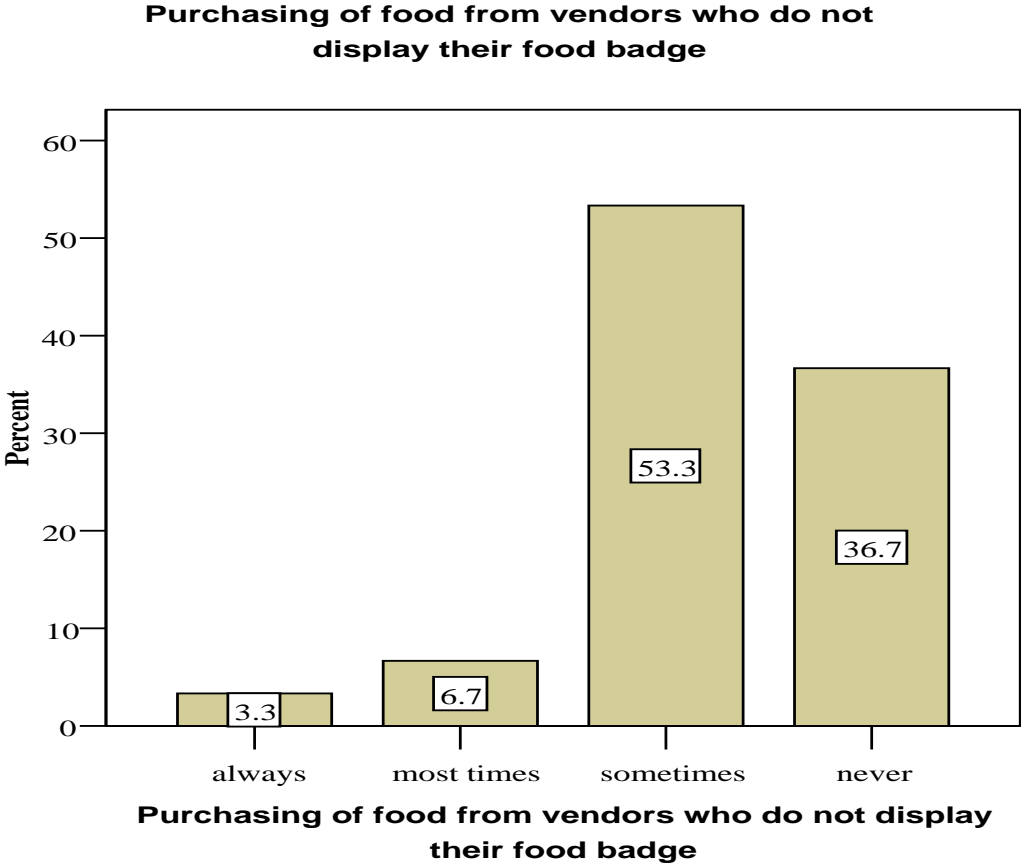
With regards to the question, do you check the expiry date on a food product when purchasing, 41.7% (n=25) said sometimes, 35% (n=21) indicated always, 20% (n=12) suggested most times followed by 3.3% (n=2) who said never.

Responses to the question, would you buy or use a food item after the expiration date, the majority 78.3% (n=47) indicated no, 15% (n=9) said yes and 6.7% (n=4) stated they do not know.

Table 4(b) – Respondents attitude to food safety habits

Questions and Options	Frequency	Percent
<u>Would you use a canned food item that has a dent or is bloated?</u>		
Always	1	1.7
Most times	0	0
Sometimes	26	43.3
Never	33	55
<u>Do you think bottled water is safe?</u>		
Always	6	10
Most times	36	60
Sometimes	16	26.7
Never	2	3.3
<u>Do you check the expiry date on a food product when purchasing?</u>		
Always	21	35
Most times	12	20
Sometimes	25	41.7
Never	2	3.3
<u>Would you buy or use a food item after the expiration date?</u>		
No	47	78.3
Yes	9	15
Do not know	4	6.7

Graph 3 - Respondents view on purchasing food from vendors who do not display their food badge.



4.9 Attitudes on food spoilage and food borne illness

Table 5 and Pie chart 1 shows respondents' attitudes towards food spoilage and food borne illness

With regards to the question on whether it is safe to consume cheese, fruits and vegetables if you cut the mold away, it showed that 50% (n=30) stated that it was not safe to consume whilst 36.7% (n=22) said it was safe and 13.3% (n=8) did not know.

When asked if cooking foods that have been left out of the refrigerator for three hours will destroy harmful bacteria, 40% (n=24) said yes whilst 38.3% (n=23) said no and 21.7% (n=13) said that they do not know.

Responses regarding the question whether freezing foods kills bacteria that can cause food poisoning, 65% (n=39) chose no and 21.7% (n=13) chose yes whilst 13.3% (n=8) chose they do not know.

