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FOOD SAFETY KNOWLEDGE AND PRACTICES AMONG UNIVERSITY STUDENTS IN THE NORTHERN REGION OF GHANA

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ABSTRACT

Food safety knowledge and practices are necessary for eliminating food borne diseases, however, there is a scarcity of information on food safety knowledge and practices among young adults in the Northern Region of Ghana. This research was therefore aimed at assessing the food safety knowledge and practices of university students in the Northern region of Ghana and to determine if any relationship exists between their food safety knowledge and practices and their socio-demographic and academic characteristics A cross-sectional study was carried out where data was collected from 397 randomly selected students of the University for Development Studies and Tamale Technical University using a questionnaire. Data was analyzed using SPSS V20. Results showed that 54.4% had good level of food safety knowledge, 38.5% had moderate level of food safety knowledge and 7.1% had poor levels of food safety knowledge. Similarly, students also showed 46.3%, 39.3% and 14.4% levels of good, moderate and poor food safety practices, respectively. The department and level of study significantly influenced ($P < 0.05$) the food safety knowledge of participants, however no demographic characteristics influenced ($P > 0.05$) the food safety practices of the participants. The findings from this study suggest the need for increased effort on how to guide students to translate their food safety knowledge into practice. Innovative and creative approaches should be applied to food safety education to increase practice since the students showed good food safety knowledge than food safety practice.

Keywords: Food Safety, Health, Safe Practices.

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INTRODUCTION

The problem of unsafe foods has persisted throughout history and is still a major issue affecting the world today (Lam *et al.*, 2013). The World Health Organization (WHO) reports that 550

million illnesses and 230,000 deaths occur annually due to unsafe foods (Havelaar *et al.*, 2015). Unsafe foods do not only lead to illnesses, complications and deaths, but indirectly affect the economy of a country. According to the Ghana Food and Drugs and Authority (FDA), the loss of productivity in Ghana in 2006 due to food borne diseases alone was approximately 594,279 days (19,0809 months) (Ababio and Lovatt, 2015). Also, tourists do not want to visit countries known for high food poisoning and illness cases. Therefore, the income that would have been made through tourism would be lost and that affects income generation of certain countries.

Food safety is the handling of food in a manner that will not cause any harm, sickness or death when consumed (Zeeshan *et al.*, 2017). It has been identified that poor food handling, poor personal hygiene and unsanitary conditions contaminate food with biological, physical and chemical hazards, thus making food unsafe for consumption. This has guided the WHO to capture the whole concept of food safety into five basic principles namely "keep clean, separate raw and cooked, cook thoroughly, keep food at safe temperatures and use safe water and raw materials" (World Health Organization, 2006).

Data from two public hospitals (Tamale Teaching Hospital and Tamale Central Hospital) in the Northern Region of Ghana shows that diarrhoea and food borne-related illnesses are frequently reported by patients that visit the hospitals for treatment (Seidu, 2020). This implies that food borne disease is a problem in the Northern Region. Although it has been suggested that a good level of food safety knowledge among a group of people is effective towards ensuring food safety and minimizing food borne diseases, researchers have not paid much attention to assessing food safety awareness and knowledge among individuals in the Northern parts of Ghana. Most of the food safety knowledge and practices assessment studies have been carried out in the Southern areas of Ghana leading to a scarcity of information on food safety knowledge and practices among individuals in the Northern parts of Ghana. Furthermore, available food safety knowledge and practices assessment studies carried out in the Northern Region often target food vendors and handlers in restaurants and canteens leaving out young individuals who either cook for themselves or their families at home.

The cooperation of every individual from food producers to consumers is needed to achieve food safety. It is however unfortunate those studies have identified low food safety practices among students and young adults. For instance, Patil *et al.* (2005) reported that young adults (18 – 29

years old) have the riskiest food handling practices among general populations. Students in universities are within this range. These university students when they arrive on campus are compelled to prepare their food because they live on a limited budget and normally safety is not a priority for them (Ferk *et al.,* 2016). Also, Bryd-Bredbenner *et al.* (2007) reported that kitchens in hostels and halls inhabited by students were supportive of food borne pathogen growth and transfer.

