Journal of Agriculture and Environmental Sciences
June 2015, Vol. 4, No. 1, pp. 118-126
ISSN: 2334-2404 (Print), 2334-2412 (Online)

Published by American Research Institute for Policy Development
DOI: 10.15640/jaes.v4n1a15
URL: http://dx.doi.org/10.15640/jaes.v4n1a15

College Students Food Safety Practices

Joseph, A[1], W.L.Whittaker[2], R. Boateng[2] & T. Hargrave[2]

Abstract

Safe food is an important issue that has been given global attention. It is critical for public health, socio-economic stability and global commerce. Food borne illness can be serious or even fatal. Therefore, it is very important for college students to know and practice safe food consumption, preparation and handling. This study investigated various aspect of college student food safety practices. The information gathered will be used for the development of effective food safety education initiatives at Alcorn State University. Data were collected by means of face-to-face surveys. Analysis was done using the Statistical Package for Social Science (SPSS). Two hundred and eighty (280) students were surveyed with a response rate of 100 percent. Results indicate that respondents consisted of 6.4 percent white and 93.6 percent Black-African Americans. Over 52 percent of respondents were female and 47.5 percent were male. Approximately 36 percent were between the age of 30-39 and 37.1 percent were between 40-49 years of age. A majority of respondents strongly agreed that food safety begins with proper hand-washing and that practicing food safety helps maintain good health. This project provides an opportunity for the development and implementation of food safety education strategies to improve specific food safety behaviors.

Keywords: Food safety, foodborne illness, socio-economic stability and global commerce, college students, food handling practice

Introduction

Food is essential, and safety should be a top priority. Safe food is important for public health, socio-economic stability and global commerce. Despite the attention to the subject of food safety and the rising concern for food borne illness (otherwise called food poisoning), research aimed at developing a deep understanding of the safety and food borne illness among college students is limited and therefore warrants attention. Food safety education is a very important aspect of the overall food safety initiative. Knowledge of food safety should be addressed at an early stage in educational institutions. It must be made clear that without the knowledge of food safety and proper handling practices, food borne illnesses cannot be reduced. It is of critical importance to recognize that college students are also consumers, therefore, there is a need to investigate food safety practices, behavior, knowledge and awareness among college students. College students 'behavior in relation to food safety issues can only be properly predicted if there is a systematic understanding of the way in which they perceive risks, and benefits, associated with different food safety issues. College students are under a lot of pressure and they often get their meals the quickest and easiest way possible. When it comes to safely preparing meals, many college students simply do not know much about safe food preparation, and many end up with food borne illness or food poisoning. Food borne illnesses or food borne diseases which can be defined as "any disease or infection caused by or believed to be caused by consuming contaminated food or water," are an importantpublic health burden in the United States.

[1] Department of Agriculture, Alcorn State University, 1000 Alcorn Drive, #750, Alcorn State, Missiissippi 39096. Office: 601-877-4055, Fax: 601-877-6219. Email: ajoseph@alcorn.edu
[2] Department of Agriculture, Alcorn State University, 1000 Alcorn Drive, #750, Alcorn State, Missiissippi 39096.

The Center for Disease Control estimates for the year (2011) that roughly one in six Americans or 48 million people got sick, 128,000 were hospitalized and 3,000 died of food borne diseases. Although the number of reported infections has steadily declined, food borne diseases remain a significant problem (CDC, 2005). The objectives of this study are to enhance the awareness of college students' in southwest Mississippi as well as the broader community about the different aspects of food safety practices. Another objective is to develop a curriculum to promote food safety practices among students, and to develop a curriculum to promote safe food practices among college students and other consumers. Food safety, including food borne illness has been a major concern for decades. While the food supply in the United States is one of the safest in the world, Centers of Disease Control and Prevention (CDC), now estimates that 47.8 million illnesses and 3,037 deaths were caused by contaminated food consumed (Scallan et al., 2011a; Scallan et al., 2011b; mead 1999). The economic toll on society from food borne illness is astronomical. Batz, Hoffmann, and Morris (2011) estimate the annual cost of food borne illnesses at $14 billion.

