FOOD SAFETY TRAINING IN TEXAS SCHOOL FOODSERVICE FACILITIES IN RELATIONSHIP TO THE IMPLEMENTATION OF A HACCP PROGRAM

A THESIS

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BY

TYLER JOHNMEYER, B.S.

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To the Dean of the Graduate School:

I am submitting herewith a thesis written by Tyler Johnmeyer entitled "Food Safety Training in Texas School Foodservice Facilities in Relationship to the Implementation of a HACCP Program." I have examined this thesis for form and content and recommend that it be accepted in partial fulfillment of the requirements for the dual degree of Master of Science with a major in Food Systems Administration and Master of Business Administration.

Carolyn Bednar
Carolyn Bednar, Major Professor

We have read this thesis and recommend its acceptance:

Department Chair

Accepted:

Jennifer Martin
Dean of the Graduate School

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ABSTRACT

TYLER JOHNMEYER

FOOD SAFETY TRAINING IN TEXAS SCHOOL FOODSERVICE FACILITIES IN RELATIONSHIP TO THE IMPLEMENTATION OF A HACCP PROGRAM

MAY 2009

The purpose of this study was to investigate food safety training currently offered in Texas school foodservice facilities in relation to implementation of Hazard Analysis Critical Control Point (HACCP). A survey instrument was developed by the researcher, validated by school foodservice professionals and pilot tested. Online surveys and paper surveys were used to obtain data. Of 525 foodservice directors randomly chosen, 120 completed the survey and results were summarized and statistical analyses were conducted using Pearson's Product Moment Correlation and Analyses of Variance. Food safety training is currently being provided in school foodservice through different methods. A majority of school foodservice directors agreed with the effectiveness of food safety training, had favorable attitudes towards food safety training and faced few barriers to food safety training. Overall, this study concluded that most Texas school foodservice facilities have standard operating procedures and a HACCP plan in place.

TABLE OF CONTENTS

LIST OF TABLES

CHAPTER I

INTRODUCTION

Justification

Foodborne pathogens are estimated to cause approximately 76 million illnesses, 323,000 hospitalizations and 5,200 deaths per year in the United States (Mead et al., 1999). In 1996, the Economic Research Service estimated that the annual medical cost, productivity losses, and the costs of premature deaths in the United States due to seven major foodborne pathogens ranged from $6.5 billion to $34.9 billion in 1996 dollars (Buzby & Roberts,1997).

Institutions such as school foodservice facilities serve food to a population who may be more vulnerable to foodborne illnesses than healthy adult individuals (Hughes & Minch, 2004). In 2007, over 30 million students ate at schools through the National School Lunch Program (NSLP; 2008), and providing food that is safe for children must be a priority for school foodservice programs. In a review of years from 1973 to 1997, Daniels et al. (2002) found that foodborne outbreaks resulted in 49,963 illnesses, 1,514 hospitalizations and one death in school foodservice facilities during the 24 year period.

In an effort to protect children in the U.S. from foodborne illnesses, the government created a requirement that every school foodservice establishment participating in the

NSLP create a food safety plan complying with the HACCP (Hazard Analysis Critical Control Point) system as a part of the Child Nutrition WIC Reauthorization Act (CNRA) of 2004 (Child Nutrition, 2004). HACCP is a system that prevents foodborne illness through safe food handling, monitoring and recordkeeping. The plan needed to be implemented by the end of the 2005-2006 school year (Child Nutrition, 2004). In July 2005, the United States Department of Agriculture (USDA) released "Guidelines for School Food Authorities: Developing a School Food Safety Program Based on the Process Approach to HACCP Principles" intended as a guide to help schools create a food safety program (2005).

Despite the new requirement, many schools were not prepared to implement a system that followed an extensive HACCP plan (Skolmowski, 2005). Since many schools had not previously required formal food safety training it was difficult for them to implement an extensive plan for food safety. In 2001, 414 school foodservice directors participated in a study about training and perceive barriers to implementing food safety practices (Sneed & Youn, 2002). Only 22% of school foodservice directors reported that they had implemented a comprehensive HACCP plan in their districts, while only 11% had a HACCP team in place to run the plan. In addition, only 30% of the directors had one or more employees whose primary responsibility was implementing and monitoring food safety program in the school foodservice departments.

In 2004, 387 school foodservice directors participated in a study to determine the extent, challenges and benefits of HACCP implementation in K-12 schools (National Foodservice Management Institute, 2005). Ninety percent of respondents reported having standard or formal food safety procedures in their schools and only 65% had begun a HACCP plan. Of the 35% that did not have a HACCP plan in place, 43% did not plan on implementing HACCP. This was prior to the CRNA.

Researchers have projected that HACCP programs may save money and time while improving food quality (Almanza & Sneed, 2003). Money saved might include unnecessary healthcare and litigation expenses due to foodborne illnesses. For example, in 1987, one foodborne outbreak at a school caused over $40,000 in medical expenses that was paid by the school. This represents only a fraction of economic costs of an outbreak (Epidemiologic, 1987). Additional costs might include the cost of training and replacing foodservice personnel who are absent as the result of an outbreak. In a 2004 study, 25% of respondents reported a reduced liability as a benefit of HACCP implementation (National Foodservice Management Institute, 2005).

To prevent foodborne illness at school foodservice facilities, management must train their employees on food safety. In 2007, a study was conducted on food safety training in 38 Iowa schools (Sneed & Henroid, 2007). Foodservice employees at 38 schools completed a pre test of food safety knowledge. The employees were then given training on safe food handling practices and then given a post test of food safety

knowledge. Results showed that food safety training had a favorable effect and many employees benefited from the educational intervention because their food safety knowledge scores improved. This study also found food safety training was effective in improving food handling practices and employee confidence. Another group of researchers concluded that HACCP training needs to present the topics in a practical, realistic and step-by-step manner, but there are no specific guidelines for the delivery of HACCP training to school foodservice employees (Giampaoli, Sneed, Cluskey, & Koenig, 2002).

Training may be one of the most crucial and most needed management responsibilities through which management provides employees appropriate ways to perform their jobs (Fitzgerald, 2002). Corporate financial experts estimated that the budget spent on training U.S. employees has risen 20% in the past 13 years; while the workforce has increased by 24% (Teach, 1996). Considering that training should be performed at the beginning of employment and continuously throughout the employee's tenure, and that projection of 24% does not account for multiple job changes or transfers of existing workforces, this finding indicates that more training may be needed in the nation's workplaces.

The foodservice industry is no exception, and training staff is considered one of the most important management responsibilities. To ensure food safety in school foodservice, food safety and HACCP training should be recognized as a priority. However, in a study

identifying effective performance and training priorities, food safety did not appear to be one of the top priorities in school foodservice (Sneed, 1992). Sneed asked 217 Tennessee participants from all types of foodservice establishments to complete a questionnaire on the importance of various categories for performance and training. School foodservice directors rated microcomputer applications, employee orientation, and menu planning/design as the top three categories most important to their job and for continuing education. Food safety training was not seen as a top priority to the importance of their jobs.

Since the CNRA was enacted in 2004, food safety and the need for continued employee food safety training at schools has become more important. Research related to training and food safety has been conducted separately. However, few researchers have investigated the effectiveness of different types of food safety training methods. Many researchers have researched whether a HACCP program is useful to schools, but few researchers have sought to investigate how the training for the HACCP program is being conducted.

Furthermore, it is important to understand effectiveness of food safety training and the barriers to food safety training that may hinder implementation of a HACCP program. Since the requirement for a HACCP program became mandatory, the current prevalence of food safety programs and training in school foodservice facilities has not been studied.

Therefore, a study that addresses current practices of food safety training and HACCP programs in school foodservice is needed.

Purpose and Objectives

The purpose of this study was to investigate food safety training currently offered in Texas school foodservice facilities in relation to the implementation of HACCP. Objectives included: (a) determine content, method, and frequency of current food safety training in Texas school foodservice facilities; (b) assess effectiveness, attitudes, and barriers concerning food safety training as perceived by school foodservice directors; and (c) investigate current food safety Standard Operating Procedures (SOP) and HACCP procedures that have been implemented in school foodservice facilities.

Null Hypotheses

The researcher hypothesized that

1. There will be no significant relationship between perceived effectiveness of food safety training and director experience in school foodservice, job tenure in current position, and age of director.
2. There will be no significant difference in perceived effectiveness of food safety training based on food safety certification of director, director education, and average daily meal participation.