Respondents were questioned if leaving pasteurized milk out of the refrigerator for two to three hours would be safe, 81.7% (n=49) indicated no, whilst 1.7% (n=1) said it will be safe and 16.7% (n=10) indicated that they do not know.

Table 5 – Respondents attitudes on food spoilage and food borne illness

Do you think that cooking foods that have been left out of the refrigerator for three hours will destroy any harmful bacteria?

Response	Frequency	Percent
No	23	38.3
Yes	24	40.0
Do not know	13	21.7
Total	60	100

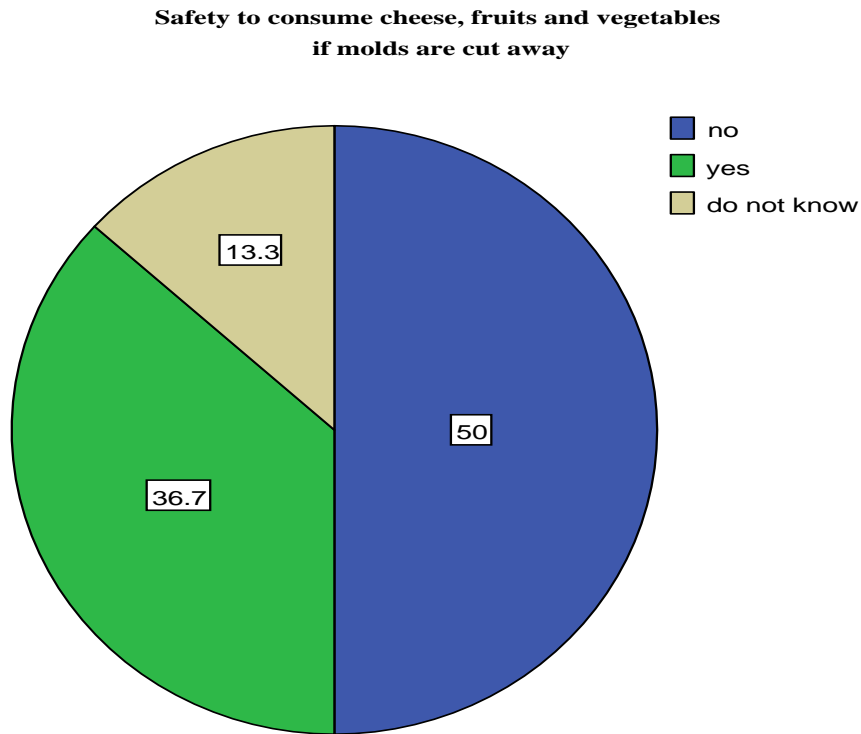
Do you think that freezing food kills bacteria that can cause food poisoning?

Response	Frequency	Percent
No	39	65
Yes	13	21.7
Do not know	8	13.3
Total	60	100

Would it be safe to leave pasteurized milk out of the refrigerator for 2-3 hours?

Response	Frequency	Percent
No	49	81.7
Yes	1	1.7
Do not know	10	16.7
Total	60	100

Pie chart 1- Respondents view on whether it is safe to consume cheese and fruits if molds are cut from it.



4.10 Food safety practices

Table 6 and Graph 4 shows respondents' views on food safety practices.

With regards to the question, which is the safest method to use when thawing frozen meat, poultry or fish products, 41.7% (n=25) answered correctly by indicating, place in the microwave, fridge or under running water, 25% (n=15) said set it on the kitchen counter, 20% (n=12) stated, place in the fridge or under

hot running water and 13.3% (n=8) selected, place in the microwave or under warm running water.

When asked, how are dishes washed on Hall, 41.7% (n=25) indicated, washed immediately with hot/cold water and soap and dried, 36.7% (n=22) answered correctly and stated immediately scraped, soaked, soaped and washed with hot/cold water and then dried followed by 20% (n=12) who selected, left to soak in the sink for several hours and then washed with soap in the same water and 1.7% (n=1) indicated washed with water only.

