



## Study on food safety concerns, knowledge and practices among university students in Saudi Arabia



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### ABSTRACT

Food Safety is important not only for the health of consumers but also the entire food industry and regulatory authorities. University students are an important target group as they are most likely to engage in risky eating behaviors and food handling practices making them susceptible to foodborne illness. The objectives of this study were to assess the level of food safety concerns, knowledge and practices among male and female university students of King Saud University, Saudi Arabia. Information concerning sociodemographic and academic characteristics and food safety knowledge were collected using self-administered questionnaire. Food safety questions were divided into four sections that covered key food safety concepts. A total of 808 students took questionnaires of which 66.08% responded (mean age  $21.1 \pm 2.9$ ). Major food concerns for students were food taste, food temperature, food presentation, wellness of cooked food, cleanliness of serving area and appearance of food handlers. Students displayed good knowledge concerning food safety. Respondents were most knowledgeable about the cleanliness of kitchen surfaces and utensils, prevention of cross contamination and hand hygiene but demonstrated poor knowledge about heat treatment of food and temperature. Good knowledge of food safety was reflected in food safety practiced by the students except temperature control. Chi-square test results revealed that both male and female students demonstrated comparable food safety knowledge and practices. This is probably the first gender-based report on the food safety concerns, knowledge and practice among students of King Saud University, Saudi Arabia. The study highlights the need for educational programs that aim not only to provide knowledge but also encourage the students to practice the food safety measures strictly.

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### 1. Introduction

Food safety is defined as the degree of confidence that food will not cause harm or sickness to the consumer when it is prepared, served and eaten according to its intended use (WHO, 2003). Foodborne diseases, an increasing public health problem, are responsible for considerable morbidity and mortality globally (Linscott, 2011). Therefore, safety of food continues to be of paramount importance for not only consumers but also the entire food industry and regulatory authorities. Increasing cases of consumption of unhealthy food are being reported and approximately 76 million cases of illness, 325000 hospitalizations and 5000 deaths each year are reported in the US alone (Mead et al. 1999). According

to a report published in 2013 by the Health Ministry, Kingdom of Saudi Arabia, approximately 1647 food borne illness were reported in 2010. In another report, in 2011 alone, the 255 incidences for food borne diseases were reported causing illness in 2066 people (Health Ministry Saudi Arabia, 2013). Occurrence of foodborne illnesses is at times attributed to the improper handling of the food items at consumers' homes (Redmond & Griffith, 2003). Mishandling of food can occur during preparation, handling and/or storage of food (Knabel, 1995) and numerous studies have shown that the mishandling of food occurs because consumers have inadequate knowledge about food handling practices (Altekruse, Street, Fein, & Levy, 1996; Knabel, 1995; Meer & Misner, 2000; Redmond & Griffith, 2003). Hence, educating consumers on safe food handling practices can achieve prevention and control of foodborne illnesses (Jevnsnik, Hlebec, & Raspor, 2008).

Several studies have shown that food safety knowledge and self-reported behavior do not co-relate well with the food handlers and consumers (Al-Shabib, Mosilhey, & Husain, 2016; Bruhn & Schutz,

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1999; Redmond & Griffith, 2003). However, such reported behaviors provide an insight into what consumers know and what they need to be educated (Redmond & Griffith, 2003). Foodborne diseases can be prevented if control measures and proper food handling and preparation practices are applied (Azevedo, Albano, Silva, & Teixeira, 2014; Milton & Mullan, 2010; Powell, Jacob, & Chapman, 2011). Food safety knowledge and behaviors among college students have been studied globally. A recent study showed positive correlation between college status, students major and self-rated food safety knowledge scores (Osaili, Obeidat, Abu Jamous, & Bawadi, 2011). In Turkey, Sanlier (2009) found that more than 50% students (14–19 year old) did not know that checking the internal temperature of the food is the safest way to know if the meat was cooked well. Garayoa, Córdoba, García-Jalón, Sanchez-Villegas, and Vitas (2005) reported that students with more knowledge of food hygiene had better reported practices, but even these students reported some high-risk behaviors. In summary, the results of a number of studies revealed that students are mainly concerned with those food safety behaviors that put their health at risk for foodborne diseases (Byrd-Bredbenner, Maurer, Wheatley, Cottone, & Clancy, 2007; Garayoa et al., 2005; Sanlier, 2009; Sharif & Al-Malki, 2010).