3. There will be no significant relationship between attitudes concerning food safety training and director experience in school foodservice, job tenure in current position, and age of director.
4. There will be no significant difference in attitudes concerning food safety training based on food safety certification of director, director education, and average daily meal participation.
5. There will be no significant relationship between perceived barriers to food safety training and director experience in school foodservice, job tenure in current position, and age of director.
6. There will be no significant difference in perceived barriers to food safety training based on food safety certification of director, director education, and average daily meal participation.
7. There will be no significant relationship in the extent of SOP and HACCP implementation and the number of hours spent on training each month, and director experience in school foodservice.
8. There will be no significant difference in the extent of SOP and HACCP implementation based on the food safety certification requirement of foodservice managers/ supervisors, food safety certification requirement of all foodservice employees, method of food safety training, how the training is provided, director education, and average daily meal participation.

Assumptions and Delimitations

It was assumed that (a) the sample studied understood and completed the survey truthfully to the best of their ability; (b) the training content, methods and frequency were identifiable and measureable through the questionnaire; (c) the perceived effectiveness, attitudes and barriers of training from the study population were identifiable and measurable; (d) the instrument developed was appropriate to collect data; and e) the facilities had a HACCP program in place. The study was limited to the state of Texas and foodservice directors in school foodservice facilities. Therefore, results were not generalized beyond this geographical area nor to other types of foodservice facilities.

CHAPTER II

REVIEW OF LITERATURE

Impact of Foodborne Illness in the U.S.

Foodborne pathogens that can cause foodborne illness include viruses, bacteria, parasites, toxins, metals and prions. Mead et al. (1999) estimated foodborne pathogens cause approximately 76 million illnesses, 325,000 hospitalizations and 5,200 deaths per year in the United States. Their analysis also suggested that unknown agents account for approximately 81% of foodborne illnesses and hospitalizations and 64% of deaths. New foodborne pathogens continue to appear and reproduce every day which makes the human population and especially children very susceptible to foodborne illness (Hughes & Minch, 2004).

Vojdani, Beuchat and Tauxe (2008) studied 21 juice-associated outbreaks reported to the Centers for Disease Control and Prevention between 1995-2005. These outbreaks included 35 states, and several outbreaks included multiple states. The 21 outbreaks led to 1,366 illnesses, 149 hospitalizations, and one death. Many of the outbreaks were linked to foodservice facilities that operated with a food safety plan; however, upon inspection, the facilities were not in full compliance with the plans. If the food safety plan had been in action, it may have prevented the foodborne outbreaks.

Foodborne disease outbreaks involve two or more individuals who show symptoms or have complaints of foodborne illness (U.S. Food and Drug Administration [FDA], 2005). Symptoms of foodborne illness vary from mild gastroenteritis to life-threatening symptoms in humans. Hedberg et al. (2008) studied United States foodborne disease outbreaks in 2002 and concluded that median intervals for symptoms of complaint were 1 day for bacterial toxins, 3 days for Norovirus, 8 days for E. Coli O157:H7 and 16 days for Salmonella. In concurrence with determining onset time period, researchers also collect stool samples which are examined at laboratories. It can take up to 5 to 10 days to discover the cause of an outbreak. All the steps of the investigation period can take up to 15 to 20 days to complete in order to diagnose a foodborne outbreak and then announce the findings to the public. This extended time frame creates a negative image for a facility under investigation.

Paying close attention to food recalls could also help foodservice facilities avoid foodborne outbreaks and negative images. Recalls are actions taken by a firm to remove products from the market when use or exposure has the probability to cause health consequences. Food recalls are announced to ensure the protection of the nation. Recalls from around the nation have included coleslaw that was linked to a Listeria contamination in November 2006; 8,500 cases of lettuce contaminated with E. Coli in October 2006; and 5 oz containers and 5 lb bulk containers of alfalfa sprouts contaminated with Salmonella in August 2006 (Klie, 2006). Foodservice facility staff

should inspect all food delivered by the suppliers for the signs of foodborne pathogens. Each of these foodborne pathogens can be very dangerous and foodservice administrators should have a comprehensive food safety plan in order to stop tragic health consequences from occurring.

In addition to health consequences, the economic impact of an outbreak can be significant to foodservice facilities and victims. In 1986, a small Oklahoma community experienced a Salmonella outbreak among students and employees in the public school system. In this small outbreak, medical expenses equaled $40,000 (Epidemiologic, 1987). Furthermore, on a larger scale, in 1996, the Economic Research Service estimated that the annual medical cost, productivity losses, and the costs of premature deaths in the United States due to seven major foodborne pathogens ranged from $6.5 billion to $34.9 billion in 1996 dollars (Buzby & Roberts,1997). In 2005, FoodNet reported that outbreaks of E. Coli caused by shiga toxin caused approximately 20,000 physician visits, 7,500 emergency department visits, and 348 hospitalizations annually. The FoodNet report also stated that illness from E. Coli outbreaks cost about $405 million with $370 million due to premature deaths, $30 million in medical costs and $5 million in lost productivity annually (Frenzen, Drake, Angulo, & FoodNet Working Group, 2005). This clearly shows how costly and tragic foodborne outbreaks can be to the nation and foodservice facilities.

Foodborne Illness in U.S. Schools

The Richard B. Russell National School Lunch Act of 1946 established the NSLP to provide adequate nutrition for the nation's children. The NSLP goals have now been expanded to promote nutrition education of diet and healthy lifestyles to prevent childhood obesity (Ralston, 2008). NSLP provides funding to schools to produce nutritionally balanced, low-cost or free lunches to children each school day. Additionally, the USDA food programs for school children include the Special Milk Program, National School Breakfast Program and After School Snack Program. In 1998, Congress expanded the program to include reimbursement for snacks served to children in after school programs. Currently, the NSLP provides funding for over 101,000 public schools, non-public schools and residential child care institutions (USDA, 2007). Over 30 million students ate school meals through the NSLP in 2007 (National School Lunch, 2008).

Providing food that is safe for children must be a priority for school foodservice programs as they reach a large number of children each year. A review of foodborne outbreaks at United States schools during the period of 1973 to 1997, revealed 49,963 illnesses, 1,514 hospitalizations and 1 death (Daniels et al., 2002). Of the 607 outbreaks in this period, 240 had a known etiology; 86% were caused by bacterial pathogens, 6% by chemical agents, 6% by viral agents, 1% by parasitic pathogens and 1% other causes. The main causes of these outbreaks were linked to improper food handling by the food

preparer at the site of preparation (115 of 607 outbreaks). Daniels et al. suspected that many food preparers had poor personal hygiene or were ill during production. Other common causes of the outbreaks included improper storage, unsafe holding temperatures, inadequate cooking, contaminated equipment and unsafe sources of food. Daniels et al. concluded that many outbreaks were preventable if proper training and food handling practices had been followed at school foodservices facilities.

On May 31, 1990, a foodborne outbreak occurred in a centralized school lunch program in Rhode Island (Richards et al., 1993). The foodservice facility employees handled the ham without gloves and failed to heat the ham to proper temperatures during cooking and serving. The food handlers batched large amounts of ham above 40° F together under aluminum foil in a walk-in refrigerator. This placed the ham in the temperature danger zone of 41° F to 135° F, a temperature range that promotes foodborne pathogen growth. Out of 662 students at five schools purchasing lunch that day, 100 students experienced one or more of the following symptoms: nausea (90%), vomiting (81%), cramps (66%), fever (31%) and diarrhea (41%) Richards et al. concluded that the environment of the preparation kitchen and delivery vehicles did not meet food safety standards as there were no standard operating procedures in place, no food thermometers to be found, and the hot holding equipment did not maintain the product above 135°F. In addition, large volumes of warm food were stored in the refrigerator without being cooled properly at the site of preparation. This foodservice facility lacked the necessary

resources of an effective food safety program. The researchers contended that susceptibility of school children and the lack of formal training of food handlers at the school facilities contributed to the foodborne outbreaks.

Ensuring Food Safety in Schools

The purpose of the Richard B. Russell National School Lunch Act was to safeguard the health and well-being of the nation's children and to encourage the domestic consumption of nutritious agricultural commodities and other food. This act was intended to assist states, through grants-in-aid and other means, to provide an adequate supply of food and other facilities for the establishment, maintenance, operation, and expansion of nonprofit school lunch programs (Richard B. Russell National School Lunch Act, 1966).

In order to ensure safe foodservice at public schools, the Child Nutrition WIC and Reauthorization Act (CRNA) was passed in 2004 as an amendment to the1946 National School Lunch Act (NSLA; Child Nutrition, 2004). The CNRA of 2004 required all schools who participate in the NSLP to have at least two food safety inspections of their facilities each year. Results of these inspections must be posted in a visible area to the public at the facility and a copy of the inspection must be provided upon public request. The CRNA also required all schools participating in the NSLP to have a food safety program in place that complied with HACCP by the end of the 2005-2006 school year. In July 2005, the USDA released "Guidelines for School Food Authorities: Developing a

School Food Safety Program based on the Process Approach to HACCP Principles," which is a resource for schools that need assistance with creating a food safety program based on HACCP (USDA, 2005).