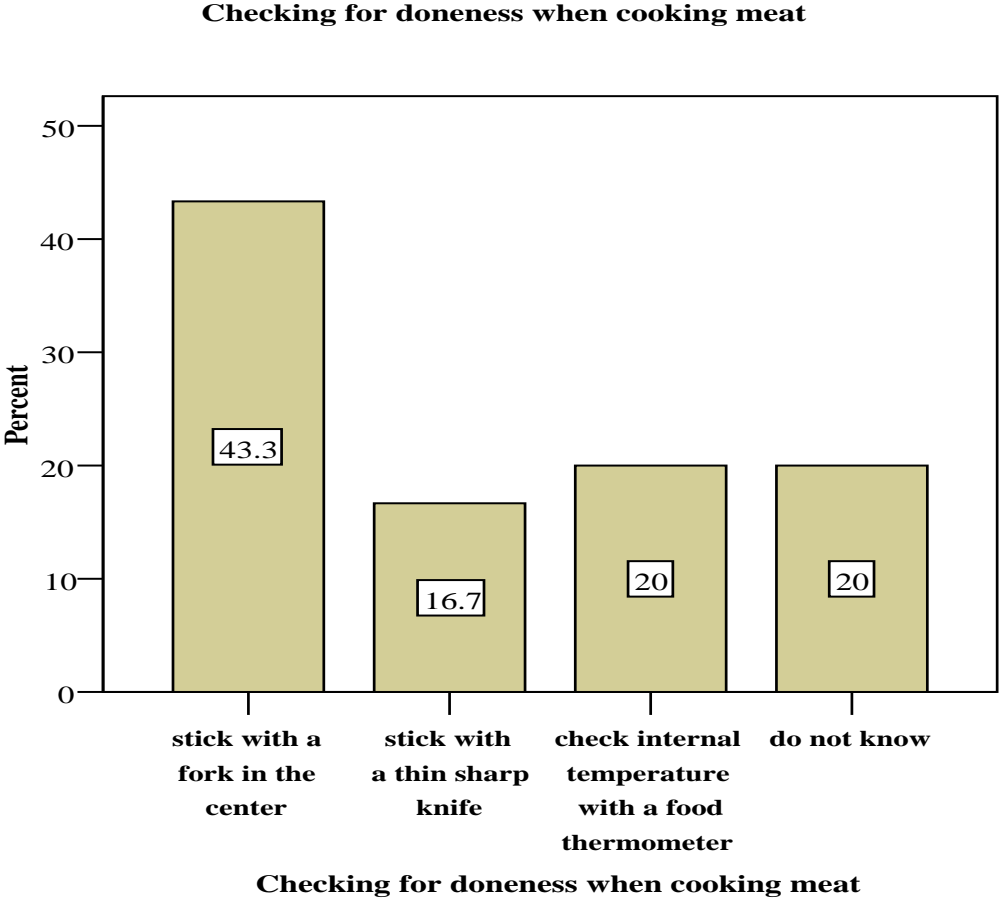
When questioned, on reheating leftovers, the majority 56.7% (n=34) answered correctly, they stated hot and steamy whilst 41.7% (n=25) indicated sufficiently warm, 1.7% (n=1) said eat cold, do not reheat and 0% (n=0) chose slightly warm.

Respondents were asked to indicate how they check for doneness when cooking meat, only 20% (n=12) chose the correct answer, check internal temperature with a food thermometer, 43.3% (n= 26) indicated stick with a fork in the center whilst 16.7% (n=10) stated stick with a thin sharp knife and 20% (n=12) said they do not know.

Table 6- Food Safety Practices

Questions and Options	Frequency	Percent
<p><u>Which are the safest methods you would use when thawing frozen meat, poultry or fish products?</u></p> <ul style="list-style-type: none"> ▪ Place in the microwave or fridge or under hot running water ▪ Place in the fridge, or under hot running water ▪ Place in the microwave or under warm running water ▪ Set it on the kitchen counter and cover properly with a kitchen towel. 	<p>25</p> <p>12</p> <p>8</p> <p>15</p>	<p>41.7</p> <p>20</p> <p>13.3</p> <p>25</p>
<p><u>When dishes are washed on the hall, they are</u></p> <ul style="list-style-type: none"> ▪ Washed with water only ▪ Washed immediately with hot/cold water and soap then dried ▪ Left to soak in the sink for several hours and then washed with soap and in the same water ▪ Immediately scraped, soaked, soaped and washed with hot/cold water and then dried 	<p>1</p> <p>25</p> <p>12</p> <p>22</p>	<p>1.7</p> <p>41.7</p> <p>20</p> <p>36.7</p>
<p><u>How do you reheat leftovers?</u></p> <ul style="list-style-type: none"> ▪ Slightly warm ▪ Sufficiently warm ▪ Hot and steamy ▪ Eat cold, do not reheat 	<p>0</p> <p>25</p> <p>34</p> <p>1</p>	<p>0</p> <p>41.7</p> <p>56.7</p> <p>1.7</p>

Graph 4 - Respondents view on checking for doneness when cooking meat



4.11 Hand Washing Practices

Table 7 shows hand washing practices by respondents.

A cross tabulation was done between gender and hand washing practices.

When respondents were asked on how often do they wash their hands when preparing food, nine males (n=9) and thirty one females (n=31) responded always, six males (n=6) and seven females (n=7) indicated most times, five males (n=5) and two females (n=2) stated sometimes whilst 0% said never.

Responses regarding the question on washing hands with warm water and soap for twenty seconds before preparing food and eating, four males (n=4) and ten females (n=10) indicated they did so always, three males (n=3) and eight females (n=8) indicated most times whilst eleven males (n=11) and twenty one females (n=21) stated sometimes and two males (n=2) and one female (n=1) chose never.

