Assessing the knowledge, Behavior and Practices on Food Safety and Hygiene among Saudi Women in Eastern Province, Saudi Arabia.

ABSTRACT

**Background:** Unsafe food is a human health problem and remains a burdened issue in most countries.

**Aims:** This work was aimed to assessing the knowledge, behavior and practices on food safety and hygiene among Saudi Women in Eastern Province.

**Methodology:** To achieve this goal, a complete and valid questionnaire was designed for collecting required data via three main questions concerning 1- food safety knowledge and attitude for food handles (buying, storage and serving food), 2- food Safety Behavior & Practices 3- food safety knowledge & awareness. The data were analyzed using SPSS for descriptive, frequency distribution and percentages.

**Results:** Findings indicated that 40% of the women were purchase their foods and needs on weekly basis with high rate (67.7%, 57.9%) for the chicken and meat, respectively, while 26.4% “weekly” utilize or cook vegetables and fruits. 96.2%, 97.4% and 98.3% of the women “always” washed their hands after touching raw chicken/meats and fish, while 48.9% utilized separate cutting boards/knives for raw chicken/meat and fish. However, 89.8% of respondent female rinse cutting boards, knives and plates used for chicken/meats and fish before using them for other food. Only 22.6% of the women “always” checked their fridge temperature (4oC), while 31.5% defrosted frozen foods outside the fridge.

**Conclusion:** Saudi women in young age (18-33Y) mid-age (34-44Y) in eastern province, showed higher knowledge and awareness score in food safety, attitude and practice. Most women (>90%) had a good practice of hand washing, cutting boards washing, knives and plates. However, 28.1% and 23.4% of the respondent’s female believed that it was “safe” to leave hot/cold foods out of the fridge for more than 4 hours, respectively; while 60% believed it was “safe” to defrost frozen foods outside the fridge.

Keywords: Food Safety, Food hygiene, Knowledge, Food borne illness, Saudi woman.

1. **INTRODUCTION**

Overall health is highly related to the food, what you eat is actually what you will gain for your health, depending on that the food needs to be safe from the farm to fork. So, what is food safety? Food Safety (FS) is a wide term can asked about the handling, storing as well as preparing foods to preventing or managing the infections related to the improper food safety and to provide a healthy diet that maintain the health of the community [1].

Furthermore, the safety needs accurate hygiene and when we look to the definition of Food Hygiene, we found it’s the measures and procedures that needs to ensure the quality of food safety from the first step (production) to the final step (consumption). Food hygiene
can indicate to the contamination of food at any point of food safety line. Improper hygiene can lead to sever medical condition it may result to death [2].

Unsafe food is a human health problem burdened in the worldwide, although governments, organization and health sectors all over the world are doing their best to improve the safety and hygiene of foods, the occurrence of foodborne disease remains a health problem issue in most countries.

Recent and previous studies showed us widely informative information about the challenging on the food safety as well as the differences on the knowledge between people about food safety can affect the community itself and the people’s health. Poor knowledge, personal and environmental hygiene contribute significantly to food contamination and resultant foodborne diseases. In addition, the distribution of food as well have a potential effect [3]. Furthermore, the leak of knowledge and awareness can lead to improper behavior of food handling, storage, processing and more until to the consumption of foods that lead to the highly concern about food borne illness and other diseases [4]. It has been reported that in many studies the lack of food safety knowledge and practices among the food handlers have been associated with highest percentage of foodborne diseases transmission [5-8]. And this can pose a significant public health problem. Moreover, WHO reported that, the percentage of food borne illness is increasing for about 30% in many countries, specially industrialized countries [9]. However, in previous studies, mentioned that health and disease-related factors were related to food, attitude, knowledge, and practice [10].

In response to the increasing number of foodborne illnesses, governments all over the world are intensifying their efforts to improve food safety. Therefore, this study aims to: Assessing the knowledge, behavior and practices on food safety and hygiene among Saudi women in eastern province, Saudi Arabia, throw survey distribution among women who’s responsible to carry out foods in deferent ways. Moreover, this study will provide the widely knowledge regarding the food safety and hygiene.

