A Questionnaire-Based Survey on Food Safety Knowledge during Food-Handling and Food Preparation Practices among University Students

Abstract
The objective of the study was to assess the level of food safety handling knowledge and practices among university students and to explore the association between their knowledge/practices and the socio-demographic and academic characteristics. Participants were undergraduate students enrolled in the University of Agriculture Peshawar. They completed a questionnaire containing six questions of food safety grouped into two subsections: food microbiology/cross-contamination and food storage (chilling). Students from faculties delivering health-related programs significantly outperformed those from humanity-sciences programs on food safety knowledge during food preparation practices. Females obtained considerably better food-handling scores than males. An educational background relevant to food safety was a significant predictor of responding accurately to a wide range of study questions. These results substantiate the need for educational initiatives tailored to develop the food safety knowledge and food-handling practices of students of university of agriculture Peshawar.

Keywords: Food safety; Demographic characteristics; Gender; University students

Introduction
Food safety is defined as the degree of confidence that food will not cause sickness or harm to the consumer when it is prepared, served and eaten according to its intended use. Food safety is an international concern. Considerable proportion of food borne diseases is owing to unsafe food-handling practices. WHO reported that these diseases were found to affect more than 30% of the population in developed countries? The problem is expected to be even more severe in developing countries. Thus, enhancing the consumer knowledge of safety rules would minimize pathogenic microorganisms in food. Great academic interest has been given to investigate the knowledge and self-reported practices of food safety overall the world [1].

Consumers in many societies seemed to be unfamiliar with the ideal refrigeration temperature. Large numbers of consumers did not use a thermometer during food preparation. Most consumers lack awareness of the different classes of bacteria and especially the pathogenic ones. Potential undesirable compounds in foods cover a broad range, from natural (e.g. mycotoxins) and environmental contaminants (e.g. dioxins) to agrochemicals (e.g. pesticides, and veterinary drug residues) and many more [2]. Food safety has become a major issue of public concern as bacterial outbreaks, and assumed reduced consumer confidence in the healthiness of food products. Reinstating confidence in food now presents a major commercial challenge to the food industry.

Even in societies with highly developed food safety systems such as the European “farm-to-fork” and the American “farm-to-table” approach a “weak link” can cause significant morbidity and mortality from food borne illness [3].

There are five major pathogen control factors that should be highlighted in food safety education programs for consumers. These control features include practicing personal hygiene, prevention of cross contamination, avoiding foods from unsafe sources, cooking foods adequately and keeping foods at safe temperatures. Few researches about food safety handling and
practices among young adults in universities have been recently published. A recent study showed that more than 50% of the Saudi college participants consumed raw eggs and raw white cheese and 34% believed that there is no risk of food poisoning from eating cooked food kept at room temperature for one day if covered.

Two types of food safety include objective measures and subjective perception. Objective food safety is the task of scientist’s measure who find out the reasons of risks that are due to specific food. Subjective measure is a consumer’s behavior towards the safety of a specific food. It is mostly observe that both the food safety measures interlinked in many of the conditions. European and other established countries are very conscious about their health risks regarding food safety and proper hygiene standards by Andersen et al. [4].

The results of consumer studies concerning food safety knowledge and practices have shown that consumers are aware of and are thinking about food safety, although there are also many gaps in food safety knowledge and practices that may result in food borne diseases by Medeiros et al. [5].

Beside the fact that public greatly concerned about food-related risks, the growth in food poisoning cases suggests that people still make decisions of food consumption, food storage and food preparation that are less ideal from a health and safety perspective by Jevšnik et al. [6].

Safe food is one of the most important human rights and in developed society’s protection from diseases and improvement of human health is of primary importance, and is important for both governments and industries but also for consumers themselves.

Therefore, the main focus of the study was to assess the self-reported food safety practices and knowledge of university participants from various field of study and to find out any relationships between the food safety awareness and demographic characteristics.

Material and Methods

Research design

A cross-sectional study was conducted on food safety knowledge and handling practices from September to December 2014. The respondents were undergraduate participants of different food related Department like (Food Science and technology, Human nutrition, Food Chemistry, Bio Technology and Animal Nutrition) and non-food related departments like (Plant Protection, Plant Pathology, Entomology, Agronomy, Horticulture and Soil Science) of University of Agriculture Peshawar whose age ranged between 23-26 years.