HACCP was originally designed in the1950s by the Pillsbury Company to ensure food safety for the United States Army and the United States Air Force by the production of zero risk foods for space flights. HACCP was first introduced at the National Conference of Food Protection in 1971 (Brandriff, 2003). The HACCP plan was based on seven basic principles created by the National Advisory Committee on Microbiological Criteria for Foods (Food Safety and Inspection Service, 2006). These principles are required elements for a HACCP plan. They include conducting a hazard audit, determining critical control points, establishing critical limits, establishing monitoring procedures, identifying corrective actions, verifying the system works and establishing procedures for record keeping and documentation (National Restaurant Association Educational Foundation [NRAEF], 2008).

Importance of Food Safety Training

Foodservice facilities need to ensure the highest standards of food safety for school children to avoid foodborne outbreaks in schools in the United States. Daniels et al. (2002) recommended performing constant investigation of foodborne disease outbreaks in schools, including outbreak surveillance to identify trends in disease frequency and to detect the emergence of new causes of foodborne illness. Richards et

al. (1993) emphasized the importance of food safety training, improved standards, and supervision of all staff at school foodservice facilities in order to prevent foodborne outbreaks.

Due to costly outbreaks, negative consequences and recent policies, food safety training is becoming more important in school facilities. All persons that come in contact with food from the farm to the table should be properly trained to handle food safely. Food safety training of the foodservice director and employees can vary from a food handler's four-hour program to more intense two-day HACCP courses.

Food safety training is important; however, challenges make it harder to carry out training. A twelve member focus group was established in 2002 to determine a list of challenges to implementing food safety and a HACCP program (Giampaoli, Sneed, Cluskey, & Koenig, 2002). Results from the focus group helped to create a questionnaire that was mailed to 800 foodservice directors about the challenges to implementing food safety and HACCP programs. Challenges included the lack of employee motivation, comfort level of food safety and lack of time and money. The researchers concluded that HACCP training needs to present the topics in a practical, realistic and step-by-step manner, but there are no specific guidelines in place for the delivery of HACCP training to school foodservice employees.

In a study by Sneed, Oakley and Ellis (2006), the food safety training requirements for school foodservice directors and employees were determined for each

state. The study included responses from 41 states and the District of Columbia. Only three of the 41 states had certification requirements for the school district foodservice director, and five states had requirements for foodservice supervisors and employees. Other states had training requirements that varied from workers earning a food handler's certificate to requiring only one manager on duty to be certified with a food handler's certificate.

In the 2007 School Nutrition Operations Report, conducted by the School Nutrition Association, 70.8% of the 1,434 schools in the study had requirements of their foodservice managers and 52.9% had food safety certification requirements of the foodservice staff. However, 6.6% required no food safety/ sanitation training of foodservice staff (2007). Schools in many states uses resources developed or offered by others for food safety training. This includes (a) food handlers programs, (b) Serving it Safe, (c) ServSafe, and (d) HACCP program training (Sneed et al., 2006).

In 2007, a study of 38 Iowa schools, found food safety training effective in improving food handling practices and employee confidence (Sneed & Henroid, 2007). Foodservice employees at 38 schools completed a pre-test of food safety knowledge. The employees were then given an educational intervention of training on safe food handling practices and a post-test on food safety knowledge. The educational intervention proved positive in helping the employees improve their test scores of food safety knowledge. In

2004 it was found that 25% of 385 respondents felt a reduced liability as an added benefit of HACCP implementation (National Foodservice Management Institute, 2005).

Training Methods

Management in school foodservice operations should train employees to perform specific tasks or to follow certain procedures (Sullivan, Harper, & West, 2002). Training of foodservice employees should be broken down into three features: (a) development of training needs, (b) the use of appropriate training methods and materials to convey the message to the trainees, and (c) an evaluation of effectiveness of the training using different criteria and strategies (Tracey & Tews, 1995). Training is begun by showing importance and involving motivation of the trainees (Engel, 1998). If the trainees have no desire to learn, nothing will be learned. Motivation and the will to learn can be developed in employees through management.

Several methods are recommended for food safety training (NRAEF, 2008). The first method is on-the-job-training which involves learning while working on the job. Classroom learning is the second method that involves several activities that can be used to deliver training. Methods can include information search, guided discussion, role-play, demonstrations, jigsaw design, games, training videos and DVDs. Technology based online training and interactive CD-ROM is also available (NRAEF, 2008). All the training methods can be used to teach food safety and HACCP. HACCP training teaches

the 7 HACCP principles and the implementation of these principles in the workplace to operate the HACCP program.

Through a questionnaire of training preferences of 339 school foodservice site managers in 2002, Sullivan et al. (2002) concluded that video based instruction conducted as classroom type training had a high preference index. In these methods the trainees were able to watch and listen to instruction. Computer based training had a low preference index and training via the internet had the least training preference. These two methods may have had a low preference because many trainees were not accustomed to working with computers. All three types of training methods can be considered classroom type training.

Proper equipment and tools with which to work are crucial to a training session. If the trainees are learning about food safety, proper tools may vary from blast chillers with temperature monitoring systems to fully stocked hand-washing sinks (Lang, 2007). With these tools in training and the work environments, employees will be able to perform all job duties asked of them by their employers.

The time of day training is held is another important aspect to training. DeHoger, Trivette and Culley (1981) conducted a study of training with 274 employees in four school districts in Louisiana. They concluded that morning was the best time to conduct training sessions. Morning training was found best because employee minds were fresh and it was the first task of the day. Afternoons were least effective because after they

completed other work earlier in the day, they were not able to concentrate on the training material. Some schools conducted training on in-service days when the employees were focused on one purpose of food safety training for the whole day.

The researchers also investigated whether group learning, individual learning, or a mixture of the two methods offered better training results. The study found that group instruction produced a highly effective learning environment. Individual learning was preferred next and the combination group/individual learning was least effective. Group learning is considered to be less time and energy consuming compared to individual learning or a mixture of the two learning techniques. Group learning was found more effective because trainees were not worried about impressing the trainer individually and group discussion was allowed for learning opportunities.

Training is one of the important activities that all foodservice managers must perform, and a great deal of money needs to be devoted to this cause (Tracey & Tews, 1995). Effective training includes a formal and systematic assessment of training needs, the use of appropriate training methods to deliver content based on needs and a comprehensive evaluation of the program using several different evaluation criteria and strategies. To find if a training session or sessions were effective, four objectives should be examined: (a) reactions to training, (b) knowledge of material, (c) changes of job related behavior and performance, and (d) improvements in organizational level results.

School Foodservice Food Safety Training

Food safety training including HACCP training holds high importance to the success of the school foodservice operation. Almanza and Sneed (2003) projected that HACCP programs may save money and time while improving food quality at the facility. Unnecessary expenses such as healthcare and litigation expenses are avoided. Sneed and Youn (2002) found that in 2002 before the CRNA was passed, only 22% of school foodservice directors reported that they had implemented a comprehensive HACCP plan in their districts, while only 11% had a HACCP team in place to run the plan. They also found that only 30% of the directors had one or more employees whose primary responsibility was implementing and monitoring food safety programs in the school foodservice department.

In 2004, 387 school foodservice directors participated in a study to determine the extent, challenges and benefits of HACCP implementation in K-12 schools (National Foodservice Management Institute, 2005). It was found that 90% of the respondents reported having standard or formal food safety procedures in their schools but only 65% had begun a HACCP plan. Of the 35% that did not have a HACCP plan in place, 43% did not plan on implementing HACCP. Of the 65% of respondents that had begun HACCP plan, 38% reported not having a HACCP team in place. A large majority of respondents that had a HACCP team in place were from large school districts in which the HACCP team was over a group of schools and not individual schools. This was prior

to the CRNA which made a requirement to have a HACCP plan in place as all school foodservices.

Sneed and Henroid (2007) found that 15 of 34 schools in Iowa had started planning, training employees, and implementing HACCP in 2005. Twenty-two of the 34 foodservice directors thought that setting up standard operating procedures as part of the HACCP plan was very important and useful to the facility. Food safety training and HACCP documentation were found useful and important to 24 of the 34 schools. Skolmowski (2005) concluded many schools throughout the United States were not ready to implement food safety training which included HACCP despite the new requirement, as a number of schools were needed to make drastic changes in their food safety procedures. In the 2007 School Nutrition Operations Report 88.7% of the elementary schools, 84.4% of the middle schools and 85.4% of the high schools in the study had implemented HACCP plan in their schools (School Nutrition Association, 2007).