2. MATERIAL AND METHODS

1 Study Area

This is a cross-sectional study, was conducted on Saudi Adult females by survey distribution from December, 2018 to February, 2019 in Eastern province of Saudi Arabia which include (Qatif, Dammam, and Khobar). The sample size was calculated based on the precision of a study and proportional representation

The sample size was calculated according to the following equation:
\[ SS = \frac{Z^2 \times p \times (1-p)}{c^2} \]

Where: \( Z = Z \) value (e.g. 1.96 for 95% confidence level) \( P = \) expected prevalence (6.57%) (General Authority for Statistics, KSA, 2016) \( C = \) confidence interval, expressed as decimal, e.g. (0.05 = \( \pm 5 \))

\[ 3.84 \times 45 \times (100-45) \]

Sample Size (SS) =
= 380 subjects

The prevalence of adolescents is about = 45 %, so the final total sample 209 subjects (Stats.gov.sa, 2018). The sample size will be 209 subjects plus 10% to overcome incomplete data or withdrawal subjects during the study. Finally, the total number will be 230 subjects.

2.2 Research Designee,

Selection of Responded and Data Collection.

A total of 230 subjects characterized Saudi females who’s responsible for preparing, helping and consuming of foods, aged from 18 and over, who living in Eastern province (Qatif, Dammam, Khobar), and agree to participant, were selected randomly and let them answering the questionnaire. But the respondents who did not meet the criteria were excluded.

Structured questionnaire given to the respondents to complete the data by their own, previously their given a consent form. The questionnaire method is popular for collecting data with fewer prices and saving time. This method adopted from Turnbull-Fortune and Badrie, [12]. The questionnaire modified to be more suitable for study aim. Having tow form, Arabic form and English form. However, the time for completion the questionnaire ranged from 10 to 15 minutes. The questionnaire was considered many subsides that include Demographic status which includes: age, gender, economic status, educational level and householder.

The second part had the list of question asked about food buying, habits, preparation and attitudes, that includes five questions about food shopping and preparation. The question usually include 5 choices (everyday, weekly or more often, monthly or more often, less than monthly, and never). The third part consisted of 12 questions regarding food safety behavior and practices, which asking about the safety during handling and preparation in the kitchen. The question include 5 choices (always, most of the time, sometimes, rarely, and never). The fourth part had 6 questions regarding food safety knowledge and 5 questions were asked about safety awareness. The question include 3 choices (safe, neither safe or nor unsafe, and unsafe). The correct answer of the safety knowledge and awareness were given a score of 1 and the incorrect answer as 0. In the knowledge part, people who scored below 50th percentile of highest score were having poor knowledge, 50th-75th percentile - fair knowledge, >75th percentile - good knowledge. In the awareness part; people who scored below 50th percentile were following poor practice, 50th-75th percentile- fair practice, >75th percentile - good practice.
2.3 Data Processing and Analysis

The data were analyzed using SPSS version (23) for descriptive, frequency distribution and percentages.

2.4 Ethical consideration

The study was approved by Institutional Review Board – (IRB — 2018-03- 274) in Imam Abdulrahman bin Al-Faisal university – Dammam, Saudi Arabia.

- As volunteers giving all of the information about objectives with procedures of the study.
- They must write all the sources of the authors that used in each part of the study.
- Discriminating, degrading, and hard language, all of these clearly effectors shouldn’t contain on the questionnaire.
- Any personal questions should be avoided or excluded from the questionnaire, and it should be collect the general information depending on the research questions.
- Each participant will be asked to sign a formal consent, which clarify the study that will be carried, patients refuse to sign will be excluded.
- A clear description of any benefits and risks associated with participation.
- Present study materials in a form that can be well understood by the respondent.

Note: Review paper may have different types of subsections.

3. RESULTS AND DISCUSSION

3.1. Food Buying Habits, Preparation and Attitudes

A total of 235 females in this cross-sectional study responded to well-designed questionnaires to measure self-knowledge about food safety, procurement, habits, preparations and attitudes (Table 1). In the responses of shopping, there was a preference for buying foods on a weekly basis, with 40% of females, and (70.25%) of these were females in age (18-33Y), 22.25% mid-age (34-44Y) and 7.5% for above 45-year-old (Figure 1). The same results showed in the Turnbull-Fortune and Badrie study [12], who reported that a 42% of the females preference purchasing foods weekly. While 38.3% of the respondents (n = 90) are purchasing their food on a monthly basis. This shows that, the most frequency of food shopping is weekly. While, they prepare, handle, or cooked raw food such as meats, chicken, fish, fruits & vegetables showed different practices on a day or a week basis. The most frequencies practices of chicken on a week basis is 67.7%, followed by meat 57.9% and fish 50.2%, while 61.7% for fruits & vegetables were observed on every day. However, 12.8% of respondents women (n=30) they never prepare, handle, or cooked raw fish, 6.0% (n=14), for both meat and chicken and 5.5% of for fruits & vegetables.