Development of questionnaire

A questionnaire was developed in order to assess the food safety knowledge and food handling practices among university participants of university of agriculture Peshawar.

The questionnaire was subjected to a preliminary validation [7] to assess its clarity, the suitability of wording, and the average time needed for its completion. Based on this pilot study, necessary modifications were identified and resolved, whereas its results were not included in the final survey. The questionnaire took approximately 5 min to be completed.

The demographic characteristics surveyed include:

1. Gender;
2. Age;
3. Field of Study;
4. Maternal Status;
5. Residential Status.

The questionnaire consists of 6 questions which were grouped into 2 sections food microbiology/cross-contamination and food storage (chilling). All questions were multiple-choice questions or statements with 2-4 possible answer choices including true/false and yes/no statements.

Data collection

The study data was collected by 3 interviewers, each of whom distributed 100+ questionnaires. Interviewers were in their graduation studies that visited selected departments and distributed questionnaires in each department in University of agriculture Peshawar Pakistan [8]. The distributors asked the help of some class teachers to distribute the survey forms to their participants randomly and the survey forms were returned after the end of class period. The objectives of the study were briefly explained to respondents.

Results and Discussion

Profile of respondent

355 Questionnaires were distributed, but only 311 questionnaires have been collected back (154 respondents from Food related departments and 157 respondents from non-Food related departments). Percentages of male and female respondents were about 53.5% (165) and 46.95% (146) respectively. The majorities of respondents were aged 23 to 24 of a total of 42.76% (133) and followed by those who aged 21 to 22 around 35.04% (109) and of age 25 to 26 were around 22.18% (69). Most of the surveyed participants (55%) were hostel residents and home resident respondents were 45%. Based on Maternal status of participants 80.38% belongs to family having House wives and 19.61% belongs to a working women family (Table 1).

Food related participants scored significantly better than nonfood related participants. The percentage of the correct answer of food related participants were about 54% and that of Non-food related participants were 46%. The female participants also scored significantly better than male participants giving correct answer which is 69.4% and that of males is 46.1%. Participants having house wives mother score significantly better than that of working women which is 58% and that of working women is 50%. Participants living in hostel and those living with their parents having not much difference in their score which is 64% for both (Table 2).
Both the department (food related and non-food related) participants were having more knowledge about storage issue that freezing does not eliminates harmful germs in food, that keeping foods refrigerated is an important way of avoiding food borne disease.

**Best practice or option is in italic:** The score of food related participants is better than that of non-food related participants regarding the knowledge of the maximum safe temperature of freezing (-18°C) only around 34% participants of food related and 31% of non-food related participants properly recognized it \[8,9\]. The score of male participants is significantly better than that of female’s participants which were 51% while that of female participants were 41% showing sufficient knowledge about recommended temperature of freezer. Participants having their mother as house wives and working women score exactly the same that is 46%. Participants residing in hostel were having significantly high score than those living with their families which was 52% and that of day scholars was 41.5% (Table 3).

This results shows that the knowledge regarding to the question is appreciable in both departments (food related and non-food related). The male participants which were hostalized were much aware of the temperature for freezing. The recommended temperature for freezer is from (-17°C to -18°C).

**Best practice or option is in italic:** Food related participants and non-food related participants have almost the same score of 38% and 37.5% which shows their lack of knowledge and low level of education about the recommended temperature of refrigeration. This question shows surprisingly the same score for male and females participants, 38% for males and 37.8% for female’s participants. Participants having their mother as house wives scored significantly higher than working women which is 37% for house wives and 33% for working women. According to