Food safety is of greater importance now than it has ever been. Business level, international trade, retail pressure and the ever increasing consumer demands dictate that safe manufacturing, retail, and transportation of food from sources to dinner plates must be in place. Preventing food borne illnesses and deaths remains a major public health challenge. Although food safety involves physical, chemical, and microbial causes, recent trends have shown microbial defects; especially pathogenic bacteria have been a major problem in the food industry and have affected the industry greatly. To many consumers, safe foods mean that there will be no danger from pathogenic microorganisms, naturally occurring toxins or other potentially harmful chemicals which may be deliberately added to foods. The economic impact of this problem is considerable, with an estimated $420 billion spent on direct medical costs and $152 billion attributed to lost productivity annually (Pew Health Group, 2010). The United States Department of Agriculture (USDA) and the Economic Research Service (2014), estimates the annual cost of food borne illnesses from major pathogens in 2015 to be over $ 15 billion in medical cost, lost wages and productivity, and premature death. These cost estimates is troubling and a major concern. Food safety is first and foremost the responsibility of food producers, processors and others throughout the food chain, including students who are also consumers. But with recent increases in reported outbreak of food related illnesses, Congress has responded to the public's growing concern over food safety with new legislation purported to strengthen the food safety system. Congress's actions reflect the common perception that food is becoming less safe (U.S. CDC, 2009). Many government agencies and other related associations are constantly developing and implementing food safety programs, regulations, and training specifications. (Meer & Misner, 2000). A key question is whether legislation that leads to more regulations and inspections will result in significant improvements in food safety.

According to Medeiros et al, (2004), improving food safety knowledge and belief through training had a positive outcome on food handling practices. To prevent food borne illness, emphasis should be placed on improving personal hygiene, cooking foods properly, avoiding cross contamination, storing food at safe temperatures, and avoiding food from questionable sources. Personal hygiene is critical in preventing contamination of food and food borne illness. Consumers must wash their hands properly after handling raw meats or using the bathroom, to prevent contaminating other foods, and surfaces they touch. More than three million cases of food borne illness annually are caused by pathogens associated with cooking food inappropriately (Masami, Miriam, Sandra, & Virginia, (2006). When cooking, food should remain heated for an adequate amount of time at a high enough temperature to kill the bacteria that cause food borne illness. Using a food thermometer ensures that food has reached a high enough temperature to destroy harmful bacteria and to guarantee that it is completely cooked. Harmful bacteria in most foods can be destroyed by cooking food at temperatures between 140^{o} F (70^{0}C) and 180^{0} F (90^{0} C) (Medeiros, Hillers, Kendall & Mason, 2001). One of the most common causes of food borne illness is cross contamination, which is the transfer of bacteria from food to food, hand to food or equipment to food (Zain & Naing, 2002). Cross contamination can also occur when raw or foods are stored directly adjacent to or above cooked foods in the refrigerator. To prevent or minimize cross contamination, cooked and ready-to eat foods should be kept separate from raw products while shopping, preparing, and storing food items. Utensils, cutting boards, and food preparation areas should be washed with hot soapy water after use for raw meat, fish or poultry products (Medeiros et al., 2001).

Methods

Population Description

College students (N=280) from Alcorn State University participated in the survey. These participants came from diverse socioeconomic backgrounds and were selected using the simple random sampling method. The random sampling methods was employed because it guaranteed that the sample chosen would be representative of the population, also the researchers wanted everyone in the target population to have the same chance of been selected to participate in the study.