It is prudent to hypothesize that the majority of university students may lack the necessary habits to ensure food safety and hence may be among individuals that need to be educated on food safety techniques and practices. The majority of the food safety assessment studies in Ghana, however, have been targeted at food establishments and health workers although several food borne disease outbreaks have been recorded in schools across the country (Odonko and Odonkor, 2020; Akabanda *et al.,* 2017; Kunadu *et al.,* 2016; Annor and Baiden, 2011). The findings of this study will be relevant in identifying ways to give better food safety education to minimize the risk of food borne diseases among them and other consumers (Cheng *et al.,* 2017). The objectives of this research were to:

i. assess the food safety knowledge and practices of university students in the Northern region of Ghana
ii. To determine if their socio-demographic and academic characteristics influences their food safety knowledge and practices.

MATERIALS AND METHODS

Study area and population

The study was carried out in the Northern Region of Ghana. The Northern Region is one of the sixteen regions in Ghana. Two main universities, known as the University for Development Studies (UDS) and Tamale Technical University (TTU) are situated in the Northern Region. Students of these universities (UDS and TTU) served as the population for this study. Convenience sampling was used in selecting classes for students to participate.

Sample size

The estimated total number of UDS and TTU students at the time of this study was obtained from the electoral commission's office of the Students' Representative Council of each school.

UDS had 18,300 students, while TTU had 8,000 students. A total of 26,300 hence became the target population of this study. Slovene's formula was used to determine the minimum sample size for the study. Slovene's formula mathematically states that;

$$n = \frac{N}{(1+Ne^2)}$$

Where; n= the sample size, N= the target population and e = degree of freedom with a margin error of 0.05 indicating a confidence level of 95%.

Therefore; $n = \frac{26300}{[1+26300\ (0.05^2)]}$ = 394. Thus, 397 participants took part in the study.

Survey instrument and data collection

A questionnaire was used to collect data from participants of the study. The questionnaire was designed from WHO's basic food safety manuals and previous studies (Azanaw *et al.*, 2021; Stratev *et al.*, 2017; Zeeshan *et al.*, 2017; WHO, 2006). The questionnaire was designed with google forms from which the link was retrieved and used for data collection. The link was shared directly with the participant via email or WhatsApp after explaining to them the objective and significance of the study. To prevent a participant from double submission, a personal email address was required from participants to access the questionnaire. Each email address could be used to submit a single response The questionnaire was peer-reviewed and pilot-tested among ten students from two universities located in the Southern part of Ghana before a final version was administered to the university students in the study area after necessary modifications were made based on the results of the pre-test feedback. Data were collected from February 2022 to May 2022. The questionnaire consisted of four sections. Section I collected data on the socio-demographic characteristics of participants. Section II collected data on the food safety awareness of the participants. Sections III and IV then focused on the food safety knowledge and food safety practices of the participants, respectively. Both closed and open-ended questions were used. A Yes / No response format was used to assess food safety knowledge and a multiple-choice response format was used while assessing the food safety practice of participants.

The food safety knowledge section (Section III) consisted of 24 questions. Each question was replied with a yes, no or I don't know. Each correct response which could be a "Yes" or "No", depending on the question was assigned a score of 1 and either of the incorrect responses was

assigned 0 hence a possible total score of 24. The overall food safety knowledge of a participant was calculated and categorized using Bloom's cut-off points as good for scores between 80 – 100% (19 – 24), moderate for scores between 50% - 79% (12 – 18) and poor for scores less than 50% (0 – 11).

The food safety practices section (Section IV) also consisted of 20 questions. The possible responses were yes, sometimes, no or I don't know. The answer yes was assigned a score of 2, sometimes was assigned a score of 1 and no or I don't know was assigned a score of 0 so the possible total score for a participant was 40. The overall level of food safety practice was determined also with Bloom's cut-off points as good for scores between 80 – 100% (32 – 40), moderate for scores between 50% - 79% (20 – 31) and poor for scores less than 50% (0 –19).

Data processing and analysis

The collected data were checked for completeness before analysis. Incomplete questionnaires were excluded from the analyses and counted as unanswered questionnaires. A total of 27 participants started the survey but did not complete it. The data collected was analyzed with SPSS v 20. SPSS v 20 was used to derive descriptive statistics such as frequencies and percentages. Also, it was used to carry out a one-way ANOVA to check the influence of the socio-demographic characteristics on the food safety knowledge and practices of the participants. All *p*-values recorded below 0.05 were considered to be significant.