### Table 1 Demographic characteristics of the study population.

| Demographic variables | Variables     | Respondents | Percentage |
|-----------------------|---------------|-------------|------------|
| Gender                | Male          | 165         | 53.05%     |
|                       | Female        | 146         | 46.94%     |
| Age                   | 21-22 years   | 109         | 35.04%     |
|                       | 23-24 years   | 133         | 42.76%     |
|                       | 25-26 years   | 69          | 22.18%     |
| Department            | Food related  | 154         | 49.5%      |
|                       | Non-food related | 157       | 50.5%      |
| Maternal status       | House wife    | 250         | 80.38%     |
|                       | Working woman | 61          | 19.61%     |
| Residential status    | Boarder       | 140         | 45%        |
|                       | Day scholar   | 171         | 55%        |

### Table 2 Freezing kills harmful germs in food.

| Demographic variables | Variables     | True | False |
|-----------------------|---------------|------|-------|
| Gender                | Male          | 89   | 76    |
|                       | %age          | 53.9%| 46.1% |
|                       | Female        | 46   | 100   |
|                       | %age          | 31.5%| 69.5% |
| Age                   | 21-22 years   | 38   | 71    |
|                       | %age          | 34.9%| 65.1% |
|                       | 23-24 years   | 74   | 59    |
|                       | %age          | 55.7%| 44.3% |
|                       | 25-26 years   | 23   | 46    |
|                       | %age          | 33.4%| 66.6% |
| Department            | Food related  | 70   | 84    |
|                       | %age          | 45.5%| 54.5% |
|                       | Non-food related | 85    |        |
|                       | %age          | 54%  |       |
|                       | House wife    | 105  | 145   |
|                       | %age          | 42%  | 58%   |
|                       | Working woman | 30   | 31    |
|                       | %age          | 49.2%| 50.8% |
|                       | Boarder       | 50   | 90    |
|                       | %age          | 35.7%| 64.3% |
|                       | Day scholar   | 61   | 110   |
|                       | %age          | 35.6%| 64.4% |
residential status both the participants shows almost the same percentage i.e., 38% and 37 % for hospitalized and day scholar respectively (Table 4).

The optimum temperature for home fridges is between 1°C and 4°C. Maintaining the optimum temperature inside a fridge is important to minimize the growth of bacteria that can cause food poisoning and spoilage:

1. Too warm and food poisoning bugs can start to grow.
2. Too cold and foods can freeze, which will damage some foods.

Table 3 Recommended temperature for freezer.

| Demographic variables | Variables     | 1-18°C | -18°C | 38°C | 40°C |
|-----------------------|--------------|--------|-------|------|------|
| Gender                | Male         | Count  | 84    | 32   | 08   |
|                       | %age         | 51%    | 19.5% | 5%   |      |
|                       | Female       | Count  | 60    | 23   | 10   |
|                       | %age         | 41%    | 15.3% | 7%   |      |
| Age                   | 21-22 years  | Count  | 55    | 18   | 09   |
|                       | %age         | 50.3%  | 16.1% | 09%  |      |
|                       | 23-24 years  | Count  | 62    | 22   | 06   |
|                       | %age         | 46.3%  | 16.4% | 5%   |      |
|                       | 25-26 years  | Count  | 27    | 15   | 03   |
|                       | %age         | 39.3%  | 12%   | 4.1% |      |
| Food related          | Count        | 53     | 34    | 11   |      |
|                       | %age         | 34.4%  | 22.3% | 7%   |      |
| Non-food related      | Count        | 50     | 31    | 38   |      |
|                       | %age         | 31.6%  | 20%   | 24.2%|      |
| Maternal status       | House wife   | Count  | 116   | 42   | 16   |
|                       | %age         | 46%    | 17.3% | 6.7% |      |
|                       | Working woman| Count  | 28    | 13   | 02   |
|                       | %age         | 46%    | 21%   | 3.4% |      |
| Residential status    | Hostalized   | Count  | 73    | 28   | 05   |
|                       | %age         | 52%    | 20%   | 3.5% |      |
|                       | Day scholar  | Count  | 71    | 27   | 13   |
|                       | %age         | 41.5%  | 15.5% | 8%   |      |

Table 4 Recommended temperature for fridge.