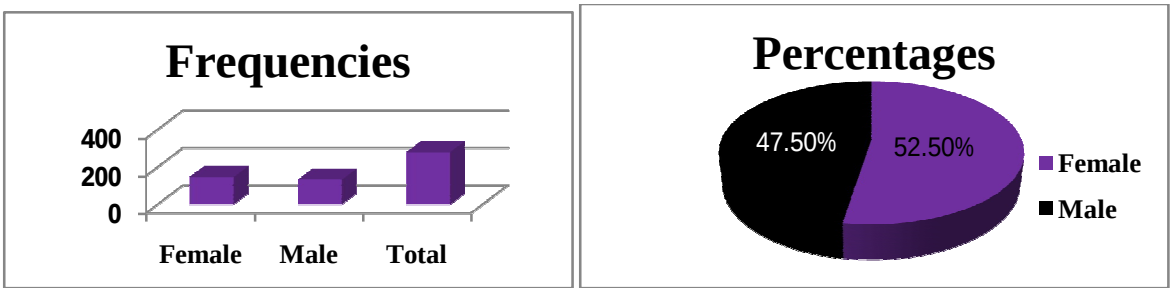
Research Design and data Analysis

The research design use for the study was descriptive method. In order to meet the study objectives a two-part questionnaire was designed. Part one was designed to collect demographic data and part two to determine the participants' level of agreement on food safety issues. The survey participants were asked to rate their level of agreement to statements by using a five- point Likert scale with the ratings of strongly agree, agree, neutral, disagree, or strongly disagree. The questionnaire was designed as described by Dillman (2000). A pilot survey was conducted with nonstudent participants to determine any deficiencies or inadequacies with the instrument design. The pilot survey indicated no problem with the design nor with the process to collect information for the study. The demographic information collected from participants included nationality, gender, marital status, age, education level, and income. Data collected were analyzed using the Statistical Package for Social Science (SPSS version 17.0).

Results and Discussions

A total of 280 student participants were administered a face-to-face survey instrument. The researcher received 280 completed surveys for an overall response rate of 100 percent. The majority of respondents 147 (52.5%) were female while 133 (47.5%) were male. Participants between the ages of 30-49 were more likely to participate in the survey. Sixty one percent of respondents were single.

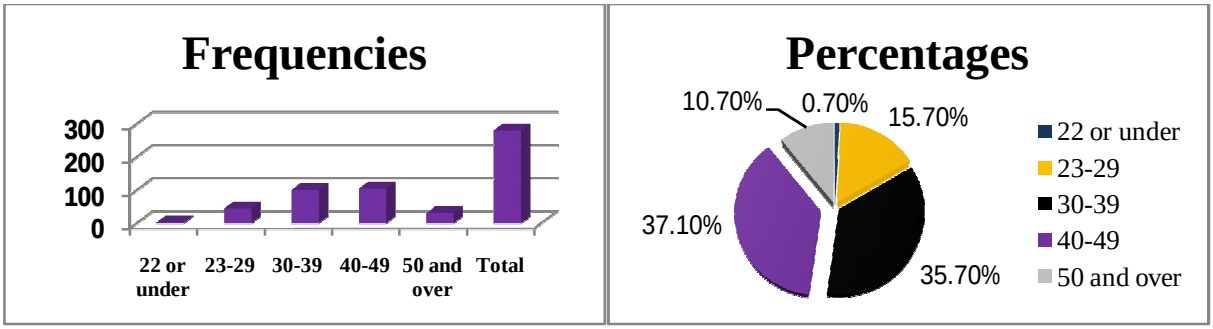
Figure 1A: Gender Information of College Students



Gender

Figure 1A indicates the gender of the participants in the study. Of the 280 participants, 147 (52.5 percent) were female and 133 (47.5 percent) were male.

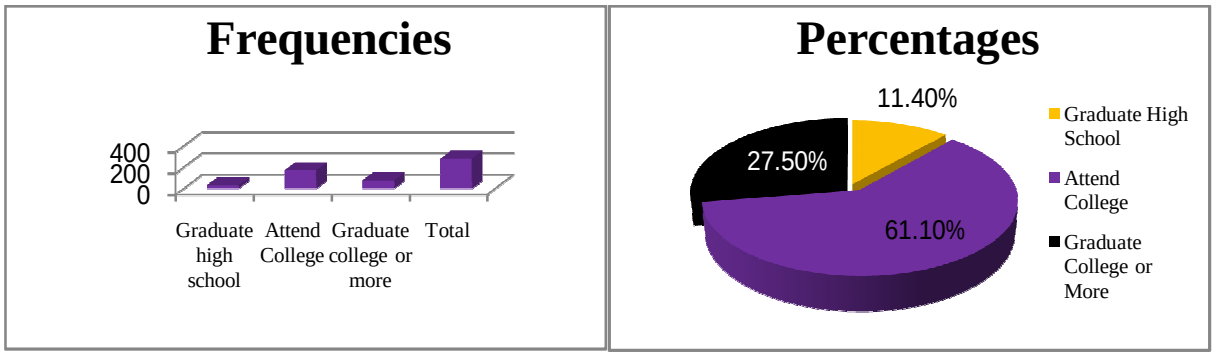
Figure 1B: Age Information of College Students



Age

Figure 1B reports the age range of the participants involved in the study. Approximately 45(15.7 percent) ofthe participants were between 23 and 29 years of age; 100 (35.7 percent) were between ages 30 and 39; 104 (37.1 percent) between the ages 40 to 49; while 30 (10.7 percent) were 50 years and older.

