Food safety practices of foodservice employees
Paez & Ortiz

Introduction: Potential Health Impact

Food safety is a public health concern. Every year in the United States an estimated of 48 million illnesses, 128,000 hospitalizations, and 3,000 deaths are the consequence of foodborne illnesses (CDC, 2011). In the United States people are spending approximately $580 million on purchasing food from retail foodservice operations (NRA, 2010). Food consumed at retail foodservice establishments, commercial and noncommercial sectors remain an important source for outbreaks of foodborne disease. It is estimated that annually foodborne illnesses in retail foodservice operations costs consumers $6 billion in healthcare costs and loss of productivity. According to the U.S. Food and Drug Administration (FDA) (2006), the top three factors contributing to foodborne illnesses in foodservice operations are: a) poor personal hygiene, b) cross contamination, and c) time/temperature control.

Segments of the population at high risk of experiencing foodborne illness are the elderly, infants, young children, pregnant women, and those who are immune-compromised, such as patients undergoing chemotherapy and organ transplants. Gerba, Rose, and Haas (1996) mentioned that weakened immune systems in the elderly and other immune-compromised groups are due to aging, chronic illness, or increased medications. Infants and young children have not yet fully developed their immune and digestive systems. Children younger than five years are at a higher risk of death from diarrhea than older children and adults, with infants at the highest risk of death (Luby, Agboatwalla, Painter, Altaf, Billhimer, & Hoekstra, 2004). During pregnancy, women’s immune systems are altered and they themselves may act as a source of infection for neonates. If immune systems are weakened or not yet fully developed, the body is less likely to fight pathogenic organisms such as bacteria or viruses (Gerba, Rose, & Haas, 1996).

Costa Rica is a developing country in Latin America which is ranked 62nd in the world on the Human Development Index (YCELP, 2010). Costa Rica’s foodservice industry faces similar issues as those faced in the United States. Even though Costa Rica provides a better lifestyle than its neighbors, Costa Rica suffers from major food safety problems. Foodborne illnesses have been traced back to catering establishments, institutional foodservice operations, and restaurants. In 2009 there was an outbreak in a city where more than 200 people were affected and hospitalized, no data are registered. The diagnostic and treatment is based on symptoms more than on laboratory tests; this results in an effective treatment but there is not enough information to create mechanisms to prevent FBI in a future (Saenz, 2001).

All the sanitary regulations related to food are supervised by the Health Ministry. The Health Ministry reported in 2001; 164,000 of cases of foodborne illnesses (INA, 2010). The Epidemiologic Section in this Ministry is responsible of the epidemiologic vigilance of foodborne illnesses. Due to limited economic resources and personnel the supervision of foodborne illnesses is considered secondary. All data related to foodborne illnesses are obtained through other institutions and in most of the cases the information is not accurate, would be treated as a bacteria problem, and the real cause would not be identified.
Known foodborne disease outbreaks have been associated with foods served at commercial and noncommercial retail food stores and foodservice facilities including restaurants, clubs, assisted living facilities, nursing homes, child care centers, schools, and university foodservice. Most common reasons for foodborne illness in Costa Rica are lack of food safety training for food handlers, purchasing from unapproved sources, time-temperature control, cross contamination, and lack of personal hygiene among food handlers (FAO, 2001; Saenz, 2001). Yatsco (2000) concluded that in Costa Rica some of the factors influencing the possibility of offering safe food are: lack of food safety training and certification, problems on equipment and layout of facilities, and lack of knowledge and supervision.

Food workers play a critical role in ensuring food safety, those who do not practice proper personal hygiene, including handwashing at the appropriate times and using appropriate methods, can contaminate food. The FDA Report on the Occurrence of Foodborne Illness Risk Factors in Selected Institutional Foodservice, Restaurant, and Retail Food Store Facility Types (2009) identified risk practices and behaviors that contributed to foodborne illnesses: improper holding/time and temperature; poor personal hygiene; and contaminated equipment/prevention of contamination. Studies have found that food safety training is positively associated with self-reported changes in food safety practices (Clayton, Griffith, Price, & Peters, 2002; McElroy & Cutter, 2004), and improved attitudes (Wie & Strohbehn, 1997).