RESULTS

Socio-demographic characteristics of the participants

The demographic characteristics of respondents are shown in Table 1. Out of the 397 that participated in this study, 202 (50.9%) were males and the majority, while 195 (49.1%) were females. Most (51.9%) were between the ages of 22 to 25 and only 5.5% were aged 30 or above in this study. The majority (64.7%) were students of the University for Development Studies while the remaining (35.3%) were students at the Tamale Technical University. Participants were dominated by students from science-related departments (64.5%) as compared to students (35.5%) in non-science-related departments. The level of the study recorded undergraduate as the highest level of education of the participants (Table 1).

Food safety awareness

As shown in Table 2, the majority (96.7%) of the participants had heard about food safety, meaning only 13 (3.3%) out of the 397 participants were unaware of food safety before this study. Participants revealed school as the highest (59.0%) source that exposed them to the words "food safety" followed by the media (16.7%), family (13.3%) and friends (11.0%) respectively. Out of the 397 participants, 392 (98.7%) believed food safety is important and cited reasons such as improvement of health (31.0%), foodborne diseases prevention (51.0%) and maintenance of food quality (18.0%). The majority (67.3%) of the participants also indicated they had never experienced food poisoning.

Food safety knowledge of the participants

The food safety knowledge of the students has been presented in Table 3. After the food safety knowledge evaluation, 216 (54.4%) participants recorded scores from 80% to 100%, thus, exhibiting a good level of food safety knowledge. Only 28 (7.1%) showed poor food safety knowledge. In terms of individual questions under the food safety knowledge assessment, participants showed good knowledge of cross-contamination and its causes. More than 70% of the participants knew that a person cooking should wash their hands after touching their face or raw food as well as the fact that bare hands and food utensils could be the reason why food gets contaminated with bacteria. Almost half (42.1%) of the respondents did not know that children, sick people, pregnant women and older people are at greater risk to get seriously ill due to food contamination.

Food safety practices of the participants

The food safety practices of the students are shown in Table 4. Out of the total participants, 184 (46.3%) had good food safety practices, 156 (39.3%) exhibited moderate food safety practices, whiles only 57 (14.4%) showed poor food safety practices after the food safety practices assessment. It was also revealed that 69.4% of the respondents always wash their hands before meals while the rests either wash sometimes (23.3%) or do not wash (7.3%) at all. Of the 386 participants that said they were aware of food poisoning, it was identified that 265(67.3%) of them indicated that they had never experienced food poisoning before. The majority (44.6%) of the respondents indicated that they often leave their leftover food on the counters or stove till the

next day. Also, more than 50% of the participants indicated that the temperature of the refrigerator did not matter during food storage (Table 2).

Relationship between socio-demographic variables and food safety knowledge and practices of the participants

The results of the one-way ANOVA revealed that there was a statistically significant relationship (P>0.05) between the department of study of a participant and their food safety knowledge as well as the level of study and the food safety knowledge, therefore, those demographic characteristics influenced food safety knowledge. However, there was no statistical relationship (P<0.05) between food safety practice and the sex, department, level, age and residence of the student participants (Table 5).

DISCUSSION

In this study, the food safety knowledge and practices of students were assessed as well as the relationship between their food safety knowledge and practice and their socio-demographic characteristics. Out of the 397 students, 202 (50.9%) were males and the majority, while 195 (49.1%) were females. This finding is in line with several other studies such as Norazmir *et al.* (2012) and Lamidi (2016), however, studies from Ilesanmi (2017), Stratev *et al.* (2017) and Azanaw *et al.* (2021) reported higher female respondents' rate. The higher number of male respondents in this study could be the reason for the higher number of participants from science-related departments when compared to respondents from non-science-related departments. This is because most science fields are dominated by males in the country and region of study. Participants were dominated by students from science-related departments (64.5%) as compared to students (35.5%) in non-science-related departments. This could be due to the perception that food safety is purely a science subject, hence, certain students in the non-science departments felt reluctant to participate in the study. Most participants selected undergraduate as their highest or current level of education. It is not surprising since undergraduate is the main education and training level provided by the University for Development Studies and Tamale Technical University where participants of this study find themselves.

It was identified that the majority (96.7%) of the participants had heard about food safety before this study. Over the past few years, some students have been involved in food safety education by the Ghana Food and Drugs Authority (FDA). Also, a conference on food safety was organized to mark the 2021 World Food Safety Day Celebration at the University for Development Studies (Zakaria, 2021). This could be the reason for the high awareness of food safety among these students.