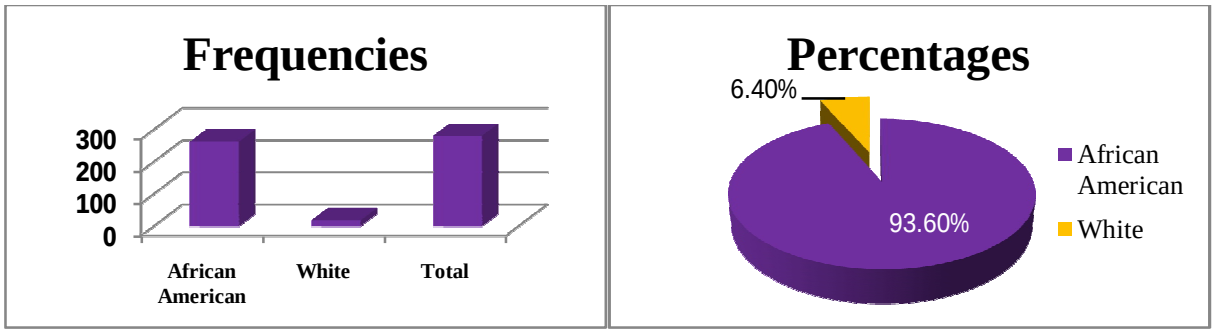
Figure 1C: Education Information of College Students



Education Level

Figure 1C shows the highest level of education completed by the student participants. Thirty-two (11.4 percent) were high school graduates (incoming freshmen); 171(61.1 percent) attend college, and 77 (27.5 percent) graduate college and are in graduate school.

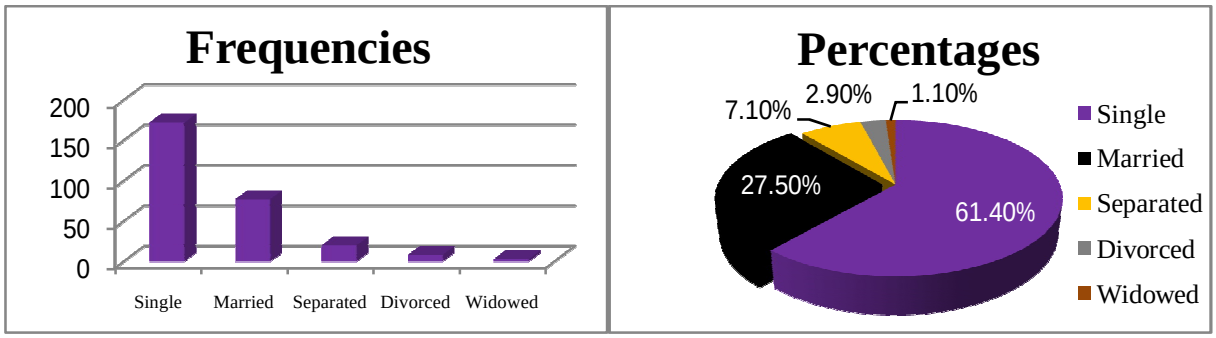
Figure 1D: Racial / Ethnic Groups



Racial / Ethnic Groups

Figure1D shows the nationality of the participants in the study. Two hundred and sixty-two (93.6%) of participants were African-American and 18 (6.4%) were white.