Table 7 – Respondents’ hand washing practices.

<u>Washing hands before preparing food</u>					
Options	Male	Female	Percent		
Always	9	31	66.7		
Most times	6	7	21.7		
Some times	5	2	11.7		
Never	0	0	0		
Total	20	40	100		
<u>Washing hands with warm water and soap for 20 seconds before preparing food and eating.</u>					
Options	Male	Female	Percent		
always	4	10	23.3		
Most times	3	8	18.3		
Some times	11	21	53.3		
Never	2	1	5		
Total	20	40	100		

4.12 **Barriers to proper food safety and sanitation practices on Hall**

Table 8 shows respondents response to barriers of food safety and sanitation practices on Hall. (See Appendix B)

Respondents were asked to indicate if they wash canned items before opening them, 35% (n=21) answered sometimes, 28.3% (n=17) said always, 25% (n=15) indicated never whilst 11.7% (n=7) stated most times.

With regards to the question whether there is a roster implemented for daily or weekly cleaning chores on their Hall, 53.3% (n=32) indicated no, 21.7% (n=13) responded to yes, and 25% (n=15) did not know.

When participants were questioned on how often is the stove and microwave cleaned after being used on Hall, 43.3% (n=26) said every seven days, 30% (n=18) stated once per day, 20% (n=12) indicated every two days whilst 6.7% (n=4) chose every four days.

Responses regarding the question on how often are garbage from the kitchen discarded on Hall, 71.7% (n=43) said once per day, 5% (n=3) indicated twice per day, 18.3% (n=11) chose every two days and 5% (n=3) responded to every three days.

Participants were also asked if they have proper and adequate kitchen cupboards on Hall to store their goods and utensils, 71.7% (n=43) suggested yes and 28.3% (n=17) indicated no.

The responses to the question asking how often is the kitchen sink, counter and floor cleaned and sanitized on Hall were, 38.3% (n=23) stated once per day, 21.7% (n=13) said every two days, 30% (n=18) chose every seven days whilst 10% (n=6) indicated every two weeks.

With regards to the question, how often is the refrigerator cleaned on Hall, 18.3% (n=11) indicated weekly, 25% (n=15) stated every three weeks, 25% (n=15) said every two months and 31.7% (n=19) chose every four months.

Respondents were asked to indicate if there are any challenges encountered on Hall to maintain proper food safety handling practices and their responses were, 5% (n=3) said there was a lack of space in the refrigerator, 1.7% (n=1) said unclean manner of the kitchen counter, 1.7% (n=1) suggested that there was a need for hand sanitizers in the kitchen followed by 1.7% who said the refrigerator needs to be repaired and 1.7% (n=1) suggested that there needs to be more space in the kitchen area. The majority 88.3% (n=53) did not give any responses to this question.

5.0 DISCUSSION

The aim of this study is to evaluate the food safety knowledge, attitudes and practices of Postgraduate students on the Halls of Residence at the University of the West Indies, St. Augustine.

It was observed from the results that the majority of respondents were knowledgeable on food borne illnesses. The results showed that, 55.3% knew the cause of the majority of food borne illnesses. It was highlighted that the majority of respondents indicated improper handling of foods in restaurants (53.3%), 18.3% by the manufacturer, 16.7 % by the consumer and 11.7% who did not know. Likewise in a study conducted by Badrie N. et al (2005)¹¹, when consumers were asked where food poisoning would occur, most felt at restaurants (55%) while other indicated homes (20%), hospitals (19.5%) and street vendors (5.5%). Respondents, 43.3%, reported appropriately for the food associated with Salmonella bacteria and 73.3% for indication of cross contamination. According to Surujlal et al, (2003)¹⁸, in a similar Australian survey, 49% of the respondents knew the meaning to the term cross contamination.

However they seemed unknowledgeable of the most common food borne bacterium, only 5% reported Campylobacter whilst the majority 43.3% reported Salmonella and 25% for Escherichia Coli. According to the Centers for Disease Control and Prevention (2002)²³, in Massachusetts, there have been 719 cases in 2009 and 766 cases of salmonella reported in 2010. Likewise in a study done by Badrie et al (2005)¹¹, most consumers had heard of Escherichia Coli (89.7%) and Salmonella (85.7%). A study done by Ellis et al, (2003)²¹ in

Iowa in the United States, with students, showed that the majority heard of Escherichia Coli 90.2% and Salmonella 89.9% but very few 4.8% students were aware of Campylobacter.