One of the major findings from this study was that 216 (54.4%) participants recorded a score of food safety knowledge score of 80% to 100%, hence the majority (54.4%) of the students in this study showed a good level of food safety knowledge. Similar to this study, several other studies such as Osaili *et al.* (2011), Norazmir *et al.* (2012), Ferk *et al.* (2016) and Ilesanmi (2017) recorded a good level of food safety knowledge of more than 50% of their study participants. However, other studies such as Lazou *et al.* (2012), Azanaw *et al.* (2021) and Hassan and Dimassi (2013) recorded poor or low food safety knowledge for their study participants involving Lebanese American University Students, Greek University Students and Ethiopian College Students, respectively. The variation identified in comparison to other study participants in terms of food safety knowledge could be due to differences in socio-demographic characteristics. It is reported by Osaili *et al.* (2013) that the level of food safety knowledge is influenced directly by demographic characteristics. Only 28 (7.1%) showed poor food safety knowledge.

Generally, the participants of this study showed good knowledge of cross-contamination and its causes**.** More than 70% of the participants knew that a person cooking should wash their hands after touching their face or raw food as well as the fact that bare hands and food utensils could be the reason why food gets contaminated with bacteria**.** Similarly, Stratev *et al.* (2017) reported a correct response of at least 70% or above on cross-contamination questions in their research. Cross-contamination of foods occurs from person (hands) to food or equipment to food which subsequently leads to foodborne illnesses (Kennedy *et al.*, 2011). The knowledge of these important hygienic procedures by most of the participants is important in foodborne disease prevention. Children, sick people, pregnant women and older people are at greater risk to get seriously ill due to food contamination (WHO, 2015). Almost half (42.1%) of the respondents did not know this. The failure to report the health condition or ages of individuals who are

mostly implicated in foodborne disease outbreaks in Ghana could be the reason why respondents were unaware of this fact. Stratev *et al.* (2017) however recorded an opposing finding as 95.6% of their study participants recognized these groups of individuals to be at more risk of foodborne illness due to weak and vulnerable immune systems compared to healthy and youthful individuals.

From the results of this study, certain participants showed certain knowledge of food safety that places them and others at risk of foodborne illness. For instance, 104 (25.3%) participants felt that a person suffering from diarrhoea and vomiting can still prepare food for others. Also, 125 (30.1%) participants out of the total did not know that foodborne microorganisms may be found on the surface of human skin, nails and fingers of healthy food handlers or individuals. Furthermore, 133 (32.5%) participants expressed that one may taste milk instead of checking the expiry date to confirm if the milk is not in a good condition for consumption. Such participants may suggest this act of tasting milk to others if they are unsure of the condition of milk.

In terms of food safety practices, 184 (46.3%) had good food safety practices, 156 (39.3%) exhibited moderate food safety practices, whiles only 57 (14.4%) showed poor food safety practices after the assessment. This implies that less than half (46.3%) of the respondents in this study recorded good food safety practice levels. Azanaw *et al.* (2021) also recorded a similar finding as less than half (30.8%) of their respondents showed good food safety levels. These findings are lower than other studies by Gavaravarapu *et al.* (2009), Sharif and Al-Malki (2010), Ilesanmi (2017) and Norazmir *et al.* (2012) who reported that more than 50% of their participants showed a good level of food safety practice. Poor hygiene is a major risk factor for food contamination so individual questions under the food safety practices assessment tackled poor hygiene as well as improper food handling**.** It was revealed that 69.4% of the respondents always wash their hands before meals while the rests either wash sometimes (23.3%) or do not wash (7.3%) at all. It was identified that 265 (67.3%) participants indicated that they had never experienced food poisoning before out of the 386 that said they were aware of food poisoning. The fact that the majority had not experienced food poisoning before could be a reason why some participants still belittle the importance of washing their hands before meals. The majority (44.6%) of the respondents indicated that they often leave their leftover food on the counters or stove till the next day. This is an unsafe food safety practice as according to the World Health

Organization when food is left for long at room temperature, microbes multiply quickly in the food (WHO, 2006). This practice could be a result of limited funds certain students live on while on campus, hence, the inability to purchase a refrigerator for storing foods that need to be refrigerated during storage. Also, more than 50% of the participants indicated that the temperature of the refrigerator did not matter during food storage. Time and temperature control during food storage are key factors in the prevention of food safety hazards in foods. For instance, the FDA suggest that the refrigerator temperature should be kept at or below 4℃ whiles the freezer temperature should be -18℃ (Food and Drug Administration, 2021). The reduced attention given to storing foods at the right temperature could lead to the multiplication of microorganisms in food thereby facilitating the consumption of contaminated foods unknowingly if the food does not go through any further processing technique that will eliminate or reduce the microorganisms before consumption.