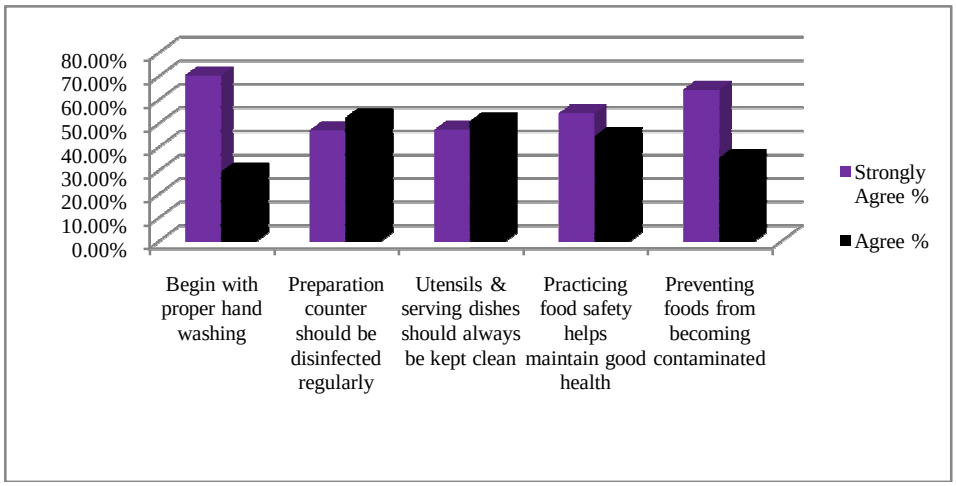
Figure 1E: Marital Status



Marital Status

Figure 1.E gives the marital status of the participants. Of the 280 participants in the study, 172(61.4 percent) were single; 77(27.5 percent) were married; 20 (7.1 percent) were separated; while 8 (2.9 percent) were divorced, and 3(1.1%) were widowed.

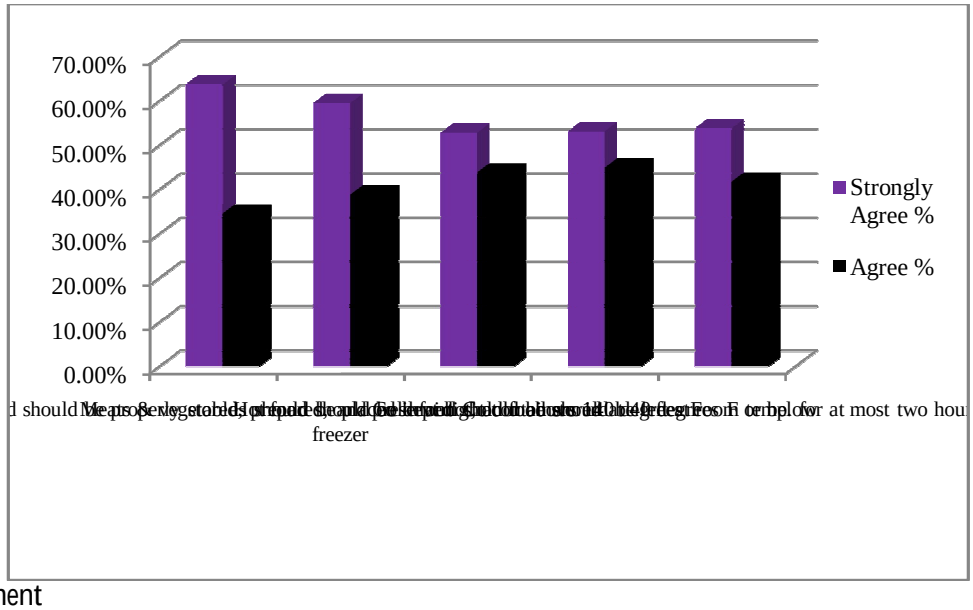
Figure 1F: College Student Level of Agreement on Food Safety Practices (n = 280)



Level of Agreement

Approximately 70.4 percent of participants strongly agreed that food safety begins with proper hand washing, while 29.6 percent agreed. When respondents were asked if the preparation counter should be disinfected regularly, 52.5 percent agreed, while 47.1 percent strongly agreed. Approximately sixty percent (50.9 percent) agreed that utensils and serving dishes should always be kept clean; 47.3 percent strongly agreed on the issue. Over fifty percent (54.3%) of participants strongly agreed that practicing food safety helps maintain good health and44.6 percent agreed on the issue. More than sixty percent (64.3 percent) strongly agreed that it is important to prevent foods from becoming contaminated and 35.8 percent agreed on the issue

Figure 1G: College Student Level of Agreement on Food Safety Practices (n = 280)