Implementation of food safety training including HACCP in schools has been slowed by employee barriers and lack of resources. Employee barriers included lack of motivation, language barriers and learning curves. Resource barriers include time, money and trainers. A study in 2004 showed barriers to HACCP implementation as time, personnel and the burden of required documentation (National Foodservice Management Institute, 2005). Schools could help overcome barriers by giving certain individuals primary responsibility for food safety and HACCP implementation. This places

responsibility in employee hands making it seem more pertinent to their jobs. Foodservice facilities need to look at resource allocation and reallocate funds for food safety training because of the critical health and safety issues of not having the program in place (Sneed & Youn, 2002).

CHAPTER III

METHODOLOGY

All methods for this study were approved by the Institutional Review Board at Texas Woman's University prior to beginning this research project (See Appendix A).

Participants

Survey participants included school foodservice directors who were responsible for managing foodservice facilities at Texas public schools (K-12). The foodservice directors chosen for the study represented foodservice operations that participated in the NSLP. The participants were randomly selected from the Texas Department of Agriculture 2008-2009 Directory of Texas Public and Charter School Foodservice Directors. There were 1,315 school foodservice managers/ directors in this directory and 525 foodservice managers/ directors were randomly selected by alphabetizing the list and choosing the first 525 odd numbered schools.

Measures

A survey instrument was developed by the researcher based on a literature review. The survey modeled the Dillman's Design for surveys (Dillman, 2007). The researcher referenced HACCP procedures and SOPs when stating the questions. The questionnaire included questions focused on school and director demographics, methods and frequencies

of food safety training, perceived effectiveness of training, perceived attitudes to food safety training, perceived barriers to food safety training, SOPs implementation and HACCP program implementation. The demographic questions included foodservice director's age, number of years or experience in school foodservice, education level, food safety training certificates, district size and average daily meal participation. Food safety questions focused on what food safety certification was required for employment and current food safety training content, methods and frequency.

Questions about perceived effectiveness, attitudes and barriers of food safety training were measured by asking participants to indicate degree of agreement for selected statements using a Likert-type scale. Training questions were used to investigate the training topics being covered during training. Likert-type questions were also asked on SOPs and steps in HACCP implementation.

The instrument was then reviewed by a group of four educators and four school foodservice professionals from the north Texas area for content, validity, and usability. After the review, the survey instrument was revised appropriately based on their feedback.

Pilot Study

Following the revision of the questionnaire, a pilot study was conducted with a convenience sample of Texas school foodservice directors. The pilot study sample was selected from even numbered members from the alphabetized Texas Department of Agriculture 2008- 2009 Directory of Public and Charter School Foodservice Directors.

The pilot study sample was not included in the final study sample. The pilot study clarified the directions and the reliability was measured. The researcher conducted a Cronbach alpha test for reliability with the 10 returned surveys from the pilot study. Each question had to be 0.70 or higher to be considered reliable. The questions that were not 0.70 of higher were modified.

Data Collection

This project was first conducted using an online questionnaire. An online questionnaire was produced by the researcher using Psychdata. All participants were mailed a letter that included a link for the online questionnaire (See Appendix B). The letter stated the purpose, directions for the survey and an opportunity to receive an incentive (See Appendix C). The incentive for participation was a chance to be entered in a drawing for two $50 dollar gift cards.

The 525 school districts chosen to participate were numbered 1-525 by alphabetical order. The researcher knew which schools participated in the survey because once participants finished the survey they were taken to a separate link that prompted them to type in the name of their school district. After they typed the name of their school district and clicked enter, Psychdata took them to another link that gave them an option to enter an email address to receive results of the study. All three links were separate and were not connected. The researcher received two lists separate from the results, these lists included a list of participating school districts with completed surveys and a list of participants

wanting the results of the study emailed to them. The list of school district names were linked to the corresponding numbers of the 525 participants. These numbers were entered in the drawing for the two gift cards. These numbers were not linked to the results in any way. The list of participating school district names were also used to determine which participants received follow-up recruitment

After the initial mailing, the researcher then sent out postcards which included a reminder and the link for the questionnaire (See Appendix D). A cover letter, a printed survey and a return postage-paid envelope was then mailed out to those participants who had not yet responded to the original letter or reminder postcard (See Appendices E & F). The participants were entered into the drawing by writing their school district at the bottom of the survey. They were also allowed to request a copy of the results be sent to them through email by writing their email address at the bottom of the survey. The requests were sent back with the completed survey. The school district names that were returned with completed surveys were entered into the drawing for the gift cards. The school district names were not connected to their survey responses in any way.

Data Analysis

Data was analyzed using SPSS software, version 15. Frequencies and means were calculated for demographic variables. The variables included district enrollment, daily meal participation, tenure in school foodservice, food safety certification, age, education level, employee certification requirements training frequency and training content.

Pearson's Product Moment Correlation was used to test the association between continuous variables and the mean scores of perceived effectiveness of food safety training, attitudes towards food safety and barriers to food safety training. Continuous variables included director experience in school foodservice, job tenure in current position and age of director. Analyses of Variance (ANOVA) was used to test the difference in the mean scores of perceived effectiveness of food safety training, attitudes towards food safety and barriers to food safety training based on categorical variables. Categorical variables included food safety certification of director, director education and daily meal participation. The 10 HACCP statements and 11 SOP statements were compared using Pearson's Product Moment Correlation to see relationships with demographic and training variables. Mean scores were calculated for the 10 HACCP statements and 11 SOP statements. The mean scores were compared by using an Analyses of Variance (ANOVA) to the demographic and training variables to investigate differences.

CHAPTER IV

RESULTS

The purpose of this study was to investigate food safety training currently offered in Texas school foodservice facilities in relation to the implementation of HACCP. This study was conducted using both online and paper surveys. Recruitment letters were mailed out to 525 Texas foodservice directors who are responsible for managing foodservice facilities at Texas public schools. Postcard reminders were sent to 494 of the directors, and paper surveys with were sent to 476. Of the 525 recruitment letters, 20 were returned due to incorrect addresses. A total of 69 participants completed online surveys and 51 returned paper surveys through the mail. Therefore, a total of 120 surveys were completed and analyzed, for a 24% response rate.

Demographics

Table 1 summarizes the student enrollment of each Texas school district that provided information. The average enrollment was 11,368 students; minimum enrollment was 90 students and maximum enrollment was 198,000 students. The school districts reported a daily meal participation average of 9,529 meals. A greater number of participants represented smaller school districts than larger school districts. Table 1 also shows the average age (49) of the foodservice directors. There were more foodservice

directors over 40 years old in the study than younger ages. On average, the foodservice directors had 14.5 years of experience in school foodservice and had spent an average of 8.9 years in their current position.

Table 1

Demographic Characteristics of Texas School Districts and Foodservice Directors (N=120)

	n	mean	SD	Min	Max
Characteristics of school district					
Student enrollment	120	11,368	26,477	90	198,000
Average daily meal participation	120	9,529	26,126	75	223,000
Characteristics of foodservice directors					
Age	120	49.1	9.5	25	70
No. of years in school foodservice	117	14.5	8.8	0	36
No. of years in current position	112	8.9	7.7	0	36

Table 2 summarizes the highest education completed and food safety certification currently held by the foodservice directors. About 40% had completed high school or a GED, and only 19% had completed their Master's degree or higher education. Over 38% of the participants had completed a Certified Manager Program by the Texas Department of State Health Services and 31% had completed a ServSafe course.

Table 2

Demographic Characteristics of Texas Foodservice Directors (N=120)

	No.	%
Highest level of education (n^a=118)		
High School or GED	47	40
Some college	22	18
Associate's degree	3	3
Bachelor's degree	17	14
Some graduate work	7	6
Master's degree & higher	22	19
Food safety certification possessed (n^a=143)		
Certified Manager Program by TX. Dept of State Health Services	55	38
ServSafe	45	31
Learn2Serve	7	5
Texas Restaurant Association	3	3
National Registry of Food Safety Professionals	3	3
Other	30	21

Note. [a] The actual number of respondents to questions varied due to missing data, invalid data or multiple choices checked.

Table 3 summarizes the food safety certification requirement for the foodservice managers/ supervisors and employees. The highest percent (42%) of required food safety certification for managers/supervisors was the Certified Manager Program by the Texas Department of State Health Services. However, 38% of the schools did not require any food safety training for employees while 34% required state or local government training.