Figure 1: Ages distribution among respondent’s women
3.2. Food Safety Behavior & Practices

As shown in Table 2, the analysis of food safety behavior and practices showed that 96.2% of respondent’s women wash hand after touching raw chicken, 97.4% after touching raw meats and 98.3% after touching raw fish. Most of participants they are always washing hands after touching raw meat (chicken, fish and red meat) which indicate good behavior and positive practices among respondents, and this finding agreed with Turnbull-Fortune and Badrie [12] report that 81% of female, 38% female and 49% male answers they are always wash hand after touching raw chicken, raw meat or fish respectively. Moreover, the analysis showed that, 48.9% of female always use separate cuttings boards or knives for just raw chicken meat, while 21.7% of female they never using cutting boards or knives for just raw chicken meat. This is line with Moreb, et al. [13]. Report that 51.2% for response report they always use sparest of the chopping board for raw meat and fresh fruit. As well as, Turnbull-Fortune and Badrie, [12] report that 33% female and 24% male they are always use individual cutting-board and knife for easy food type. But the opposite finding shown in Turnbull-Fortune and Badrie, [12] this research finds out that, the Indian students didn’t use a separate cutting board. The total percentage for females who always rinse cutting boards, knives and plates used for raw chicken before using them for other food 89.8% which indicted to good practice. In investigation regarding leaving hot and cold foods at room temperature for more than 4 hours, 43.9% females rarely leaving cold foods at room temperature for more than 4 hours as the same percentage for never. On the other hand, 72.8% females, they were responded that they never leaving hot foods at room temperature for more than 4 hours. As the same results shown in result by Turnbull-Fortune and Badrie, [12] 37% of response there are sometime leave cold food out of fridge for more than 4 hr. Redmond and Griffith [14] belief this practice can affect the behavior of the person. 40.9% of females sometimes back cooked meat to the same plate before cooking, unsafe behavior appeared hears. This finding agreed with Kraus [15] which believing how much the behavior can affect the safety. Furthermore, in responses to defrost frozen foods outside the fridge always with 31.5% female, 72.9% aged group from 18-33 Y/O, 24.3% aged from 34-44 Y/O and 2.70% more than 45 Y/O, otherwise, the defrosting foods outside of the fridge increase the contamination chance. This result can observe low education regarding safety. On the other hand, in the study (NWC Research- May 2006) showed the opposite finding, they represented the 15% responding always, 33% sometimes, 19% never. Responses of cleaning the fridge 41.7% female always clean the fridge. This is good practice for preventing contamination and observes good understanding about the cleaning behavior. In another research, they reported the general cleaning about the serving area and eating area utensils is good practice and indicating to good understanding and knowledge about cleaning [16]. 23.4% in responding to check the fridge temperature (4oC) with never. This finding is supported by AL-Sahbib, Husain and khan [16], the observe the majority of response is 61.8% never chck the fridge temperature. However, in the refrigerator, store raw meat, poultry and seafood below cooked or ready to eat food, the most respondents with 58.7% saying never. And this practice is high in 33.3% aged group 18-25 Y/O. This shows good practice for preventing cross contamination. WHO reported the good practice can prevent the all shapes of contamination [17].

Table: 1 Self-reported on food buying, habits, preparation & attitudes

<table>
<thead>
<tr>
<th>Self-reported on food buying, habits, preparation &amp; attitudes</th>
<th>Every Day</th>
<th>weekly or more often</th>
<th>monthly or more often</th>
<th>less than monthly</th>
<th>Never</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Food Shopping</td>
<td>26(11.1%)</td>
<td>94(40.0%)</td>
<td>90(38.3%)</td>
<td>22(9.4%)</td>
<td>3(1.30%)</td>
<td>235(100%)</td>
</tr>
<tr>
<td>How often do you prepare, handle or cook raw chicken?</td>
<td>41(17.4%)</td>
<td>159(67.7%)</td>
<td>18(7.7%)</td>
<td>3(1.3%)</td>
<td>14(6.0%)</td>
<td>235(100%)</td>
</tr>
<tr>
<td>How often do you prepare, handle or cook other raw meats?</td>
<td>11(4.7%)</td>
<td>136(57.9%)</td>
<td>52(22.1%)</td>
<td>22(9.4%)</td>
<td>14(6.0%)</td>
<td>235(100%)</td>
</tr>
<tr>
<td>How often do you prepare, handle or cook other raw fish</td>
<td>8(3.4%)</td>
<td>118(50.2%)</td>
<td>43(18.3%)</td>
<td>36(15.3%)</td>
<td>30(12.8%)</td>
<td>235(100%)</td>
</tr>
<tr>
<td>How often do you prepare, handle or cook other raw vegetables or Fruits?</td>
<td>145(61.7%)</td>
<td>62(26.4%)</td>
<td>15(6.4%)</td>
<td>10(4.3%)</td>
<td>13(5.5%)</td>
<td>235(100%)</td>
</tr>
</tbody>
</table>