| Demographic variables | Variables     | 1-4°C | 2-4°C | 2-12°C | 4-16°C |
|-----------------------|--------------|-------|-------|--------|--------|
| Gender                | Male         | Count | 60    | 30    | 12     |
|                       | %age         | 36%   | 19%   | 6%    |        |
|                       | Female       | Count | 45    | 34    | 12     |
|                       | %age         | 30%   | 23%   | 9.4%  |        |
| Age                   | 21-22 years  | Count | 25    | 32    | 07     |
|                       | %age         | 23%   | 29%   | 7%    |        |
|                       | 23-24 years  | Count | 61    | 17    | 09     |
|                       | %age         | 46%   | 12%   | 08%   |        |
|                       | 25-26 years  | Count | 19    | 15    | 08     |
|                       | %age         | 27%   | 21%   | 12%   |        |
| Food related          | Count        | 46    | 33    | 16    |        |
|                       | %age         | 29%   | 21%   | 12%   |        |
| Non-food related      | Count        | 59    | 31    | 08    |        |
|                       | %age         | 37.5% | 19%   | 6%    |        |
| Maternal status       | House wife   | Count | 80    | 56    | 22     |
|                       | %age         | 32%   | 22%   | 9%    |        |
|                       | Working woman| Count | 25    | 08    | 8      |
|                       | %age         | 41%   | 13%   | 13%   |        |
| Residential status    | Hostalized   | Count | 53    | 26    | 09     |
|                       | %age         | 38%   | 18%   | 7%    |        |
|                       | Day scholar  | Count | 52    | 38    | 15     |
|                       | %age         | 30%   | 22%   | 10%   |
Best practice or option is in italic: Food related a participant shows a good response than non-food related participants that raisin is not needed to be refrigerated there percentage is 43% and that of non-food related participants is 33%. Females showed a good response and have more knowledge about refrigeration than male and score 39% and that of male were 37%. Participants having their mother house wives scored significantly higher than working women which was 36.8% and that of working women was 32%. Participants living in hostel had a better score than those living with their families which was 39% and those living with their families were 37% and those participants with age range from 23-24 years had a better knowledge about refrigeration which is 53% (Table 5) [10-13].

So the food product having high moisture rate must be refrigerated in order to avoid microorganism. Raisins have lower moisture so it does need to be refrigerated and its quality lasted almost for 1 year without opening the can of raisin.

Those participants who stated their mothers as working women answered better than those whose mothers were house wives. From another aspect it is observed in many surveys that participants scored well who lived with their educated working women where they noticed the different handling practices from their mother and had high food safety practicing knowledge compare to those who lives with housewives. The reason is that as working women are educated and have go through the food safety basics in their studies compares to these housewives who run the food handling traditionally by following unhygienic practices.

**Table 5** Foods that does not need to be refrigerated.

| Demographic variables | Variables | Count | Salad | Open can of peas | Raisin | Cooked meal |
|-----------------------|-----------|-------|-------|------------------|--------|-------------|
| Gender                | Male      |       |       |                  |        |             |
|                       | %age      | 29%   | 21%   | 37.5%            | 12.5%  |             |
|                       | Female    |       |       |                  |        |             |
|                       | %age      | 30%   | 13%   | 39%              | 18%    |             |
| Age                   | 21-22 years |     |       |                  |        |             |
|                       | %age      | 41%   | 20%   | 27%              | 12%    |             |
|                       | 23-24 years |     |       |                  |        |             |
|                       | %age      | 15.7% | 15.7% | 53%              | 15.6%  |             |
|                       | 25-26 years |     |       |                  |        |             |
|                       | %age      | 39%   | 17.3% | 26.4%            | 17.3%  |             |
| Department            | Food related |     |       |                  |        |             |
|                       | %age      | 28%   | 10%   | 43%              | 19%    |             |
|                       | Non-food related |     |       |                  |        |             |
|                       | %age      | 31.8% | 24%   | 33%              | 11.2%  |             |
| Maternal status       | House wife |     |       |                  |        |             |
|                       | %age      | 29.2% | 18%   | 36.8%            | 16%    |             |
|                       | Working woman |   |       |                  |        |             |
|                       | %age      | 32.7% | 16%   | 32.7%            | 18.6%  |             |
|                       | Residential status | |       |                  |        |             |
|                       | Hostelized |     |       |                  |        |             |
|                       | %age      | 30%   | 20%   | 39%              | 11%    |             |
|                       | Day scholar |     |       |                  |        |             |
|                       | %age      | 28.8% | 15%   | 37%              | 19.2%  |             |