From the results it was seen that few respondents were knowledgeable on food safety and temperatures. The results from the question that were answered correctly showed that only 33.3% knew the temperature the refrigerator should be maintained. Likewise in a study conducted by Badrie et al, (2005)¹¹, 65.3% did not know or have measured the temperature of their refrigerator

From this study 26.7% knew how soon perishable goods should be refrigerated after purchasing, 35% knew for the length of time perishable goods can be left out of room temperature and an alarming 8.3% for temperature of reheating leftovers. As a result of this lack of knowledge, potential hazards can be brought to food as they should not be of temperatures in the danger zone (40 °F – 140° F).

With regards to the questions relating to knowledge on food spoilage, respondents answered more appropriately in terms of, 65%, indicated refrigerating leftover food at lunch and 66.7% reported when foods is no longer suitable for consumption it has molds, smells bad and tastes sour. According to Fleet et al, (2009)¹⁶ consumers should never buy outdated food and need to be alert to abnormal odour, taste, and appearance of a food item.

Sanitation has a major role to play when ensuring food safety. From the results shown, it was seen that the majority of respondents have relatively good sanitation practices. This was seen in both the male and female population, in which 100% of the respondents chose a cool dry cupboard to store canned foods, 50% indicated a plastic chopping board as the safest to use, 91.7% washed their cutting boards with soap, hot water and sanitized after cutting fish and

poultry and 75% for cleaning the kitchen counter, with hot water, soap and a sanitizing agent. It is recommended that that cutting boards should be sanitized by using 5ml (1 teaspoon) of chlorine in 1 quart of water.

The majority of respondents were knowledgeable on storage and thawing of meats, In relation to storage of meat, fish, and poultry when thawing in the refrigerator, 90 % of the respondents did the correct procedure by putting it in sealable containers and putting it in the bottom of the refrigerator so they do not drip onto other foods.

Regarding respondents attitudes to food safety, interest to seek medical treatment if experiencing a food borne illness, the majority 85% of persons indicated yes. According to Surujlal M et al, (2003)¹⁸, illness resulting from food borne disease is defined as a disease of an infectious or toxic nature caused by the consumption of food or water. However, in contrast, a study done by the same authors, only 23.8% said they would treat medical treatment. With regards to, spoilage of food, 93.3% reported yes it is a threat to food safety, and 65% indicated responsibility upon themselves to get information on food safety.

With regards to who they deem most responsible for food safety, the majority of respondents 53.3% indicated manufacturers and processors. Similarly, in a United Kingdom Survey by Henson et al, (1999)²⁵, it was found that when consumers were asked who were responsible for ensuring that the food eaten was safe, it was perceived to be the primary responsibility of the food manufacturer.

The attitudes of the respondents, ranking food safety on Hall were determined and it was seen that the majority 55% indicated food safety is an extremely important issue. However, in a study done by Wilcock et al, (2003)⁹, it was indicated that in studies conducted on

consumer attitudes towards food safety in the third world countries suggests that this issue may not be of as much interest. This reduced interest towards food safety may be due to a lack of consumer education and training and a low consumer impact on food safety.

With regards to attitude on food safety habits, it was seen that the participants were somewhat knowledgeable, 55% reported, never to using a canned food item that is dented or bloated. However, 53.3% would sometimes purchase food from a vendor without a food badge. Likewise in a study conducted by Surujlal M et al, (2003)¹⁸, 35.7% of the consumers bought food “sometimes”. The majority 60% of the respondents also indicated that they think that bottled water is always safe.

Regarding, the expiry date on a food product when purchasing, 41.7% indicated sometimes and 35% reported always. In contrast, in a study conducted by Surujlal et al, (2003)¹⁸, it was found that 61.9% always checked for expiry date while 33.3% of the consumers would sometimes check. With regards to the use a food product after the expiration date 78.3% indicated no. Regarding a study done by Unklesbay et al, (1998)¹⁹, in a survey, it was also found that, college students in the United States usually discard foods that have passed the expiration date.

With regards to the questions concerning, attitudes towards food spoilage, respondents showed some intelligence, safety of consuming cheese, fruits and vegetables if the mold is cut off (50%) indicated no, if cooking foods that have been left out of the refrigerator for three hours destroys harmful bacteria (40%) reported yes, safety of leaving pasteurized milk out of the refrigerator for two to three hours (81.7%), stated no and freezing of food that destroys bacteria, only 21.7% implied yes.

Respondents were also knowledgeable in their food safety practices. According to the study by Badrie et al (2005)¹¹, it was stated that foods should never be thawed or stored on the counter or defrosted in hot water and most respondents are aware of that safety practice. 41.7% suggested place in the microwave, fridge or under running water.

In addition, the practice of scraping, soaking and washing and drying their dishes were practiced by 36.7% of the respondents. With regards to reheating food, 56.7% reported hot and steamy. However it was seen that only 20% used the correct method for checking doneness when cooking meat. According to Badrie N. et al (2005)¹¹ most consumers 87.5% never use a thermometer to check the safe internal temperature when cooking meat. To evaluate the doneness when meat is cooked, most consumers visually use colour.