Other studies have found that training helps to improve overall employee knowledge of food safety (Costello, Gaddis, Tamplin, & Morris, 1997; Finch & Daniel, 2005; Howes, McEwen, Griffiths, & Harris, 1996; Lynch, Elledge, Griffith, & Boatright, 2005; Roberts et al., 2008) although others have found that training is not consistently associated with improved knowledge (Luby, Jones, & Horan, 1993; Pilling et al., 2008). Chapman, Eversley, Fillion, MacLaurin, and Powell (2010) observed the influence of a food safety information sheet on practices within the foodservice environment. Results showed that the information had a positive impact on foodhandler behaviors.

Food safety knowledge is important to prevent foodborne illness. Prevention of foodborne illnesses is one of the primary responsibilities of the foodservice industry (Cushman, Shanklin, & Niehoff, 2001). It is the managers´ responsibility to ensure the safety of food prepared and served to customers. Retail foodservice operations often produce large quantities of different types of food in the same area, which creates a risk environment for outbreaks of foodborne disease. Foods can become contaminated at any link of the food chain, from production to service. The majority of foodborne illnesses have been linked to foods prepared in retail foodservice operations and caused by human error at some point in the food chain. Identifying foodservice employees´ knowledge, attitudes, and practices is essential to assure food safety in retail foodservice operations and prevent the occurrence of foodborne illnesses, a health public problem. Even though there might be some cultural differences identifying food safety practices in Costa Rica, will provide information about food safety training needs on a developing country.

Project Goal and Objectives

Limited information is available regarding food safety knowledge attitudes, and practices of foodservice employees in Costa Rica. The literature also underscored the role of retail foodservice employees in order to prevent foodborne illnesses. The goal of this study is to
identify food safety practices, attitudes, and knowledge of foodservice employees of operations serving high risk populations.

Specific objectives are:

1. Identify food safety practices that contribute to the occurrence of foodborne illnesses in retail foodservice operations.
2. Determine food safety knowledge and attitudes of retail foodservice employees serving high risk populations.
3. Identify food safety training needs of retail foodservice employees to prevent foodborne illnesses.

Methods

Overall Project Design: For this study, a combination of qualitative and quantitative methods will be used to collect, analyze, and better understand the topic (Creswell & Plano, 2007). This project will consist of two phases. The first phase will include the use of structured in-depth field observations to determine food safety practices of foodservice employees. Observation is one method of qualitative research and with structured observation, every aspect of the research is planned before data are collected. The second phase of the project will involve the use of a questionnaire to assess employees’ food safety knowledge, attitudes, and self reported practices. This phase will include determination of food safety training needs of foodservice employees.

Phase I: Identify food safety practices of foodservice employees
- Develop a food safety practices observation form.
- Test the food safety practices observation form.
- Assessment of food safety practices of foodservice employees.
- Identify food safety training needs of foodservice employees.

Phase II: Determine food safety knowledge, attitudes, and self reported practices of foodservice employees and training needs
- Develop survey questionnaire.
- Pilot-test survey questionnaire.
- Assess food safety knowledge, attitudes, and practices of foodservice employees using a survey.
- Identify food safety training needs of foodservice employees.

The project proposal has been reviewed by the University Of Costa Rica Office Of Research Assurance (Appendix 1). All data collection instruments will be approved prior to data collection. Methods and expected results specific to each research objective are presented below.

Objective 1: Identify food safety practices that contribute to the occurrence of foodborne illnesses in retail foodservice operations

Methods for objective. A sample of employees working in foodservice operations from childcares, nursing homes, schools, and hospitals will be used. This type of operations was selected because the
people they serve are considered high risk populations; which are at a higher risk of suffering foodborne illnesses if food safety practices are not followed. An observation form will be developed to assess employees´ food safety practices. A total of 12 foodservice operations (three childcares, three nursing homes, three hospitals, and three school foodservice operations) will be visited to observe employees´ food safety practices. Two employees in each one of the operations will be observed during three hours. One employee will be observed during production time and the other one during service. Researchers will observe one employee at a time.

**Expected results:** As a result of this objective, food safety practices of foodservice employees serving high risk populations in a developing country will be established. Information from this phase of the study will be used to develop the survey questions of phase II and to identify food safety training needs of foodservice employees and supervisors.