Best practice or option is in italic: Food related participants have much better knowledge than non-food related securing a total score of 46% and that of non-food related participants is 41% similarly the female student scored significantly than male by securing a total score of 62% and non-food relate participants is 55%. Participants showing their mother as working women has high knowledge about food poisoning than house wives by gaining score of 68.8% and house wives scored a total of 56% participants living with their families have a much better knowledge of microorganism causing food poisoning in human than living in hostels and there score is 63% and of hostlaries is 53% (Table 6).

Bacteria are the main cause of food poisoning in human beings. Bacteria related food poisoning is the most common, but fewer than 20 of the many thousands of different bacteria actually are the culprits. More than 90 percent of the cases of food poisoning each year are caused by *Staphylococcus aureus*, *Salmonella*, *Clostridium perfringens*, *Campylobacter*, *Listeria monocytogenes*, *Vibrio parahaemolyticus*, *Bacillus cereus*, and Enteroto-pathogenic *Escherichia coli*. These bacteria are commonly found on many raw foods. Normally a large number of food- poisoning bacteria must be present to cause illness [14-17].

Best practice or option is in italic: The food related participants scored significantly better than non-food related participants which is 52% and 44% shows that food related participants have much knowledge of temperature range in which bacteria can grows than non-food related participants. Both the males and...
females participants have somewhat the same knowledge and idea about ideal temperature and their score is 50% and that of female participants is 48% similarly participants living in hostel and those living with their families have the same level of knowledge and awareness about the ideal temperature range for bacterial growth which is from 5-6°C and there score is 49% and that of working women is 48%. participants showing their mother status as house wives has a significantly better score than those with working women there score is 45% and that of participants with working women is 41% it shows that those participants belongs to house wives families has a better knowledge of bacteria and there temperature of growth and causing diseases (Table 7).

Best practice or option is in italic: The temperature range in which most bacteria grow is between 40°F (5°C) and 140°F (60°C). Raw and cooked foods should not be kept in this danger zone any longer than absolutely necessary. Undercooking or improper processing of home-canned foods can cause very serious food poisoning [18-22].

### Limitation of the Study

This survey was carried out among students of University of Agriculture Peshawar so the results should not be for all the students of university or all the residential of entire Peshawar city. Self-reported practices are blamed for possibly not reflecting actual behavior due to social desirability bias hence, inclusion of some self-reported practices in this study may be considered to be a limitation. Nevertheless, these reports give the important information about food safety and shows that consumers have some ideas about the right practice even if they do not practice their knowledge all the time. The problem is not people are saying what they are practicing instead; the main concern is to enhance their knowledge about handle food hygienically.

The limited samples involved in this study have made it difficult for the researchers to generalize to all students of higher learning institutions. It would be worthwhile if future research can be undertaken by considering more variety of students’ profiles such as their major of study. Future research can be done to explore the relationship between food safety knowledge level and attitude between health and hospitality major. Little participation by the higher learning institution also specifically limits the sample size. In the future, it is suggested that these kind of study which is known to have huge impact nationally, should be done as a national initiative and with collaboration from relevant government agencies such as the Ministry of Health or other related agencies.

### Conclusion and Recommendations

It is concluded on the basis of these results that respondents are not familiar with their role in the food safety chain or with the importance of maintaining a cold chain, and that they allow numerous opportunities for microbiological contamination of food. The most important issues is the lack of knowledge regarding refrigeration temperatures, lack of knowledge concerning cross-contamination and its control, and a lack of knowledge with respect to hand hygiene. The results indicated that women adhered to safer food handling practices to a greater degree than men.