Pertaining to hand washing practices, when asked about washing hands with warm water and soap for twenty seconds before preparing food and eating an appalling 53.3% said they did so sometimes, 23.3% indicated always, 18.3% said most times and 5% said never. According to a study done by Ansari S. et al, (2003)²², it was stated that poor hand washing practices can lead to bacterial and viral pathogens being retained on the hands after handling raw produce or toilet activities. Therefore it is necessary to practice proper hand washing techniques at all times in order to prevent the outbreak of a food borne illness from occurring. From these results, there is the possibility that a food borne illness can occur with the respondents who do not practice proper hand washing all the time.

Pertaining to barriers to proper food safety and sanitation practices on hand, with regards to washing of canned items, the majority of participants, 35% said sometimes, 28.3% indicated always, 25% stated never followed by 11.7% who chose most times. 53.3%

indicated that there is no roster implemented for daily or weekly cleaning chores, 21.7% said yes whilst 25% did not know. With regards to the stove and microwave being cleaned after using, 43.3% said every seven days, 30 % stated once per day, 20% chose every two days and 6.7% indicated every four days.

The majority of participants 71.7% also indicated that garbage is discarded once per day from the kitchen. Regarding the question if there were adequate kitchen cupboards to store goods and utensils 71.7% answered yes and 28.3% said no. 38.3% indicated that the kitchen sink, counter and floor were cleaned and sanitized once per day on the halls, whilst 30 % said every seven days, 21.7% said every two days and 10% said every two weeks.

When asked how often the refrigerator is cleaned on halls, 31.7% said every four months, 18.3% said weekly, both 25% indicated every two months. The majority of persons did not respond to the question when asked if there are any challenges encountered on the Hall to maintain proper food safety practices however some said the main problem was that there was a lack of space in the refrigerator. Students need to improve and maintain proper food safety practices where lacking.

Although restaurants and hotels are most frequent cited sites of outbreaks of food borne diseases, it has been suggested that food borne illness is initiated in private homes three times more frequently and is due to inefficient refrigerator management. Failure to follow correct refrigerator maintenance, poses a number of risk to consumers. To prevent a food borne illness, a refrigerator has to be cleaned twice a week. Refrigerators accounts for 28% of outbreaks of domestic food borne illnesses. (Jackson V. et al 2005)²⁶

5.1 Limitations

The limitations encountered when conducting this study are –

1. The respondents consisted of more females (40%) than males (20%). This can be bias in the study as the population of the males was smaller.
2. The sample consisted of only 60 participants as a result such a small sample size may not be representative of the Postgraduate population at the University.
3. Only one Law student was surveyed in this study, this was not representative of the entire Law faculty.
4. Few studies were conducted with regards to food safety, knowledge, attitude and practices among Postgraduate studies at the University of the West Indies.
5. When collecting data, respondents may have given socially desirable choices which may or may not have been the truth.
6. The respondents may have interpreted questions differently.
7. Limited time frame for planning and preparation for this study.

5.2 RECOMMENDATIONS

The following recommendations are suggested:-

- There should be implementation of effective education programmes directed to microbial, physical and chemical risks which are associated with poor food handling practices.
- There can be a food safety awareness day on campus where health educational material on food safety can be distributed and skits can be done on the importance of food safety. This programme should be done in order to hold students' attention as well as make them aware so they would not take food safety for granted and they can also learn common food safety practices such as proper hand washing and sanitation practices.
- There can also be food safety education training programmes and lectures based on good hygiene and food handling practices, agents and factors which causes food borne illnesses, for example cross contamination as well as principles of Hazard Analysis and Critical Control Point system.
- Brochures on food safety can be strategically placed where students can have access to them such as in the front desk on the Halls, main office in each faculty, at administration office or at the Health Center on campus.
- The media can also be used to motivate and sensitize both male and female students on the consequences of food borne illnesses.
- The sample size could have been increased; it limited the study's validity. A larger sample would have allowed the researcher to generalize findings to a wider population. This would have allowed the study to give a better representation of the students' knowledge, attitudes and practices towards food safety.

6.0 CONCLUSION

The results of this study have highlighted gaps in food safety knowledge, attitudes and correct food safety practices with the Postgraduate students. Although there was a high response ranking food safety as extremely important, the attitude towards taking the responsibility of food safety onto their hands was poor.

The majority of persons also indicated that they would take the responsibility of getting information on food safety. Both males and females should be targeted for food safety education programmes.

The prevalence of food safety controversies is increasing as the food supply changes and technology becomes more sophisticated. Developing effective food safety education for young adults is critical, given their future roles as caregivers, likely to be preparing food for populations who may be at greater risk for food borne diseases. An improvement in food handling can lead to reducing morbidity and mortality due to food borne diseases.