Good food safety practices are key to preventing foodborne diseases and maintaining good health. Cross-contamination may occur from one food source to the other (Kennedy *et al.*, 2011). The results show that more than half of the participants did not always wash their raw eggs before boiling or breaking them to fry. Several studies including Oviasogie *et al.* (2016) and De Reu *et al.* (2009) have confirmed that egg shells are often contaminated with microorganisms. Oviasogie *et al.* (2016) isolated pathogenic bacteria like *Salmonella*, *Escherichia coli* and *Bacillus cereus* as well as fungi like *Aspergillus sp. Fusarium sp.* and *Penicillium sp.* from egg shells. Egg shells can therefore serve as a risk factor for food contamination so the failure of more than half of the participants to ensure egg shells are clean before using them is a problem and may lead to foodborne illness subsequently through cross-contamination.

The results of the one-way ANOVA as shown in Table 5 revealed that there was a statistically significant strong positive relationship (P>0.05) between certain demographic features like age, department and level of study, and food safety knowledge. Stratev *et al.* (2017) however reported that no significant relationship existed between age and food safety knowledge in their study. In terms of department and level of study, studies from Zeeshan *et al.* (2017), Ilesanmi (2017), and Lazou *et al.* (2012) also reported significant relationships between department and level of study and food safety knowledge which supports the findings of this study. In this study, students from science departments showed better food safety knowledge than their colleagues in non-science

departments. The science departments consisted of students enrolled in study programmes such as Biotechnology and Molecular biology, Food Science and Technology, and Agriculture Technology. Students enrolled in such departments may have come across topics or modules on food safety principles which influenced their food safety knowledge. The sex of an individual often influences food safety practices (Mekesha *et al.,* 2016; Sanlier and Konaklioglu, 2012; Nesbitt *et al.,* 2009). This study however did not find any statistically significant relationship ($P<0.05$) between the two variables. The finding of this study is supported by Stratev *et al.* (2017), Azanaw *et al.* (2021) and Zyoud *et al.* (2019). It was further identified that food safety knowledge influenced the food safety practices of students in this study. This implies that students who showed good food safety knowledge levels exhibit relatively better food safety practices. Since students enrolled in science departments showed better food safety knowledge than their colleagues in non-science departments, they may show better food safety practices because they may have an understanding of the consequences of not practising food safety This assertion is supported by Lambiri *et al.* (2016) and Salhadi *et al*. (2017).

The limitations of the study include:

a. The study focused on knowledge and practices of food safety without attitudes which is an important variable included in models and theories associated with such studies.
b. An internet connection was required to answer the questionnaire since it was a google form. There were times the internet was not stable in the area during the data collection, therefore preventing certain prospective participants from participating at the time.
c. Some students who were approached felt reluctant to participate because the questionnaire consisted of 64 questions and took about 20 minutes to complete.

CONCLUSION AND RECOMMENDATIONS

Majority (96.7%) of university students in the Northern Region of Ghana are aware of food safety. The overall level of food safety knowledge of university students in the Northern Region of Ghana was good, however, their food safety practices were not as good as their knowledge. The study further revealed a significant relationship between certain demographic characteristics such as the department of study and food safety knowledge but not their food safety practice. The generally lower level of food safety practices exhibited by the students is a challenge to

ensuring public health safety. It is, therefore, suggests that increased effort be made by the Ghana FDA and other concerned bodies on how to guide students to translate their knowledge into practice. Innovative and creative approaches such as the use of art (poetry, paintings and parodies), and videography should be applied to food safety education to boost food safety knowledge and practice since some individual students still exhibited low food safety knowledge and practice.