The results of this study support the hypothesis that the development and delivery of a food safety education program for participating food recovery agency personnel and volunteers

| Demographic variables | Variables | Parasite | Fungi | Bacteria | Virus |
|-----------------------|-----------|----------|-------|----------|-------|
| Gender                | Male      | Count 26 | 36    | 91       | 12    |
| %age                  | 15.7%     | 21.8% 55%| 7.5%  |
| Female                | Count 12 | 30       | 91    | 13       |
| %age                  | 8.2%      | 20.5% 62%| 9.3%  |
| Age                   | 21-22 years | Count 13 | 24    | 63       | 09    |
| %age                  | 12%       | 22%     | 57.6% | 8.4%     |
| 23-24 years           | Count 16 | 26       | 81    | 10       |
| %age                  | 12%       | 19.5%   | 61%   | 7.5%     |
| 25-26 years           | Count 09 | 16       | 38    | 06       |
| %age                  | 13%       | 23%     | 55%   | 9%       |
| Food related          | Count 24 | 44       | 72    | 14       |
| %age                  | 15.5%     | 28.5%   | 46%   | 10%      |
| Non-food related      | Count 29 | 32       | 65    | 31       |
| %age                  | 18%       | 20%     | 41%   | 21%      |
| Maternal status       | House wife| Count 31 | 55    | 140      | 24    |
| %age                  | 12%       | 22%     | 56%   | 10%      |
| Working woman         | Count 07 | 11       | 42    | 01       |
| %age                  | 11%       | 18%     | 68.8% | 2.2%     |
| Residential status    | Boarder   | Count 21 | 34    | 74       | 11    |
| %age                  | 15%       | 24%     | 52.8% | 7.2%     |
| Day scholar           | Count 17 | 32       | 108   | 14       |
| %age                  | 10%       | 18%     | 63%   | 9%       |

This article is available in: http://clinical-nutrition.imedpub.com/archive.php
Table 7 Temperature range of bacteria causing diseases.

| Demographic variables | Variables | 30-70°C | 5-60°C | 40-60°C | 20-60°C |
|-----------------------|-----------|---------|---------|---------|---------|
| Gender                | Male      | 19      | 82      | 51      | 13      |
|                       | %age      | 11%     | 50%     | 30%     | 9%      |
|                       | Female    | 29      | 70      | 41      | 6       |
|                       | %age      | 19.5%   | 48%     | 28%     | 4.5%    |
| Age                   | 21-22 years | 23      | 76      | 02      | 08      |
|                       | %age      | 21%     | 70%     | 2%      | 7%      |
|                       | 23-24 years | 09      | 30      | 89      | 05      |
|                       | %age      | 6.7%    | 22.5%   | 67%     | 3.8%    |
|                       | 25-26 years | 16      | 46      | 01      | 06      |
|                       | %age      | 23%     | 66.6%   | 1.4%    | 9%      |
| Department            | Food related | 27      | 81      | 37      | 09      |
|                       | %age      | 17.5%   | 52.5%   | 24%     | 6%      |
|                       | Non-food related | 30      | 70      | 37      | 20      |
|                       | %age      | 19%     | 44.5%   | 23.5%   | 13%     |
| Maternal status       | House wife | 41      | 117     | 78      | 14      |
|                       | %age      | 16%     | 45.8%   | 31%     | 7.2%    |
|                       | Working woman | 10      | 25      | 16      | 10      |
|                       | %age      | 16.3%   | 41%     | 26.4%   | 16.3%   |
| Residential status    | Hostelized | 19      | 69      | 47      | 05      |
|                       | %age      | 13.5%   | 49.2%   | 33.5%   | 3.8%    |
|                       | Day scholar | 29      | 83      | 45      | 14      |
|                       | %age      | 16.9%   | 48%     | 27%     | 8.1%    |

will increase food safety knowledge and indication of adoption of safe food handling behaviors. This will presumably decrease the risk and incidence of food-borne illness in those receiving assistance.

We should adopt similar programs locally those are being adopted by developed countries such as “Fight BAC (“BAC” stands for “bacteria”)” and “Home Food Safety.

Food safety agencies should play an important role in the education of consumers. Educational material about Good Housekeeping Practice should be available to the general public from many sources. Food safety messages should focus on the younger members of a population with educational programs, but more importantly, with relevant training. It is also of vital importance to properly educate teaching staff in order to transmit food hygiene principles to children, and through them, to their parents. Only safety-conscious consumers can become active partners within the food safety circle.
References

1. WHO (2010) World Health Statistics.

2. Redmond EC, Griffith CJ (2003) Consumer food handling in the home: a review of food safety studies. J Food Protect 66: 130-161.