There is definitely a need for public food safety education by planning education intervention programmes for students in order to improve their knowledge, attitude and practice towards food borne illness and food safety.

7.0 APPENDICES

APPENDIX A

Total students enrolment for the Academic year 2010/2011

<u>FACULTIES</u>	<u>NUMBER OF POSTGRADUATE STUDENTS</u>
ENGINEERING	857
GENDER AND DEVELOPMENT	19
HUMANITIES AND EDUCATION	811
MEDICAL SCIENCES	290
SCIENCE AND AGRICULTURE	473
SOACIAL SCIENCES	1626
THE UWI SEISMIC RESEARCH	2
TOTAL	4078

APPENDIX B

Table 8 – Responses to barriers and food safety and sanitation practices on Hall

Questions and Options	Frequency	Percent
<u>Do you wash canned items before opening them?</u>		
Always	17	28.3
Most times	7	11.7
Sometimes	21	35
Never	15	25
<u>Is there a roster implemented for daily or weekly cleaning chores on your Hall?</u>		
No	32	53.3
Yes	13	21.7
Do not know	15	25
<u>How often is the stove and microwave cleaned after used on the Hall?</u>		
Once per day	18	30
Every two days	12	20

Every four days	4	6.7
Every seven days	26	43.3
<u>How often is garbage from the kitchen discarded on the Hall?</u>		
Once per day	43	71.7
Twice per day	2	5
Every two days	11	18.3
Every three days	3	5
<u>Do you have proper and adequate kitchen cupboards to store goods and utensils on Hall?</u>		
No	17	28.3
Yes	43	71.7
<u>How often, the kitchen sink, counter and floor are cleaned and sanitized on Hall?</u>		
Once per day	23	38.3
Every two days	13	21.7
Every seven days	18	30

Every two weeks	6	10
<u>How often is the refrigerator cleaned on your Hall?</u>		
Weekly	11	18.3
Every three weeks	15	25
Every two months	15	25
Every four months	19	31.7
<u>Are there any challenges you encounter on Hall to maintain proper food safety handling practices?</u>		
No response	53	88.3
Lack of space in the refrigerator	3	5
Unclean manner of kitchen counter	1	1.7
Need for hand sanitizers in the kitchen	1	1.7
Refrigerator needs repairs	1	1.7
Space in the kitchen area	1	1.7

APPENDIX C

FOOD SAFETY QUESTIONNAIRE GIVEN TO THE RESPONDENTS

FOOD SAFETY QUESTIONNAIRE

Dear Respondent,

This survey is being carried out to examine the food safety knowledge, attitudes and practices of Postgraduate students. You are kindly asked to answer the questions honestly and truthfully. You are not required to write your name or student ID number and all information will be kept confidential.

**Thank you,
Yours respectfully,**

Giana Zama

Sex - Male Female

Age - 18-25 26-35 >35

Ethnicity - African East Indian Chinese Mixed Other

Faculty - Engineering Humanities and Education Law

Medical Sciences Science and Agriculture Social Sciences

Degree/ Programme - _____

Nationality - _____

QUESTIONS – PLEASE CIRCLE OR TICK THE ANSWER OF YOUR CHOICE.

KNOWLEDGE QUESTIONS -

1. **The majority of food borne illness is a result of?**
 - a. Improper handling of foods in restaurants or food service establishments
 - b. Improper handling of foods by the consumer
 - c. Improper processing of foods by the manufacturer
 - d. Do not know

2. **What is the most common food borne bacterium?**
 - a. Escherichia Coli
 - b. Campylobacter
 - c. Salmonella
 - d. Do not know

3. **Which food is associated with the most cases of food borne illness due to the Salmonella bacteria?**
 - a. Raw eggs
 - b. Raw vegetables
 - c. Raw chicken
 - d. Do not know

4. **Which of the following indicates cross contamination?**
 - a. Pantry foods invaded by pests
 - b. Bacteria spreading when raw meat is ground
 - c. Raw foods coming into contact with cooked foods
 - d. Placing salad ingredients near main dish ingredients

5. **At what temperature should your refrigerator be maintained?**
 - a. 40 F (4.4°C)
 - b. 45 F (7.2°C)
 - c. 60 F (15.5°C)
 - d. Do not know

6. **At what temperature are leftovers reheated before serving?**
 - a. 150 F (65.6°C)
 - b. 165 F (73.9°C)
 - c. 180 F (82.2°C)
 - d. Do not know

7. **How long can perishable foods stay left out at room temperature?**
 - a. 1/2 hour
 - b. 1 hour
 - c. 2 hours
 - d. Do not know