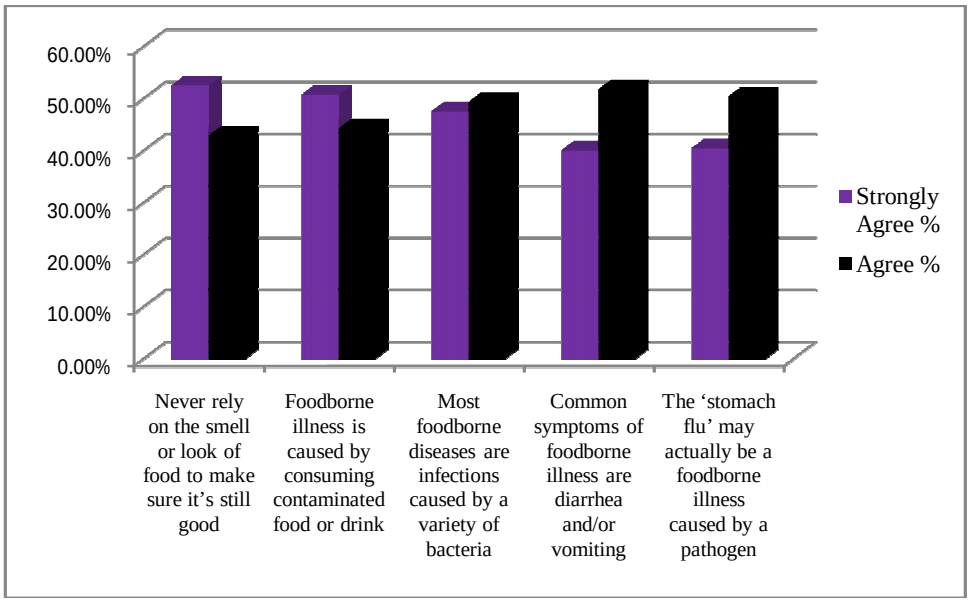


Level of Agreement

On the issue that all types of food should be properly stored, prepared, and preserved, 63.9 percent strongly agreed, 34.6 percent agreed. When asked if meats and vegetables should be placed in airtight containers in the freezer, 59.6 percent of respondents strongly agreed while 38.9 percent agreed on the issue.

On the issue that hot food should be kept hot, at or above 140 degrees **F,** 59.6 percent of participants indicated that they strongly agreed, while 38.9 percent indicated that they agreed. When asked if cold food should be stored at 40 degrees F, or below to prevent bacteria growth, 53.2 percent indicated strongly agreed, while 43.9 percent indicated agreed on the issue. With regard to the issue that cooked food should only be left at room temperature for, at most two hours, 53.9 percent of participants indicated strongly agreed and 41.8 percent indicated agreed.

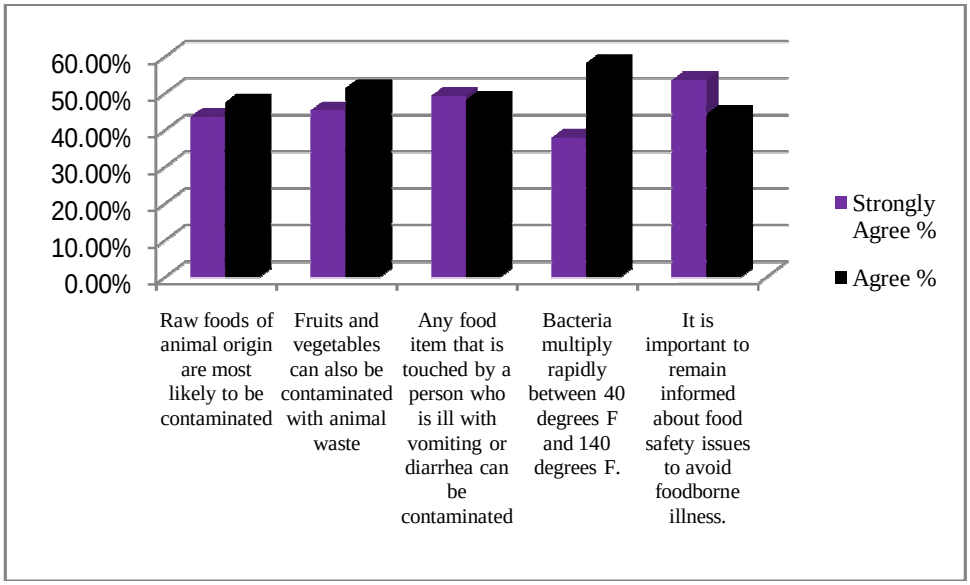
Figure 1H: College Students Level of Agreement on Food Safety (n = 280)



Level of Agreement

Over fifty percent (52.5 percent) of participants strongly agreed that they should not rely on the smell or look of food to prove that it is still good for consumption, while 42.9 percent indicated that they agreed on the issue. When asked if food borne illness is caused by consuming contaminated food or drink, 50.7 percent of participants indicated strongly agreed and 44.3 percent agreed on the issue. On the issue that most food borne diseases are infections caused by a variety of bacteria, 47.5 percent of participants strongly agreed and 49.3 percent. When asked if the common symptoms of food borne illness are diarrhea and/or vomiting, 51.8 percent indicated agreed, 40.0 percent strongly agreed on the issue. When asked if what some people call the 'stomach flu' may actually be a food borne illness caused by a pathogen, 50.4 percent of participants agreed and 40.4 percent indicated strongly agreed.