Table 3

Food Safety Certification Required for Texas School Foodservice Managers/ Supervisors and Employees (N=120)

	No.	%
Food safety certification required by managers/ supervisors (n^a=135)		
Certified Manager Program by TX Dept. of State Health Services	58	42
ServSafe	28	21
Learn2Serve	4	3
National Registry of Food Safety Professionals	2	1
Texas Restaurant Association	1	1
Other	25	19
None	17	13
Food safety certification required by all foodservice employees (n^a=122)		
State or Local Government Food Safety Training	42	34
ServSafe	11	9
Learn2Serve	4	3
None	46	38
Other	19	16

Note. [a] The actual number of respondents to questions varied due to missing data, invalid data or multiple choices checked.

Training

Table 4 show frequency and methods of food safety training provided in Texas school foodservice operations. Food safety training is typically provided when an employee is hired (31%) and yearly for all staff (38%). One-half (53%) of schools provided a combination of group and "one on one" training. Hands on training and handouts represented the most frequent (21% and 19% respectively) types of training methods used.

Table 4

Demographic Characteristics of Texas School Foodservice Food Safety Training (N=120)

	No.	%
Frequency of food safety training sessions (n[a]=186)		
When an employee is hired	57	31
Weekly for all staff	10	5
Monthly for all staff	32	17
Yearly for all staff	71	38
Other	16	9
How is food safety training provided (n[a]=137)		
Group training	52	38
Individual "one on one" training	10	7
Both group & individual "one on one" training	72	53
Other	3	2
Types of training methods (n[a]=416)		
Hands on training	88	21
Handouts	79	19
Training videos & DVDs	67	16
Posters	62	15
Classroom lecture	60	15
Online training or interactive CD-Rom	19	5
Games & activities	17	4
Role playing	14	3
Other	10	2

Note. [a] The actual number of respondents to questions varied due to missing data, invalid data or multiple choices checked.

Effectiveness, Attitudes, and Barriers to Food Safety Training

Table 5 shows the foodservice director's perception of food safety training effectiveness, attitudes and barriers. The Likert scale was reverse coded as 1 strongly disagree, 2 disagree, 3 neutral, 4 agree and 5 strongly agree. Most foodservice directors agreed (4) or strongly agreed (5) with statements concerning effectiveness and attitudes related to food safety training. However, the foodservice directors tended to be neutral (3) or disagree (2) with the statements concerning barriers to food safety training.

Table 5

Foodservice Directors' Perception of Food Safety Training Effectiveness, Attitudes, and Barriers (N=120)

	(M± SD)[a]
Effectiveness of training (N[b]= 113)	
Food safety training is effective in reducing the risk of foodborne illness	4.6 ± 0.5
Food safety training is effective in my district	4.4 ± 0.6
Employees are confident after food safety training	4.2 ± 0.6
The methods of food safety training in my district are effective	4.1 ± 0.7
The frequency of food safety training in my district is adequate	3.9 ± 0.9
Attitudes concerning food safety training	
I feel teaching safe food handling is an important part of my job	4.6 ± 0.5
Being certified in food safety has or will help me do my job better	4.5 ± 0.7
Children can easily get foodborne illness compared to a healthy adult	4.5 ± 0.7
My staff considers training and learning procedures for safe food handling part of their job	4.2 ± 0.7
Barriers to food safety training	
Length of time for our training sessions is adequate	3.8 ± 0.8
I feel we have adequate funding to offer food safety training	3.4 ± 1.2
Language barriers between management and employees make food safety training difficult	3.2 ± 1.5
I feel we have adequate time to provide training on food safety	3.2 ± 1.1
Lack of motivation of staff to participate in training is a barrier in our district	2.8 ± 1.2

Note. [a] A Likert Scale was used as follows: 5= Strongly Agree, 4= Agree, 3= Neutral, 2= Disagree, 1= Strongly Disagree.

Note.[b] The actual number of respondents to questions varied due to missing data or invalid data.

Foodservice Director's Perception of Current Food Safety Plan

Table 6 and Table 7 show that most of the school foodservice directors agree (4) or strongly agree (5) that their current food safety plan includes the standard operating procedures (See table 6) and the 10 steps to a HACCP plan (See table 7). However, more foodservice directors had a higher level of agreement on having the standard operating procedures in place than the steps of a HACCP plan in place.

Table 6

Foodservice Directors' Perception of Standard Operating Procedures in Current Food Safety Plan (N=120)

	(M± SD)[a]
Standard Operating Procedures (n[b]=113)	
Standard operating procedures are in place for cooking potentially hazardous foods	4.6 ± 0.9
Standard operating procedures for handwashing are in place	4.6 ± 0.5
Standard operating procedures for cooling potentially hazardous foods are in place	4.5 ± 0.6
Standard operating procedures for washing fruits and vegetables are in place	4.5 ± 0.6
Standard operating procedures are in place for holding hot and cold potentially hazardous foods	4.5 ± 0.5
Standard operating procedures for personal hygiene are in place	4.5 ± 0.5
Standard operating procedures for reheating potentially hazardous foods are in place	4.5 ± 0.5
Standard operating procedures are in place for receiving deliveries	4.5 ± 0.5
Standard operating procedures to store poisonous and toxic chemicals are in place	4.5 ± 0.5
Standard operating procedures of using suitable utensils when handling ready-to-eat foods are in place	4.5 ± 0.5
Standard operating procedures for date marking ready-to-eat potentially hazardous foods are in place	4.4 ± 0.6

Note. [a] A Likert Scale was used as follows: 5= Strongly Agree, 4= Agree, 3= Neutral, 2= Disagree, 1= Strongly Disagree.

Note. [b] The actual number of respondents to questions varied due to missing data or invalid data.

Table 7

Foodservice Directors' Perception of HACCP Procedures in Current Food Safety Plan (N=120)

	(M± SD)[a]
HACCP Statements (n[b]=111)	
Time and temperatures monitoring records are being used daily while operation is open	4.5 ± 0.5
Food safety training records of employees are kept and updated after each food safety training session	4.4 ± 0.7
Procedures for record keeping and documentation have been established	4.4 ± 0.5
Corrective actions have been identified if a critical limit has not been met	4.3 ± 0.8
Monitoring procedures for critical control points and critical limits are in place	4.3 ± 0.6
Critical control points of potentially hazardous foods and procedures have been determined for each menu cycle	4.2 ± 0.7
Critical limits of potentially hazardous foods have been established for each menu cycle.	4.2 ± 0.7
The food safety system has been verified to be reliable.	4.2 ± 0.6
A hazard analysis of menu items and food handling procedures has been conducted for each menu cycle	4.1 ± 0.8
One person or a group of employees other than a manager leads the effort of the HACCP program	3.8 ± 1.2

Note. a A Likert Scale was used as follows: 5= Strongly Agree, 4= Agree, 3= Neutral, 2= Disagree, 1= Strongly Disagree.

Note. [b] The actual number of respondents to questions varied due to missing data or invalid data.

Effectiveness of Food Safety Training

Pearson's Product Moment Correlation was used to test relationships between perceived effectiveness of food safety training and director experience in school foodservice, job tenure in current position and age of director. No significant relationships were found for these variables (See Table 8).

An Analyses of Variance (ANOVA) was used to determine if there were significant differences in foodservice director's perceived effectiveness of food safety training based on food safety certification of director, director education and average daily meal participation. Certified Manager Program offered by the Texas Department of State Health Services and ServSafe were the only two food safety certifications examined, as these were the most widely held certifications of the study participants (38% and 31% respectively). However, each certification had to be tested separately as a foodservice director could hold both types of certification. Director education and average daily meal participation were grouped into categories for a better understanding of the results. Director education was divided into four categories: High School/ GED, Associate' degree/ some college, Bachelor's degree/ some graduate school, and Master's degree or higher. Daily meal participation was divided into four categories by the number of meals: under 500 meals, 500-1,999 meals, 2,000-9,999 meals, and ≥10,000 meals. No significant differences were found in foodservice directors' perceived effectiveness of food safety training based on the food safety certification of director (See

Table 9), director education (See Table 10), and average daily meal participation (See Table 11).

Table 8

Relationships Between Foodservice Director's Perceived Effectiveness of Food Safety Training and Foodservice Director's Experience, Current Position, and Age (N=120)

	r	*p*
Experience (n[a]=111)		
Employees are confident after food safety training	-0.003	0.98
Food safety training is effective in reducing the risk of foodborne illness	-0.007	0.94
Food safety training is effective in my district	0.074	0.44
The frequency of food safety training in my district is adequate	0.118	0.22
The methods of food safety training in my district are effective	-0.033	0.73
Current Position (n[a]=107)		
Employees are confident after food safety training	-0.016	0.87
Food safety training is effective in reducing the risk of foodborne illness	0.005	0.96
Food safety training is effective in my district	0.105	0.28
The frequency of food safety training in my district is adequate	0.079	0.42
The methods of food safety training in my district are effective	0.027	0.78
Age (n[a]=113)		
Employees are confident after food safety training	-0.077	0.42
Food safety training is effective in reducing the risk of foodborne illness	-0.097	0.31
Food safety training is effective in my district	0.036	0.70
The frequency of food safety training in my district is adequate	0.029	0.76
The methods of food safety training in my district are effective	-0.062	0.51

Note. Results for Pearson Product Moment Correlation analyses ($p < 0.05$) show no significant correlations.