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APPENDICES

TABLE 1. Socio-demographic characteristics of the students

Variables	Number	Percentage (%)
Sex		
Male	202	50.9
Female	195	49.1
Age		
Less than 18	7	1.8
18 – 21	127	32.0
22 – 25	206	51.9
26 – 29	35	8.8
30 and above	22	5.5
Marital status		
Married	42	10.6
Single	352	88.7
Divorced	3	0.8
School		
University for Development Studies	257	64.7
Tamale Technical University	140	35.3
Department of study		
Science-related Department	256	64.5
Non-Science related Department	141	35.5
Level of study		
Diploma	131	33.0
Undergraduate	241	60.7
Postgraduate	25	6.3
Residential arrangement		
Hostel / Hall	164	41.3
Off-Campus House	131	33.0
Home	102	25.7

TABLE 2. Food safety awareness of students

Variable	Number	Percentage (%)
Have you heard of food safety before?		
Yes	384	96.7
No	13	3.3
If yes, where did you hear it first?		
School	255	66.4
Friends	32	8.3
Family	45	11.7
Media	52	13.6
Is food safety important?		
Yes	392	98.7
No	5	1.3
If yes, food safety is important because;		
Improves health	188	31.0
Prevents food poisoning and diseases	305	51.0
Prevents food contamination and maintains food quality	107	18.0
Are you aware of food poisoning?		
Yes	386	97.2
No	11	2.8
If yes, have you ever experienced food poisoning before?		
Yes	129	32.7
No	265	67.3
If yes, list some of the symptoms you experienced		
Vomiting and nausea	92	40.0
Diarrhoea	81	36.0
Fever	12	5.0
Stomach pain	31	14.0
Weakness	9	4.0
Rashes	2	1.0

Food Safety Knowledge	Correct Responses N (%)	Incorrect Responses N (%)
Contact between cooked and uncooked foods causes cross-contamination.	231 (59.2)	166 (40.8)
The best way to avoid getting food poisoning from fresh fruits and vegetables is to wash them with cool running water.	295 (76)	102 (24.0)
A person suffering from diarrhoea and vomiting can prepare food for others	293 (74.7)	104 (25.3)
When preparing food, one should wash their hands after touching their face, cloth or fresh fruit.	365 (93.1)	32 (6.9)
Is it advisable to prepare food for others if you have a sore on the back of your hand without covering the sore?	317 (81.1)	80 (18.9)
Frequent food contact surface cleaning can prevent contamination of the food.	290 (74.7)	107 (25.6)
To prevent food poisoning, the best way to wash dishes is to hand-wash them right after the meal and then let them air-dry or wash and dry them in an automatic dishwasher.	336 (85.9)	61 (14.1)
To prevent food poisoning, leftover soup should be reheated until they are boiling.	351 (89.8)	46 (10.1)
To prevent food poisoning, one should keep foods that can be refrigerated in the fridge until it is time to cook or serve.	357 (92.2)	40 (7.8)
Uncooked meat should be stored frozen and never be eaten raw.	353 (91.2)	44 (8.8)
Children, sick people, pregnant women, and older people (60 and above) are not at a greater risk to get seriously ill from harmful germs in food compared to young and healthy people.	227 (57.9)	170 (42.1)
Biological, chemical and physical agents make food unsafe for consumption.	313 (80.1)	84 (19.9)
Salmonella and *Campylobacter* bacteria can cause food poisoning. We can however make the food safe for consumption when we cook the food thoroughly.	280 (71.6)	117 (28.4)
Food utensils and our bare hands can be a source of contamination of food with bacteria.	352 (89.8)	45 (10.1)
Lack of good food hygiene can cause foodborne disease and illness	363 (93.6)	34 (6.4)
Is it advisable to eat canned foods if the cover of the tin is bloated or tight?	206 (52.8)	191 (47.2)
Inadequate cooking of raw chicken and meats can result in foodborne disease outbreaks.	329 (83.9)	68 (16.1)
Drinking unpasteurized raw milk is unsafe	301 (77.2)	96 (22.8)
You should taste milk rather than check its expiry date if you want to confirm if it is safe to use or not.	264 (67.5)	133 (32.5)
To get rid of bacteria, one should wash their hands with soap and water under running water and not wash with only water.	354 (90.8)	43 (9.2)
Eating unwashed raw vegetables and fruits can result in foodborne illness.	355 (90.8)	42 (9.2)
Foods that have high available moisture content have a low or reduced shelf life and can spoil easily.	308 (79.4)	89 (20.6)
Foodborne micro-organisms can be found on the surface of human skin, nails and fingers of healthy food handlers.	272 (69.9)	125 (30.1)
Diarrhoea and vomiting are symptoms of foodborne illness and can be contacted through contaminated foods.	358 (91.8)	39 (8.2)
Overall Food Safety Knowledge		
Poor = 28 (7.1%)		
Moderate = 153 (38.5%)		
Good = 216 (54.4%)		