**Objective 2: Determine food safety knowledge and attitudes of retail foodservice employees serving high risk populations**
A written questionnaire will be developed to assess foodservice employees´ food safety knowledge, attitudes, and practices. The questionnaire will be distributed to all foodservice employees of the selected operations. The questionnaire will include four sections. The first section will identify employees´ knowledge related to food safety. The questions included in this section will be related to general food safety knowledge such as personal hygiene, foodborne illness, time and temperature control, cross contamination, glove use, and cleaning and sanitizing. Part two of the questionnaire will use a 5-point Likert-type rating scale, ranging from one (1) “strongly disagree” to five (5) “strongly agree” to determine employees´ attitudes toward food safety. Part three will measure employees´ self reported food safety practices. The last section will include information on food safety training and demographics of participants. The questionnaire and a cover letter will be distributed to a representative sample of foodservice employees of selected operations. If employees are not present at the time the questionnaire is distributed, the questionnaires will be given to the manager to distribute them, and sealed envelopes will be provided so information will be kept confidential. Employees will place completed questionnaires in designated sealed boxes in the operations. The questionnaire will be pilot tested by foodservice employees of operations not participating in the study with the purpose of seeking comments on clarity of statements and length of time needed to complete the questionnaire. Changes in format and content will be incorporated according to recommendations before data collection.

**Expected results:** As a result of this phase of the study, a valid and reliable questionnaire will be developed that can be used to determine employee`s food safety knowledge, attitudes, and practices. This questionnaire could be used as an assessment tool in foodservice operations and guide training needs of employees and supervisors in foodservice operations.

**Objective 3: Identify food safety training needs of retail foodservice employees to prevent foodborne illnesses**
An analysis of the information from the observations and questionnaires will allow the identification of food safety knowledge, attitudes, and practices that employees are not following. Based on the obtained information a list of training topics on food safety for foodservice employees will be developed to prevent foodborne illnesses in foodservice operations serving high risk populations.

**Expected results:** As a result of this objective a list of food safety training topics will be developed that could be use as a guide to train employees and supervisors of foodservice operations.
Project dissemination plans

Research results will be communicated to a broad audience. Research results will be communicated through a variety of channels. Through University Extension publications results of the project could be communicated to university professionals. Articles will be prepared for publication in appropriate journals, such as *Journal of Food Protection*, *Food Protection Trends*, *Journal of the American Dietetic Association*, or *The Journal of Child Nutrition & Management*. Presentations of results will be made at professional meetings at national and international conferences—both as refereed and invited presentations.

Project personnel

The principle personnel involved in this project are Dr. Paola Páez, MSc. Allan Ortiz, and MBA Ana Beatriz Avendaño. The three researchers are faculty members in the Department of Nutrition at the University of Costa Rica. The three researchers involved in this work are identified below along with unique qualifications and roles each will undertake for project completion. Two of the researchers are ServSafe® Certified Instructors and Proctors (National Restaurant Association Education Foundation).

University of Costa Rica

The University of Costa Rica is a public university in the Republic of Costa Rica, in Central America. Its main campus, Ciudad Universitaria Rodrigo Facio, is located in San Pedro, in the province of San José. It is the oldest, largest, and most prestigious institution of higher education in Costa Rica. It is also the most important research university in the country and Central America.

Pitfalls that might be encountered

We could encounter challenges in recruiting foodservice operations. When we contact operations, we will stress the value of the study and how results can contribute to determine food safety training needs. Because of recent foodborne illness outbreaks and lack of following food safety practices in a number of hotels and chain restaurants that have been newspaper and television stories, we anticipate willingness to participate.

Limitations to the Proposed Study

This study is limited to foodservice employees of the selected types of foodservice operations in a developing country (Costa Rica); however, there is no reason to believe that these individuals would differ from those working in other foodservice operations or that food handling practices of employees in these operations are unique from those in other establishments.

Length of Project. This research project will be developed in one year.

Budget and justification

A detailed budget is shown in Appendix 2. Total cost of the project: $29,750.
Salary
Funds to cover 3 calendar months (.25% of 12 months) effort by Dr. Paola Páez and 3 calendar months (.25% of 12 months) effort for each MSc. Ortiz and MBA Avendaño. Dr. Páez will be responsible for managing the project, supervise an undergraduate student, collaborate on developing data collection tools, setting up and conducting observation, participating in data analysis, and writing manuscripts. MSc. Ortiz and MBA Avendaño will collaborate on developing data collection tools, setting up and conducting observation, participating in data analysis, and writing manuscripts. The undergraduate student will assist with data collection, data analysis. Salary for the undergraduate student is calculated at $15.6/hour x 5 hours per week x 6 weeks per year.