Figure 1I: **College Students Level of Agreement on Food Safety (n = 280)**



Level of Agreement

When asked if raw foods of animal origin are most likely to be contaminated, 43.6 percent of respondents reported strongly agreed and 47.5 percent reported agreed on the issue. When asked if fruits and vegetables can also be contaminated with animal waste, 51.4 percent indicated that they agreed, while 45.4 percent indicated strongly agreed on the issue. When asked if any food item that is touched by a person who is ill with vomiting or diarrhea can be contaminated, 49.3 percent reported strongly agreed, while 48.2 percent reported agreed. On the issue that bacteria multiply rapidly between 40 degrees **F** and 140 degrees **F,** 58.2 percent indicated agreed, while 37.9 percent indicated strongly agreed. When asked if it is important to remain informed about food safety issues to avoid food borne illness, 53.6 percent of respondents said they strongly agreed, and 44.3 percent said they agreed on the issue.

Table 1: Mean Importance scores on Food Safety Identified by College Students (n = 280)

Survey Items	Mean	Standard Deviation
Begin with proper hand washing	1.30	.46
Preparation counter should be disinfected regularly	1.53	.51
Utensils and serving dishes should always be kept clean	1.58	.82
Practicing food safety helps maintain good health	1.54	1.33
Important to prevent foods from becoming contaminated	1.36	.49
All types of food should be properly stored, prepared, and preserved	1.38	.54
Meats and vegetables should be placed in airtight containers in the freezer	1.42	.52
Hot food should be kept hot, at or above 140 degrees **F**	1.51	.59
Cold food should be stored at 40 degrees **F**or below to prevent bacteria growth	1.49	.56
Cooked food should only be left at room temperature for, at most two hours	1.52	.64
Never rely on the smell or look of food to make sure it's still good	1.54	.66
Foodborne illness is caused by consuming contaminated food or drink	1.56	.64
Most foodborne diseases are infections caused by a variety of bacteria	1.58	.62
Common symptoms of foodborne illness are diarrhea and/or vomiting	1.71	.69
What some people call the 'stomach flu' may actually be a foodborne illness caused by a pathogen	1.73	.73
Raw foods of animal origin are most likely to be contaminated	1.69	.73
Fruits and vegetables can also be contaminated with animal waste	1.59	.60
Any food item that is touched by a person who is ill with vomiting or diarrhea can be contaminated	1.54	.59
Bacteria multiply rapidly between 40 degrees **F** and 140 degrees **F**.	1.67	.57
It is important to remain informed about food safety issues to avoid foodborne illness.	1.49	.56

A majority of respondents strongly agreed on five issues (see Figures 1F & 1G) including (1) begin with proper hand washing (70.4 percent, M=1.30), preventing foods from becoming contaminated (64.3 percent, M=1.36), all types of food should be properly stored, prepared and preserved (63.9 percent, M=1.38), meats and vegetables should be placed in airtight containers in the freezer (59.6 percent, M=1.42) and practicing food safety helps maintain good health (54.3 percent, M=1.54).

Conclusions

This survey research provides some insights into college students 'level of agreement on food safety issues and practices. It has been suggested that if research of this nature does not involve actual incentives to participants, they could provide biased responses. This project involved actual incentives, where each participant was given a lanyard and a pen as a token of our appreciation for participating in the study. The researchers believe that these findings show that college students in southwest Mississippi have some basic knowledge of food safety issues and how it plays a crucial role in their food preparation and purchasing behavior. It is important to note that the majority of food borne illness can be traced back to mishandling of foods by preparers rather than food that was bought contaminated. The study has been useful in providing baseline data regarding the food safety knowledge and handling practices. Their responses indicate that they believe food safety practices should be taken seriously because it is an important health issue. Their responses also indicate that they believe that food safety practices should be taken seriously in order to prevent food borne illness and remained healthy. Although food safety in the United States (U.S) is among the safest in the world, food borne illness remains an ever increasing societal concern. A recent study by a branch of the United States Department of Agriculture (USDA), and the Economic Research Service (2014), estimates that the annual cost of food borne illnesses from major pathogens in 2015 to be over $ 15 billion in medical cost, lost wages and productivity, and premature death. Therefore, emphasis be placed on the notion that food borne illness is preventable when proper food hygiene is followed, especially with foods that are at a greater risk for contamination. Study results showed that participants have decided to take the safety of their food seriously in order to avoid food borne illnesses and remain healthy. The results also indicate that college students need to be better informed about current issues related to food safety and food borne illness in order to remain healthy productive citizens. In order for this to be realized, students must have access to accurate information about safe food handling practices. Investigators were provided with insights into college students' level of agreement on food safety issues as well as their awareness of issues related to safe food handling practices which contribute to good health. It is critically important that emphasis be placed on prevention of food borne illnesses, which is very inexpensive. Clearly, the economic impact of food safety should not be taken lightly.