Table: 2 Self-reported on food safety behavior & practices

<table>
<thead>
<tr>
<th>Self-reported on Food Safety Behavior &amp; Practices</th>
<th>Always</th>
<th>Mostof time</th>
<th>Sometimes</th>
<th>Rarely</th>
<th>Never</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Wash your hands after touching raw chicken: 226(96.2%)  7(3.0%)  0.0  2(0.9%)  0.0  235(100%)
Wash your hands after touching raw meats: 229(97.4%)  5(2.1%)  0.0  1(0.4%)  0.0  235(100%)
Wash your hands after touching raw fish: 231(98.3%)  3(1.3%)  1(0.4%)  0.0  0.0  235(100%)
Use separate cuttings boards or knives for just raw chicken/meat and fish: 115(48.9%)  35(14.9%)  23(9.8%)  11(4.7%)  51(21.7%)  235(100%)
Rinse cutting boards, knives and plates used for raw chicken before using them for other food: 211(89.8%)  14(6%)  2(0.9%)  0.0  8(3.4%)  235(100%)
Leave cold food room temperature out of the fridge for more than 4 hours: 17(7.2%)  21(8.9%)  73(31.1%)  82(34.9%)  82(34.9%)  235(100%)
Put cooked meats back into the same plates used to store raw meats without washing them first: 15(6.4%)  46(19.6%)  96(40.9%)  43(18.3%)  35(14.9%)  235(100%)
Leave hot foods at room temperature out of the fridge for more than 4 hours: 7(3%)  12(5.1%)  19(8.1%)  26(11.1%)  171(72.8%)  235(100%)
Defrost frozen foods outside the fridge: 74(31.5%)  60(25.5%)  14(6%)  14(6%)  33(14%)  235(100%)
I used to clean the fridge: 98(41.7%)  67(28.5%)  57(24.3%)  9(3.8%)  4(1.7%)  235(100%)
I used to check the fridge temperature (4°C): 53(22.6%)  44(18.7%)  34(14.5%)  34(14.5%)  55(23.4%)  235(100%)
In the refrigerator, store raw meat, poultry and seafood below cooked or ready to eat food: 18(7.7%)  11(4.7%)  35(14.9%)  33(14%)  138(58.7%)  235(100%)

3.3. Food safety knowledge & awareness

The investigation of the knowledge of food safety (table 3) showed the knowledge about washing hand before touching, handling, and preparing food was mostly reported correct answer as “safe” with 94.9 % of female in aged 18-25 Y/O. This result is in cross with Gong et al., [18], which showed the respondents not washing their hands before preparing food and they have poor knowledge about safety regarding to the washing hand before handling, touching and preparing food. On the other hand, AL-Sahbib, Husain and Khan [16], reported that there is a significant relationship between washing hand before handling food and reduce contamination. However, the data of this study showed the knowledge about the safety after touching raw chicken meat, or fish was mostly reported as “safe” with 96.3% female. This finding reported highly knowledge about the safety after touching raw chicken meat, or fish. Support that (NWC, 2006) access the knowledge about washing hand after thought raw meat, the result found 66% of sample they though wash hand after thought meat and fish is safe. Furthermore, the knowledge of separating cutting board of knife for raw chicken or meat in this study also reported as “safe” with 89.8% female, most of them 70.14% aged from 18-33 Y/O, 24.17% aged from 34-44 Y/O, and 5.21% above 45Y/O. Highly knowledge about the separating cutting board of knife for raw chicken or meat showed in this study especially in age group 18-33 Y/O. This result is line with (NWC, 2006), which reported 50% from the respondents choose safe. Another study showed different results which mentioned that, when the respondents ask about the practice of cutting board of knife for raw chicken or meat, they were belief that is unhygienic practice with 99.6% [19]. The investigation about the knowledge for leaving hot and cold food in room temperature, 46.8% n 44.3% of the respondents felt that it was unsafe for good practice in food safety. Support the result Naeem et al., [19] 74.5% of participant report than leaving hot food at room temperature for more than 4 hr., unhygienic practice. The same result report by (NWC, 2006), 48% of response thought leave hot Or cold foods at room temperature for more than 4 hours unsafe. Likely to see the good knowledge about the safety of leaving cold foods at room temperature for more than 4 hrs. These finding is in a line with Turnbull-Fortune and Badrie, [12] findings. The results supporting the finding in this study and reporting that, there was highly knowledge about food safety after touching raw meat, separating board, leaving hot and cold in room temperature more than 4 hrs. The last question is about the knowledge about defrosting frozen foods outside the fridge, and the most likely answers “safe” with 60%. (NWC, 2006) reported 31% of respondents answered safe.