Note. [a] The actual number of respondents to questions varied due to missing data, invalid data or multiples choices checked.

Table 9

Differences in Director's Perceived Effectiveness of Food Safety Training Based on Director's Food Safety Certification (N=120)

	n	Mean [a]	SD	*F*	*p*
Employees are confident after food safety training:					
Certified manager checked	54	4.18	0.6	0.25	0.62
Certified manager nonchecked	59	4.20	0.6		
ServSafe checked	44	4.09	0.5	1.56	0.21
ServSafe nonchecked	69	4.23	0.6		
Food safety training is effective in reducing the risk of foodborne illness:					
Certified manager checked	54	4.61	0.5	0.00	0.99
Certified manager nonchecked	59	4.61	0.5		
ServSafe checked	44	4.59	0.5	0.10	0.75
ServSafe nonchecked	69	4.62	0.5		
Food safety training is effective in my district:					
Certified manager checked	54	4.37	0.6	0.02	0.90
Certified manager nonchecked	59	4.35	0.6		
ServSafe checked	44	4.34	0.6	0.96	0.76
ServSafe nonchecked	69	4.37	0.6		
The frequency of food safety training in my district is adequate:					
Certified manager checked	54	3.89	0.9	0.05	0.80
Certified manager nonchecked	59	3.93	0.9		
ServSafe checked	44	3.90	0.9	0.00	0.98
ServSafe nonchecked	69	3.91	0.9		
The methods of food safety training in my district are effective:					
Certified manager checked	54	4.05	0.7	1.21	0.27
Certified manager nonchecked	59	4.20	0.8		
ServSafe checked	44	4.04	0.8	1.08	0.30
ServSafe nonchecked	69	4.18	0.6		

Note. [a] A Likert Scale was used as follows: 5= Strongly Agree, 4= Agree, 3= Neutral, 2= Disagree, 1= Strongly Disagree.

Note. Results for Analyses of Variance ($p < 0.05$) show no significant differences.

Table 10

Differences in Director's Perceived Effectiveness of Food Safety Training Based on Director's Highest Education Level (N=120)

	n	Mean [a]	SD	*F*	*p*
Employees are confident after food safety training:					
High school/ GED	41	4.21	0.7	0.44	0.21
Associate's degree/some college	25	4.21	0.6		
Bachelor's degree/ some graduate school	23	4.17	0.5		
Master's degree or higher	22	4.04	0.4		
Food safety training is effective in reducing the risk of foodborne illness:					
High school/ GED	41	4.5	0.5	0.53	0.75
Associate's degree/some college	25	4.68	0.5		
Bachelor's degree/ some graduate school	23	4.65	0.6		
Master's degree or higher	22	4.5	0.6		
Food safety training is effective in my district:					
High school/ GED	41	4.34	0.6	1.28	0.76
Associate's degree/some college	25	4.52	0.6		
Bachelor's degree/ some graduate school	23	4.39	0.5		
Master's degree or higher	22	4.18	0.7		
The frequency of food safety training in my district is adequate:					
High school/ GED	41	4.02	0.6	1.27	0.98
Associate's degree/some college	25	4.04	0.9		
Bachelor's degree/ some graduate school	23	3.78	0.9		
Master's degree or higher	22	3.63	0.8		
The methods of food safety training in my district are effective:					
High school/ GED	41	4.14	0.9	0.90	0.30
Associate's degree/some college	25	4.2	0.9		
Bachelor's degree/ some graduate school	23	4.21	0.8		
Master's degree or higher	22	3.9	0.5		

Note. [a] A Likert Scale was used as follows: 5= Strongly Agree, 4= Agree, 3= Neutral, 2= Disagree, 1= Strongly Disagree.

Note. Results for Analyses of Variance ($p < 0.05$) show no significant differences.

Table 11

Differences in Director's Perceived Effectiveness of Food Safety Training Based on Daily Meal Participation (N=120)

	n	Mean [a]	SD	*F*	*p*
Employees are confident after food safety training:					
Under 500	32	4.28	0.7	0.69	0.56
500-1,999	34	4.17	0.6		
2,000-9,999	26	4.15	0.5		
≥ 10,000	21	4.04	0.4		
Food safety training is effective in reducing the risk of foodborne illness:					
Under 500	32	4.62	0.5	1.47	0.23
500-1,999	34	4.47	0.6		
2,000-9,999	26	4.65	0.5		
≥ 10,000	21	4.76	0.4		
Food safety training is effective in my district:					
Under 500	32	4.43	0.6	0.48	0.70
500-1,999	34	4.35	0.6		
2,000-9,999	26	4.38	0.6		
≥ 10,000	21	4.23	0.5		
The frequency of food safety training in my district is adequate:					
Under 500	32	4.18	0.7	1.57	0.20
500-1,999	34	3.85	1.0		
2,000-9,999	26	3.73	1.0		
≥ 10,000	21	3.80	0.8		
The methods of food safety training in my district are effective:					
Under 500	32	4.21	1.0	0.40	0.75
500-1,999	34	4.11	0.7		
2,000-9,999	26	4.15	0.5		
≥ 10,000	21	4.00	0.4		

Note. [a] A Likert Scale was used as follows: 5= Strongly Agree, 4= Agree, 3= Neutral, 2= Disagree, 1= Strongly Disagree.

Note. Results for Analyses of Variance ($p < 0.05$) show no significant differences.

Attitudes Concerning Food Safety Training

Pearson's Product Moment Correlation was used to determine if there were significant relationships between attitudes concerning food safety training and director experience in school foodservice, job tenure in current position and age of director. No significant relationships were found for any of the variables (See Table 12).

An Analyses of Variance (ANOVA) was used to determine if there was a significant difference in attitudes concerning food safety training based on food safety certification of director, director education and average daily meal participation. It was determined that those foodservice directors with a ServSafe certification gave higher agreement to "Being certified in food safety has or will help me do my job better" (See Table 13). There were no significant differences in attitudes concerning food safety training based on foodservice director's education level (See Table14) or average daily meal participation (See Table 15).

Table 12

Relationships Between Director's Attitudes Towards Food Safety Training and Foodservice Director's Experience, Current Position and Age (N=120)

	r	*p*
Experience (n^a=111)		
My staff considers training and learning procedures for safe food handling part of their job	0.640	0.50
I feel teaching safe food handling is an important part of my job	-0.780	0.42
Being certified in food safety has or will help me do my job better	-0.400	0.68
Children can easily get foodborne illness compared to a healthy adult	0.015	0.88
Current Position (n^a=107)		
My staff considers training and learning procedures for safe food handling part of their job	-0.480	0.62
I feel teaching safe food handling is an important part of my job	-0.095	0.33
Being certified in food safety has or will help me do my job better	-0.159	0.10
Children can easily get foodborne illness compared to a healthy adult	-0.002	0.99
Age (n^a=113)		
My staff considers training and learning procedures for safe food handling part of their job	0.106	0.26
I feel teaching safe food handling is an important part of my job	-0.860	0.37
Being certified in food safety has or will help me do my job better	-0.008	0.93
Children can easily get foodborne illness compared to a healthy adult	-0.172	0.07

Note. Results for Pearson Product Moment Correlation analyses ($p < 0.05$) show no significant correlations.

Note. [a] The actual number of respondents to questions varied due to missing data, invalid data or multiple choices checked.

Table 13

Differences in Director's Attitudes Towards Food Safety Training Based on Director's Food Safety Certification (N=120)

	n	Mean [a]	SD	*F*	*p*
My staff considers training and learning procedures for safe food handling part of their job					
Certified manager checked	54	4.25	0.8	0.20	0.66
Certified manager nonchecked	59	4.32	0.7		
ServSafe checked	44	4.31	0.6	0.89	0.77
ServSafe nonchecked	69	4.27	0.8		
I feel teaching safe food handling is an important part of my job					
Certified manager checked	54	4.75	0.4	2.31	0.13
Certified manager nonchecked	59	4.62	0.5		
ServSafe checked	44	4.65	0.5	0.32	0.57
ServSafe nonchecked	69	4.71	0.5		
Being certified in food safety has or will help me do my job better					
Certified manager checked	54	4.62	0.6	3.18	0.08
Certified manager nonchecked	59	4.38	0.8		
ServSafe checked	44	4.68	0.5	4.49	0.04*
ServSafe nonchecked	69	4.39	0.8		
Children can easily get foodborne illness compared to a healthy adult					
Certified manager checked	54	4.59	0.7	1.45	0.23
Certified manager nonchecked	59	4.44	0.7		
ServSafe checked	44	4.50	0.7	0.03	0.87
ServSafe nonchecked	69	4.52	0.7		

Note. [a] A Likert Scale was used as follows: 5= Strongly Agree, 4= Agree, 3= Neutral, 2= Disagree, 1= Strongly Disagree.