Acknowledgement

This study was supported by United States Department of Agriculture, National Institute of Food and Agriculture (USDA-NIFA) Evan Allen Grant Program

References

Batz, M.B., Hoffman, S., & Morris, J. G., Jr. (2011) Ranking the Risk: the 10 Pathogen-Food Combinations with the Greatest Burden on Public Health. Emerging Pathogens Institute, University of Florida.

CDC (Center for Disease Control and Prevention, 2011), 'FoodNet-Foodborne Diseases Active Surveillance Network', (2009a) accessed October 2014 from: http://www.cdc.gov/FoodNet.

CDC (Center for Disease Control and Prevention, 2004). Preliminary Foodnet date on incidence of infection with pathogens transmitted commonly through food, United States, 2003. Morbidity Mortality Weekly Report, 53(16), 338-343

CDC (Center for Disease Control and Prevention, 2006). United States foodborne disease outbreaks.Accessed October 2014 from: http://www.cdc.gov/Foodborneoutbreaks/outbreak_data.htm

Gauci, C., & Guaci, A.A. (2005). What does the food handler in the home know about salmonellosis and food safety? Journal of the Royal Society of Health, 125 (3), 136-142.

Dillman, D.A. (2000). Mail and Internet surveys: The tailored design method. New York, NY: John Wiley & Sons, Inc.

ERS, USDA (Economic Research Service of the United States Department of Agriculture), Cost of US Foodborne Illnesses (2014) accessed November 2014 from: http://foodpoisiningbulletin.com/2014/cost-of-us-foodborne-illnesses-15-billion-per-year/

Koopamans, M., & Duizer, E. (2004). Foodborne viruses: An emerging problem. International Journal of Food Microbiology, 90(1), 23-41.

Masami, T.T., Miriam E., Sandra M.M., Virginia N. H. (2006). Development and validation of stages-of-change questions to assess consumers' readiness to use food thermometer when cooking small cuts of meat. Journal of American dietetics.106 (2), 262-266.

Mead, P.S., L. Slutsker, V. Dietz, L. F. McCaig, J.S. Bresee, C. Shapiro, P.M. Griffin, and R.V. Tauxe. (1999). 'Food-Related Illness and Death in the United States'. Emerging Infectious Diseases, 5: 607-25.

Medeiros, L., Hillers, V., Kendall, P., & Mason, A. (2001). Evaluation of food safety education for consumers. Journal of Nutritional Education, 33(1), 27-34.

Mitchell, R.E., Fraser, A. M., & Bearon, L.B. (2007). Preventing foodborne illness in food service establishment: Broadening the framework for intervention and research on safe food handling behaviors. International Journal of Environmental Health Research, 17(1), 9-24.

Roseman, M., & Deale, C. (2008). An investigation of college students' self-reported food safety knowledge and skills ratings and actual food safety behaviors and knowledge.Paper presented at the International CHRIE Conference, July, 2008, Atlanta, GA.

Scallan, E., Griffin, P. M., Angulo, F., Tauxe, R., & Hoekstre, R. (2011a). Foodborne Illness Acquired in the United States-Unspecified Agents. Emerging Infectious Diseases, 17(1), 16-22.

Scallan, E., Hoekstre, R., Angulo, F., Tauxe, R. V., Widdowson, M., Roy, S. L., Jones, J. L., & Griffin, P. M. (2011b). Foodborne Illness Acquired in the United States-Major Pathogens. Emerging Infectious Diseases, 17(1), 7-15

Zain, M.M., & Naing, N.N. (2002). "Socio demographics of food handlers and their knowledge, attitude and practice towards food sanitation: a preliminary report", Southeast Asian Journal of Tropical Medicine and Public Health, 33(2), 410-417.