TABLE 4. Food safety practices of students

Food Safety Practices	**Yes N (%)**	**Sometimes N (%)**	**No/I don't know N (%)**
Do you always wash your hands with soap and water before handling and cooking raw vegetables and fruits?	256 (66.1)	112 (28.9)	29 (5.0)
Do you always cover the sore/cut on your palm with a bandage and use gloves when you have a cut/sore before preparing food?	258 (67)	76 (19.7)	63 (13.3)
Do you always wash your hands with soap and water before eating your food?	268 (69.4)	90 (23.3)	39 (7.3)
Do you always wash fresh vegetables and fruits under running tap water before eating?	296 (76.3)	58 (14.9)	43 (8.8)
Do you always check the best before and expiry dates before buying packaged foodstuffs?	283 (72.9)	81 (20.9)	33 (48.0)
Do you often use soapy water to clean the surfaces or countertops of your kitchen?	283 (73.5)	72 (18.7)	42 (7.8)
Do you always make sure not to leave your leftover cooked food on the stove or counter till the next day?	135 (32.1)	90 (23.3)	172 (44.6)
Do you always refrigerate your leftover food before using it the next day?	245 (63.3)	79 (20.4)	73 (16.3)
Do you always check the temperature of your refrigerator to make sure it is at the right temperature for storing foods?	166 (42.9)	67 (17.3)	164 (39.8)
Do you always reheat your leftover soup till it's boiling before you serve it to eat?	335 (87.0)	28 (7.3)	34 (5.7)
Do you always wash your hands with soap and water after using the toilet?	340 (88.1)	35 (9.1)	22 (2.8)
Do you always wash used utensils immediately after eating?	254 (66.1)	101 (26.3)	42 (7.6)
Do you always wash used cups with soap and water, and not only with water?	270 (69.9)	86 (22.3)	41 (7.8)
Do you always clean and wash cans and bottles of canned and bottled foods before opening them?	165 (42.9)	98 (25.5)	134 (31.6)
Do you always wash your hands after handling money?	166 (43.2)	115 (29.9)	116 (26.9)
Do you always protect your raw stored foods from insects and rodents?	319 (83.1)	42 (10.9)	36 (6.0)
Do you always store raw chicken or meats separately from other foods?	289 (75.1)	48 (12.5)	60 (12.4)
Do you always wash your eggs before boiling or breaking them to fry?	192 (49.9)	82 (21.3)	123 (28.8)
Do you always remove accessories like rings and bracelets when cooking food?	240 (62.3)	59 (15.3)	98 (22.4)
Do you always read labels like conditions of storage and use of package foods?	249 (65.4)	79 (20.7)	69 (13.9)
Overall Food Safety Practice			
Poor = 57 (14.4%)			
Moderate = 156 (39.3%)			
Good = 184 (46.3%)			

Table 5. Relationship between socio-demographic variables of students and their food safety knowledge and practices

Variables	Mean square	F	*P* value
Sex vs Knowledge	0.192	0.756	0.0779
Sex vs Practice	0.324	1.329	0.114
Sex vs Total Knowledge and Practice level	0.216	0.844	0.767
Department of Study vs Knowledge	0.704	3.488	0.000
Department of Study vs Practice	0,285	1.268	0.156
Department of Study vs Total Knowledge and Practice level	0.288	1.306	0.089
Age vs Knowledge	1.720	2.791	0.000
Age vs Practice	0.638	0.936	0.570
Age vs Total Knowledge and Practice level	0.832	1.272	0.112
Level of Study vs Knowledge	0.760	2.563	0.000
Level of Study vs Practice	0.328	1.019	0.443
Level of Study vs Total Knowledge and Practice level	0.361	1.138	0.251
Residential arrangement vs Knowledge	1.136	1.836	0.013
Residential arrangement vs Practice	0.630	0.970	0.517
Residential arrangement vs Total Knowledge and Practice level	0.740	1.168	0.212