To the best of our knowledge, limited studies focused on college students have been performed, and there are no gender based studies concerning food safety knowledge of students studying at King Saud University, Saudi Arabia. The target group for this study has been chosen to be university students because 1) they are more likely to engage in risky eating behaviors than others and thus more susceptible to foodborne illnesses 2) they are more likely to engage in risky food handling practices than others because of their future roles as home makers, cooks and food processors and handlers. Therefore, this study aimed to assess the level of concerns, knowledge, attitude and practice concerning food safety among male and female students of King Saud University, Saudi Arabia.

## 2. Materials and methods

### 2.1. Subjects' selection and recruitments

A cross-sectional study was conducted to assess the level of food safety knowledge among college male and female students of King Saud University, Riyadh, Kingdom of Saudi Arabia. Subjects of the study belonged to different age groups and college of studies. The researchers met with students to inform them about the study, its objectives, significance, and the protocol. Students were asked to participate voluntarily in the study. Participants were given 1 week to complete the questionnaire and return it to the researcher. Participants who did not return the questionnaire in the stipulated time were sent a reminder and given further 1 week to complete the survey. Subjects whose response did not come in the allotted time and those submitting incomplete questionnaires were not considered in the study. A total of 808 students took questionnaires of which 534 (66.08%) participated in the study.

### 2.2. Questionnaire

The questionnaire was developed by authors in accordance with the preventive measures laid down by the World Health Organization (2012) and previous studies (Byrd-Bredbenner, Abbot, & Quick, 2010; Ovca, Jevsnik, & Raspor, 2014). The questionnaire was divided into five sections. Part 1 included demographic data namely respondents age, gender, nationality and college of study. The 2nd section focused on the food safety concerns of students. The respondents were asked to list their food safety concerns related to the food they buy in the campus. The 3rd

part comprising six statements evaluated the personal understanding of respondents towards food preparation and related risks. Knowledge regarding food safety was evaluated in the 4th part of the questionnaire on the basis of 15 questions. The questions were grouped under six categories, and one question was uncategorized as it was related to food safety responsibility after purchase. Food safety practices were investigated in the 5th section. Using a 3-point scale (never, always and occasionally) the respondents reported how often they performed the described action and scored from 0 to 2 with higher scores for better practices. Level of practice was classified into poor level (Less than 59%), fair level (60–80%) and good level (80–100%) as described by Gizaw, Gebrehiwot, and Tekla (2014).

### 2.3. Statistical analysis

Data analysis was performed using SPSS software for Windows, version 20.0. Data is presented as frequencies (%); chi-square test of independence is used to test association between gender and select variables. p-value less than 0.05 was considered statistically significant.

## 3. Results

### 3.1. Demographic profile of the respondents

The demographic profile of the student respondents is shown in Table 1. Male respondents exceeded the number of female respondents in the present study. Male respondents constituted 53.4% of the subjects as against 46.6% female respondents. The majority of the respondents were Saudi Nationals (89.7%) and remaining 3.9%, 1.6%, 2.6% and 2% were from Pakistan, Nigeria, Yemen and India, respectively. The average age of the respondents was  $21.1 \pm 2.9$  years and in terms of age distribution, most student respondents (59.7%) were in age group of 21–25 as against those who were less than 20 years (19.4%), 26–30 years (15.7%) and 31 and above (5%). Students in the present investigation belonged to different colleges of study, most of them are enrolled in College of Food and Agriculture (33.1%) followed by Biological Sciences (26%), Business Administration (23%), Science (16.4%) and Nursing (14.2%).

**Table 1**  
Demographic profile of respondents.

Demographic characteristic	N	Percent
<b>Sex</b>		
Male	285	53.4
Female	249	46.6
<b>Nationality</b>		
Saudi	479	89.7
Pakistani	21	3.9
Nigeria	9	1.6
Yemen	14	2.6
India	11	2
<b>Age (years)</b>		
≤20	104	19.4
21–25	319	59.7
26–30	84	15.7
≥31	27	5
<b>College of study</b>		
Science	88	16.4
Biological science	139	26
Nursing	76	14.2
Business administration	54	23
Food and agriculture	177	33.1

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