Table3: Responses to food safety knowledge (N = 235).
The last finding on this article is about self-reported on food safety awareness table 4, showed in the first and second questions, > 70% of the respondents had heard or read information about food safety and food poisoning. These results indicate that most of the respondents had a good awareness about food safety and food poisoning information. The following question The third question was, to know the respondent’s awareness, that food poisoning could be resulted from lack of food safety and hygienic practices. They mostly answer yes with 97.4%. This finding approves that, the respondents were aware of the hazard regarding unsafety of food such poisoning. However, the respondents of 48.9% felt that they were fully understand all the issues surrounding the safe buying, transporting, preparing, cooking, serving and storing food. These results illustrate that almost about 50% of respondents feel they are fully understand the safety from the handling to the preparing and eating food. The finding reported is supported by Turnbull-Fortune and Badrie, [12]. Which find that, the respondents have aware about food safety. Finally, the last question was about have you ever had any formal training in food safety or food preparation? Interestingly, more than 80% of the respondents did not attend or receive any workshop or training on food safety.

### Table 4: Responses to food safety awareness (N = 235).

<table>
<thead>
<tr>
<th>Self-reported on Food Safety awareness, based on the question response to Yes, No</th>
<th>Yes (%)</th>
<th>No (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Can you remember, seeing, hearing or reading any information about food safety?</td>
<td>166(70.6%)</td>
<td>68(29.4%)</td>
</tr>
<tr>
<td>Can you remember, seeing, hearing or reading any information about food poisoning</td>
<td>173(73.6%)</td>
<td>62(26.4%)</td>
</tr>
<tr>
<td>Do you know many food poisonings could be resulted from lack of food safety and hygienic practices?</td>
<td>229(97.4%)</td>
<td>6(2.6%)</td>
</tr>
<tr>
<td>Do you feel that you fully understand all the issues surrounding the safe buying, transporting, serving and storing food?</td>
<td>115(48.9%)</td>
<td>120(51.1%)</td>
</tr>
<tr>
<td>Have you ever had any formal training in food safety or food preparation?</td>
<td>43(18.3%)</td>
<td>129(81.7%)</td>
</tr>
</tbody>
</table>

### Strengths and Limitations

The strengths of this study is that the authors clearly observed, the honesty regarding the woman answers, the age group which is suitable to the study aim and questions in the questionnaire, easy to asses to the females, low cost regarding this study. One of the limitation of this study is the sample size is limited; in future we should to makes into account other cities in Eastern Province. On the other hand, the self-report studies usually leading to over estimation to the self-correct practice.

### 4. CONCLUSION

A total of 235 women in this cross-sectional study responded to well-designed questionnaires to measure self-knowledge about food safety knowledge and awareness, attitude and practices, as well as food buying practices, preparation and services. Most women (>80%) have almost good knowledge and awareness, with >90% had a good practice of handwashing, cutting boards washing, knives
and plates. However, 28.1% and 23.4% of the respondent’s female believed that it was “safe” to leave hot/cold foods out of the fridge for more than 4 hours, respectively; while 60% believed it was “safe” to defrost frozen foods outside the fridge.

**CONSENT (WHERE EVER APPLICABLE)**

Authors have declared that ‘written informed consent was obtained from the participants. (A copy of the written consent was attached)

**ETHICAL APPROVAL (WHERE EVER APPLICABLE)**

Ethical approval: Authors hereby declare that the questionnaire and the study were approved by the committee of Institutional Review Board (IRB) “No. IRB 2018-03- 274” in Imam Abdulrahman Bin Faisal University (IAU), Dammam, Saudi Arabia.

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