Benefits
The standard benefit rate at the University of Costa Rica (UCR) for faculty members is 43.52% and covers: CCSS, INS, ASFA, IMAS, disability insurance, worker’s compensation, life insurance, unemployment insurance, health insurance, and dental insurance. As stated by the University of Costa Rica policies, the undergraduate student receives no benefits.

Travel
Domestic: The three researchers and the graduate assistant anticipate traveling to 12 foodservice operations to 3 provinces to recruit foodservice operations and explained the project to managers. Approximately 36 trips will be conducted to collect data. A total of 24 foodservice workers would be observed for a total of 12 visits to retail foodservice operations.
Foreign: Dr. Paez will attend a professional meeting in the United States for the purpose of dissemination of study results. Travel costs were based on the Travel Regulations established by the Costa Rican Financial Office. Airfare $850 x 1 = $850, Registration $500, Lodging $150 x 3 nights = $450, Meals $50/day x 3 days = $150, ground transport= $50.

Other
Materials and Supplies: A laptop computer ($1000) will be purchased. The laptop is essential for use in data collection in the field as will have data analysis software loaded so the researchers and the undergraduate student will be able to use it for data analysis; it would be password locked, only the research team members will have access. SPSS software ($1300) will be purchased.

Consumable Research Supplies: Binders and dividers $100 are requested for data storage, USB storage device.

Printing Services: UCR will provide desk/chairs/telephones/work space. Funds will be used to duplicate data collection tools such as observation forms and questionnaires.

Indirect Costs
The University of Costa Rica calculated indirect costs at 20% of the Total Direct Costs.
References


Appendix 1. University Of Costa Rica Office of Research Assurance

General Secretariat
World Health Organization
Avenue Appia 20
1211 Geneva 27
Switzerland.

REF: R&D for Diseases Affecting Developing World

Dear Sirs:

In relation to the recent call for proposals released by the Consultative Expert Working Group on Research and Development, we are pleased to present the proposal entitled “Employees’ food safety knowledge and practices in foodservice operations serving high risk populations”, to the consideration of this funding opportunity.

Due to the limited information that our country possesses, it is crucial for the University of Costa Rica to generate knowledge about the current status of food safety attitudes and practices that can improve foodservice operations serving high risk populations. In addition, a second phase of the study will provide the food safety training needs for employees and supervisors in foodservice operations, disclosing in this way a complete overview of this important topic.

The research team in charge of developing this proposal is integrated by Dr. Paola Páez, M.Sc. Allan Ortiz and MBA Ana Beatriz Avendaño, young researchers of the Department of Nutrition at this University. It is important to mention that two of them are already ServSafe®Certified Instructors and Proctors, a condition that ensures the success of the project.

Based on the above, the Vicepresidency for Research fully supports the proposal and the research team.

Sincerely,

[Signature]

Dr. Henning

Vicepresident

HJP/AIGC.-
Cc: Files.-
# Appendix 2. Detailed Budget

**PI Name**: Paola Paez  
**Project Name**: Food Safety Practices in Foodservice Operations Serving High Risk Populations

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<th></th>
<th>FY 11 base</th>
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|                                |            |        |        |
| **BENEFITS**                   |            |        |        |
| Faculty (PI) 43.52%            | 2,614      | 2,614  |        |
| Faculty 2 43.52%               | 1,550      | 1,550  |        |
| Faculty 3 43.52%               | 1,550      | 1,550  |        |
| **TOTAL BENEFITS**             |            |        | **5,713**  |

|                                |            |        |        |
| **TRAVEL**                     |            |        |        |
| Travel to sites for participant recruitment, data collection/training | 500 | 500 |        |
| Professional Meeting           | 2,000      | 2,000  | 0      |
| **TOTAL TRAVEL**               |            |        | **2,500**  |

|                                |            |        |        |
| **OTHER DIRECT**               |            |        |        |
| **MATERIALS & SUPPLIES**       |            |        |        |
| Laptop Computer                | 1,000      |        | 1,000  |
| Software: SPSS                 | 1,300      |        | 1,300  |
| **TOTAL OTHER DIRECT**         |            |        | **2,950**  |

|                                |            |        |        |
| **TOTAL DIRECT**               | 24,791     | 24,791 |        |
| IDC 20% allowable              | 4,958      | 4,958  |        |
| **TOTAL ALL COSTS**            | 29,750     | 29,750 |        |