Note. * Results for Analyses of Variance ($p < 0.05$) show significant differences.

Table 14

Differences in Director's Attitudes Towards Food Safety Training Based on Director's Highest Education Level (N=120)

	n	Mean [a]	SD	*F*	*p*
My staff considers training and learning procedures for safe food handling part of their job					
High school/ GED	41	4.19	0.7	0.37	0.77
Associate's degree/some college	25	4.32	0.9		
Bachelor's degree/ some graduate school	23	4.39	0.5		
Master's degree or higher	22	4.27	0.8		
I feel teaching safe food handling is an important part of my job					
High school/ GED	41	4.56	0.5	1.66	0.18
Associate's degree/some college	25	4.8	0.4		
Bachelor's degree/ some graduate school	23	4.73	0.4		
Master's degree or higher	22	4.72	0.5		
Being certified in food safety has or will help me do my job better					
High school/ GED	41	4.48	0.6	1.65	0.18
Associate's degree/some college	25	4.68	0.6		
Bachelor's degree/ some graduate school	23	4.56	0.7		
Master's degree or higher	22	4.22	1.0		
Children can easily get foodborne illness compared to a healthy adult					
High school/ GED	41	4.34	0.7	1.70	0.17
Associate's degree/some college	25	4.64	0.7		
Bachelor's degree/ some graduate school	23	4.47	0.7		
Master's degree or higher	22	4.68	0.6		

Note. [a] A Likert Scale was used as follows: 5= Strongly Agree, 4= Agree, 3= Neutral, 2= Disagree, 1= Strongly Disagree.

Note. Results for Analyses of Variance ($p < 0.05$) show no significant differences.

Table 15

Differences in Director's Attitudes Towards Food Safety Training Based on Daily Meal Participation (N=120)

	n	Mean [a]	SD	*F*	*p*
My staff considers training and learning procedures for safe food handling part of their job					
Under 500	32	4.34	0.7	0.23	0.88
500-1,999	34	4.21	0.8		
2,000-9,999	26	4.31	0.7		
≥ 10,000	21	4.33	0.8		
I feel teaching safe food handling is an important part of my job					
Under 500	32	4.65	0.5	1.59	0.19
500-1,999	34	4.58	0.5		
2,000-9,999	26	4.73	0.5		
≥ 10,000	21	4.85	0.4		
Being certified in food safety has or will help me do my job better					
Under 500	32	4.59	0.6	0.76	0.52
500-1,999	34	4.41	0.7		
2,000-9,999	26	4.61	0.6		
≥ 10,000	21	4.38	1.0		
Children can easily get foodborne illness compared to a healthy adult					
Under 500	32	4.59	0.6	1.78	0.16
500-1,999	34	4.29	0.8		
2,000-9,999	26	4.61	0.6		
≥ 10,000	21	4.61	0.6		

Note. [a] A Likert Scale was used as follows: 5= Strongly Agree, 4= Agree, 3= Neutral, 2= Disagree, 1= Strongly Disagree.

Note. Results for Analyses of Variance ($p < 0.05$) show no significant differences.

Barriers to Food Safety Training

Pearson's Product Moment Correlation was used to determine if there were significant relationships between barriers to food safety training and director experience in school foodservice, job tenure in current position and age of director. It was determined there were no significant relationships for these variables (See Table 16).

Analyses of Variances (ANOVA) was used to determine if there were significant differences in perceived barriers to food safety training based on food safety certification of director, director education and average daily meal participation. It was determined there was no significant differences in perceived barriers of food safety training based on food safety certification (See Table 17). However, there was a significant difference between foodservice director education levels and perceived barriers to food safety training. Foodservice directors with higher education tended to disagree (2) or be neutral (3) with one statement of perceived barriers in food safety training (See Table 18). They disagreed or were neutral with their feelings of "I feel we have adequate funding to offer food safety training." There was also a significant difference found for statements regarding barriers in food safety training based on average daily meal participation. Schools with lower average daily meal participation tended to agree they had adequate funding and adequate time for food safety training while larger schools tended to have neutral opinions on those statements (See Table 19).

Table 16

Relationships Between Director's Perceived Barriers to Food Safety Training and Foodservice Director's Experience , Current Position, and Age (N=120)

	r	*p*
Experience (n^a=111)		
Length of time for our training sessions is adequate	0.130	0.90
I feel we have adequate funding to offer food safety training	-0.120	0.21
I feel we have adequate time to provide training on food safety	-0.084	0.38
Language barriers between management and employees make food safety training difficult	-0.100	0.29
Lack of motivation of staff to participate in training is a barrier in our district	-0.103	0.28
Current Position (n^a=107)		
Length of time for our training sessions is adequate	0.088	0.37
I feel we have adequate funding to offer food safety training	-0.049	0.62
I feel we have adequate time to provide training on food safety	-0.050	0.61
Language barriers between management and employees make food safety training difficult	-0.145	0.14
Lack of motivation of staff to participate in training is a barrier in our district	-0.108	0.27
Age (n^a=113)		
Length of time for our training sessions is adequate	-0.028	0.77
I feel we have adequate funding to offer food safety training	-0.033	0.73
I feel we have adequate time to provide training on food safety	0.005	0.96
Language barriers between management and employees make food safety training difficult	-0.139	0.14
Lack of motivation of staff to participate in training is a barrier in our district	-0.098	0.30

Note. Results for Pearson Product Moment Correlation analyses ($p < 0.05$) show no significant correlations.

Note. [a] The actual number of respondents to questions varied due to missing data, invalid data or multiple choices checked.

Table 17

Differences in Director's Perceived Barriers to Food Safety Training Based on Director's Food Safety Certification (N=120)

	n	Mean [a]	SD	*F*	*p*
Length of time for our training sessions is adequate					
Certified manager checked	54	3.85	0.8	0.00	0.98
Certified manager nonchecked	59	3.84	0.8		
ServSafe checked	44	3.84	0.8	0.01	0.93
ServSafe nonchecked	69	3.85	0.8		
I feel we have adequate funding to offer food safety training					
Certified manager checked	54	3.40	1.2	0.22	0.64
Certified manager nonchecked	59	3.31	1.2		
ServSafe checked	44	3.29	1.1	0.18	0.67
ServSafe nonchecked	69	3.39	1.2		
I feel we have adequate time to provide training on food safety	54	3.29	1.1	0.37	0.54
Certified manager checked	59	3.17	1.1		
Certified manager nonchecked	44	3.25	1.1	0.02	0.88
ServSafe checked	69	3.21	1.1		
ServSafe nonchecked					
Language barriers between management and employees make food safety training difficult					
Certified manager checked	54	3.33	1.8	0.35	0.56
Certified manager nonchecked	59	3.16	1.1		
ServSafe checked	44	3.15	1.1	0.26	0.61
ServSafe nonchecked	69	3.30	1.7		
Lack of motivation of staff to participate in training is a barrier in our district					
Certified manager checked	54	2.98	1.2	1.40	0.24
Certified manager nonchecked	59	2.71	1.2		
ServSafe checked	44	2.79	1.1	0.10	0.75
ServSafe nonchecked	69	2.86	1.3		

Note. [a] A Likert Scale was used as follows: 5= Strongly Agree, 4= Agree, 3= Neutral, 2= Disagree, 1= Strongly Disagree.

Note. Results for Analyses of Variance ($p < 0.05$) show no significant differences.