3. Farber CR, Bennett BJ, Orozco L, Zou W, Lira A, et al. (2011) Mouse genome-wide association and systems genetics identify Asxl2 as a regulator of bone mineral density and osteoclastogenesis. PLoS Genet 7: e1002038.

4. Andersen AS, Hansen PH, Schaffer L, Kristensen C (2000) A new secreted insect protein belonging to the immunoglobulin superfamily binds insulin and related peptides and inhibits their activities. J Biol Chem 275: 16948-16953.

5. Medeiros LC, Hillers VN, Chen G, Bergmann V, Kednall P, et al. (2004) Design and development of food safety knowledge and attitude scales for consumer food safety education. J Am Dietetic Assoc 104: 1671-1677.

6. Jevšnik M, Hlebec V, Raspor P (2007) Consumers awareness of food safety from shopping to eating. J Food Control 19: 737-745.

7. Angelillo IF, Foresta MR, Scozzafava C, Pavia M (2001) Consumers and foodborne diseases: knowledge, attitudes and reported behaviour in one region of Italy. International J Food Microbiol 64: 161-166.

8. Byrd-Bredbenner C, Maurer J, Wheatley V, Schaffner D, Bruhn C, et al. (2007) Food safety self-reported behaviors and cognitions of young adults: results of a national study. J Food Protect 70: 1917-1926.

9. Byrd-Bredbenner C, Maurer Abbot J, Quick V (2010) Food safety knowledge and beliefs of middle school children: implications for food safety educators. J Food Sci 9: 19.

10. Christine MB, Howard GS (1999) Consumer food safety knowledge and practices. J Food Safety 19: 73-87.

11. Comfort OC (2010) Food safety and hygienic practices of street food vendors in Owerri. Nig Stud Sociol Sci 1: 50-57.

12. Aygen FG (2012) Safe Food Handling: Knowledge, Perceptions, and Self-Reported Practices of Turkish Consumers. Int J Business Manag 7: 24.

13. Annor GA, Baiden EA (2011) Evaluation of food hygiene knowledge attitudes and practices of food handlers in food businesses in Accra, Ghana. J Food Nutr Sci 2: 830-836.

14. Gettings MA, Kiernan NE (2001) Practices and perceptions of food safety among seniors who prepare meals at home. J Nutr Educ 33: 148-154.

15. Hassan HF, Dimassi H (2015) Food safety and handling knowledge and practices of Lebanese university students. J Food Control 40: 127-133.

16. Haapala I, Probart C (2004) Food safety knowledge, perceptions, and behaviors among middle school students. J Nutr Educ Behav 36: 71-76.

17. Kennedy J, Jackson V, Blair IS, McDowell DA, Cowan C, et al. (2005) Food safety knowledge of consumers and the microbiological and temperature status of their refrigerator. J Food Protect 68: 1421-1430.

18. Sharif L, Obaidat MM, Al-Dalalah MR (2013) Food Hygiene Knowledge, Attitudes and Practices of the Food Handlers in the Military Hospitals. J Food Nutr Sci 4: 245-251.

19. Langeveld LPM, Cuperus F (1980) The relation between temperature and growth rate in pasteurized milk of different types of bacteria which are important to the deterioration of that milk. Milk Dairy J 34: 106-125

20. Lazou T, Georgiadis M, Pentieva K, McKevitt A, Iossifidou E (2012) Food safety knowledge and food-handling practices of Greek university students: a questionnaire-based survey. J Food Control 28: 400-411.

21. Soares LS, Almeida RCC, Cerqueira ES, Carvalho JS, Nunes IL (2012) Knowledge, attitudes and practices in food safety and the presence of coagulase-positive staphylococci on hands of food handlers in the schools of Camaçari Brazil. Food Control 27: 206-213.

22. Moua LJ, Pérez MA, Pinzon-Perez M (2006) Food Preparation, Practices, and Safety In The Hmong Community. Hmong Stud J 7: 1-24.