- 8. How soon should you refrigerate perishable foods after purchase?**
- Immediately after purchase
 - Within 1-4 hours after purchase
 - More than 4 hours after purchase
 - Do not know
- 9. Which of the following is the best place to store canned foods?**
- Under the sink
 - Above the sink
 - A damp cupboard
 - A cool dry secured cupboard
- 10. How can you tell when food is no longer suitable for consumption?**
- It has molds, smells bad and tastes sour
 - It smells bad and tastes sour
 - It has molds
 - You cannot tell
- 11. Which is the safest cutting board one should use?**
- Plastic cutting board
 - Wood cutting board
 - Fiber glass cutting board
 - Hard rubber cutting board
- 12. If a cutting board was used to cut raw fish or poultry and it was used to chop another food, this board should be**
- Washed with cold water
 - Wiped with a hot damp cloth
 - Reused as is
 - Washed with soap and hot water and then sanitize
- 13. If the kitchen counter and other surfaces come into contact with food, it should be cleaned with**
- Cold water
 - A damp cloth with no sanitizing agent
 - Water at room temperature and soap only
 - Hot water and soap then a sanitizing agent
- 14. What would you do with leftover food at lunch?**
- Put it in the refrigerator right away
 - Cool for no more than 2 hours and refrigerate
 - Leave it out on a plate and save it for supper
 - Leave it in the microwave and consume for breakfast the next morning

15. How are meat, fish and poultry stored in the refrigerator when thawing?

- a. On the top shelf
- b. In the side compartment on the door
- c. Open and close contact with other food items
- d. In sealable containers at the bottom of the refrigerator so they do not drip onto other foods

ATTITUDE QUESTIONS –

16. Do you think it is safe to consume cheese, fruits and vegetables if you cut the mold away?

No Yes Do not know

17. Do you think that cooking foods that have been left out of the refrigerator for 3 hours will destroy any harmful bacteria?

No Yes Do not know

18. Do you think that freezing food kills bacteria that can cause food poisoning?

No Yes Do not know

19. Would it be safe to leave pasteurized milk out of the refrigerator for 2-3 hours?

No Yes Do not know

20. Would you use a canned food item that has a dent or is bloated?

Always Most times Sometimes Never

21. Would you purchase food from a vendor who does not display their food badge?

Always Most times Sometimes Never

22. Do you think bottled water is always safe?

Always Most times Sometimes Never

23. Do you check the expiry date on a food product when purchasing?

Always Most times Sometimes Never

24. Would you buy or use a food item after the expiration date?

No Yes Do not know

25. If you ever experience a food borne illness would you seek medical treatment?

No Yes Do not know

26. Do you consider spoilage of food a threat to food safety?

No Yes Do not know

27. Would you take the responsibility upon yourself to get information on food safety?

No Yes Do not care

28. Which of the following would you say is most responsible for food safety?

Manufacturers and processors Government Consumers

29. How will you rank food safety as an issue on the hall? Please choose 1 answer.

Extremely important Moderately important

Fairly important Not important

PRACTICE QUESTIONS-

30. Which are the safest methods you would use when thawing frozen meat, poultry or fish products?

- a. Place in the microwave or fridge or under cold running water
- b. Place in the fridge or under hot running water
- c. Place in the microwave or under warm running water
- d. Set it on the kitchen counter and cover properly with a kitchen towel

31. When dishes are washed on the hall, they are

- a. Washed with water only
- b. Washed immediately with hot/cold water and soap and then dried
- c. Left to soak in the sink for several hours and then washed with soap in the same water
- d. Immediately scraped, soaked, soaped and washed with hot/cold water and then dried

32. How do you reheat leftovers?

- a. Slightly warm
- b. Sufficiently warm
- c. Hot and steamy
- d. Eat cold, do not reheat

33. How do you check for doneness when cooking meat?

- a. Stick with a fork in the center
- b. Stick with a thin sharp knife
- c. Check internal temperature with a food thermometer
- d. Do not know

34. How often do you wash your hands when preparing food?

Always Most times Sometimes Never

35. Do you wash your hands with warm water and soap for 20 seconds before preparing food and eating?

Always Most times Sometimes Never

36. Do you wash canned items before opening them?

Always Most times Sometimes Never

37. Is there a roster implemented for daily or weekly cleaning chores on your Hall?

Yes No Do not know

38. How often is the stove and microwave cleaned after being used on Hall?

- a. Once per day
- b. Every two days
- c. Every four days
- d. Every seven days

39. How often is garbage from the kitchen discarded on the Hall?

- a. Once per day
- b. Twice per day
- c. Every two days
- d. Every three days

40. Do you have proper and adequate kitchen cupboards to store goods and utensils on Hall?

Yes No

41. How often the kitchen sink, counter and floor cleaned and sanitized on Hall?

- a. Once per day
- b. Every two days
- c. Every seven days
- d. Every two weeks

42. How often is the refrigerator cleaned on your Hall?

- a. Weekly
- b. Every three weeks
- c. Every two months
- d. Every four months

43. Are there any challenges you encounter on Hall to maintain proper food safety handling practices?

THANK YOU!

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