Table 18

Differences in Director's Perceived Barriers to Food Safety Training Based on Director's Highest Education Level (N=120)

	n	Mean [a]	SD	*F*	*p*
Length of time for our training sessions is adequate					
High school/ GED	41	3.85	0.9	1.83	0.15
Associate's degree/some college	25	4.12	0.7		
Bachelor's degree/ some graduate school	23	3.73	0.8		
Master's degree or higher	22	3.59	8.0		
I feel we have adequate funding to offer food safety training					
High school/ GED	41	3.68	1.0	3.00	0.03*
Associate's degree/some college	25	3.40	1.2		
Bachelor's degree/ some graduate school	23	3.08	1.3		
Master's degree or higher	22	2.86	1.1		
I feel we have adequate time to provide training on food safety					
High school/ GED	41	3.46	1.0	2.67	0.05
Associate's degree/some college	25	3.40	1.2		
Bachelor's degree/ some graduate school	23	2.95	1.0		
Master's degree or higher	22	2.77	1.1		
Language barriers between management and employees make food safety training difficult					
High school/ GED	41	3.46	2.0	0.94	0.42
Associate's degree/some college	25	2.84	1.0		
Bachelor's degree/ some graduate school	23	3.17	1.1		
Master's degree or higher	22	3.27	1.1		
Lack of motivation of staff to participate in training is a barrier in our district					
High school/ GED	41	3.02	1.2	0.68	0.57
Associate's degree/some college	25	2.68	1.4		
Bachelor's degree/ some graduate school	23	2.69	1.1		
Master's degree or higher	22	2.68	1.2		

Note. [a] A Likert Scale was used as follows: 5= Strongly Agree, 4= Agree, 3= Neutral, 2= Disagree, 1= Strongly Disagree Significant Difference at $p < 0.05$.

Note. Results for Analyses of Variance ($p < 0.05$) show significant differences.

Table 19

Differences in Director's Perceived Barriers to Food Safety Training Based on Daily Meal Participation (N=120)

	n	Mean [a]	SD	*F*	*p*
Length of time for our training sessions is adequate					
Under 500	32	4.21	0.7	3.73	0.01*
500-1,999	34	3.82	0.8		
2,000-9,999	26	3.57	0.9		
≥ 10,000	21	3.67	0.7		
I feel we have adequate funding to offer food safety training					
Under 500	32	3.93	1.1	4.24	0.01*
500-1,999	34	3.14	1.1		
2,000-9,999	26	3.19	1.1		
≥ 10,000	21	3.00	1.2		
I feel we have adequate time to provide training on food safety					
Under 500	32	3.93	1.0	7.18	0.00*
500-1,999	34	2.94	1.0		
2,000-9,999	26	3.00	1.0		
≥ 10,000	21	2.90	1.1		
Language barriers between management and employees make food safety training difficult					
Under 500	32	3.53	2.3	1.28	0.28
500-1,999	34	2.88	0.8		
2,000-9,999	26	3.19	1.0		
≥ 10,000	21	3.47	1.1		
Lack of motivation of staff to participate in training is a barrier in our district					
Under 500	32	2.90	1.3	0.26	0.85
500-1,999	34	2.94	1.3		
2,000-9,999	26	2.69	1.0		
≥ 10,000	21	2.76	1.3		

Note. [a] A Likert Scale was used as follows: 5= Strongly Agree, 4= Agree, 3= Neutral, 2= Disagree, 1= Strongly Disagree.

Note. Results for Analyses of Variance ($p < 0.05$) show significant differences.

Standard Operating Procedures

Pearson's Product Moment Correlation was used to determine if there was a significant relationship in the extent of SOP implementation and the number of hours spent on food safety training each month and director experience in school foodservice. It was determined there was a relationship between SOP implementation and the number of hours spent on food safety training each month (See Table 20). The number of hours a month ranged from ½ hour to 20 hours a month spent on training food safety. More time spent on training led to a greater agreement in one SOP statement. The statement that showed significance was "Standard operating procedures for handwashing are in place." There was no significant relationship in the foodservice director experience and the extent of SOP implementation (See Table 21).

Table 20

Relationship Between Standard Operating Procedures in Place to the Number of Hours Spent on Training Each Month (N=120)

	r	*p*
Standard Operating Procedures (n^a=113)		
Standard operating procedures are in place for cooking potentially hazardous foods.	-0.141	0.15
Standard operating procedures for cooling potentially hazardous foods are in place.	-0.134	0.17
Standard operating procedures are in place for holding hot and cold potentially hazardous foods.	-0.169	0.09
Standard operating procedures for date marking ready-to-eat potentially hazardous foods are in place.	0.105	0.29
Standard operating procedures for personal hygiene are in place.	0.189	0.05
Standard operating procedures for reheating potentially hazardous foods are in place.	-0.127	0.20
Standard operating procedures are in place for receiving deliveries.	0.180	0.07
Standard operating procedures to store poisonous and toxic chemicals are in place.	-0.151	0.13
Standard operating procedures of using suitable utensils when handling ready-to-eat foods are in place.	0.161	0.10
Standard operating procedures for washing fruits and vegetables are in place.	-0.131	0.18
Standard operating procedures for handwashing are in place.	0.200	0.04*

Note. * Results for Pearson Product Moment Correlation analyses ($p < 0.05$) show significant correlations.

Note. [a] The actual number of respondents to questions varied due to missing data, invalid data or multiple choices checked.

Table 21

Relationship Between Standard Operating Procedures in Place to the Director Foodservice Experience (N=120)

	r	*p*
Standard Operating Procedures (n[a]=113)		
Standard operating procedures are in place for cooking potentially hazardous foods.	-0.200	0.84
Standard operating procedures for cooling potentially hazardous foods are in place.	0.047	0.62
Standard operating procedures are in place for holding hot and cold potentially hazardous foods.	-0.053	0.58
Standard operating procedures for date marking ready-to-eat potentially hazardous foods are in place.	-0.046	0.64
Standard operating procedures for personal hygiene are in place.	0.067	0.48
Standard operating procedures for reheating potentially hazardous foods are in place.	-0.029	0.77
Standard operating procedures are in place for receiving deliveries.	-0.062	0.52
Standard operating procedures to store poisonous and toxic chemicals are in place.	-0.038	0.69
Standard operating procedures of using suitable utensils when handling ready-to-eat foods are in place.	0.039	0.68
Standard operating procedures for washing fruits and vegetables are in place.	0.039	0.68
Standard operating procedures for handwashing are in place.	0.062	0.52

Note. Results for Pearson Product Moment Correlation analyses ($p < 0.05$) show no significant correlations.

Note. [a] The actual number of respondents to questions varied due to missing data, invalid data or multiples choices checked.

Analyses of Variances (ANOVA) was used to determine if there was a significant difference in the extent of SOP implementation based on the food safety certification requirement of managers/ supervisors, food safety certification requirement of foodservice employees, methods of food safety training, how the training is provided, director education and average daily meal participation. The mean of each participant's SOP responses were compared to these variables. Certified Manager Program offered by the Texas Department of State Health Services and ServSafe were the only two required food safety certification of managers/ supervisors examined, as these were the most widely required of the study participants (42% and 21% respectively). State/ local government food safety training and no food safety certification were the only two required food safety certification of employees examined, as these were the most widely required of the study participants (34% and 38% respectively). Hands on training and handouts were the only methods of food safety training compared, as these were the most utilized methods of food safety training in this study (21% and 19% respectively). There were no significant differences found in the extent of SOP implementation based on the food safety certification requirement of foodservice managers/ supervisors, food safety certification requirement of foodservice employees, methods of food safety training, how the training is provided, director education or average daily meal participation (See Tables 22 and 23).

Table 22

Differences in Mean SOP Based on Food Safety Requirement of Managers/ Supervisors, Food Safety Requirement of Employees, and Method of Food Safety Training (N=120)

	n	Mean [a]	SD	*F*	*p*
Mean SOP- Manager/ Supervisors Food Safety Certification					
Certified manager checked	57	4.55	0.4	0.26	0.61
Certified manager nonchecked	55	4.51	0.5		
ServSafe checked	28	4.54	0.5	0.01	0.94
ServSafe nonchecked	84	4.53	0.5		
Mean SOP- Employee Food Safety Certification					
State/ local government training checked	42	4.46	0.5	1.57	0.21
State/ local government training unchecked	70	4.58	0.5		
None checked	45	4.49	0.5	0.68	0.41
None unchecked	67	4.56	0.5		
Mean SOP- Method of Food Safety Training					
Hands on training checked	85	4.55	0.5	0.74	0.39
Hands on training unchecked	27	4.47	0.5		
Handouts checked	78	4.56	0.5	1.11	0.30
Handouts unchecked	34	4.46	0.5		

Note. [a] A Likert Scale was used as follows: 5= Strongly Agree, 4= Agree, 3= Neutral, 2= Disagree, 1= Strongly Disagree.

Note. Results for Analyses of Variance ($p < 0.05$) show no significant differences.

Table 23

Differences in Mean SOP Based on How Food Safety Training Is Provided, Education of Foodservice Director and Daily Meal Participation (N=120)

	n	Mean [a]	SD	*F*	*P*
Mean SOP- How is Food Safety Training Provided?					
Group training checked	52	4.50	0.5	0.63	0.43
Group training unchecked	60	4.57	0.5		
Individual training checked	10	4.33	0.4	2.21	0.14
Individual training unchecked	102	4.55	0.5		
Both group and individual checked	69	4.58	0.5	1.59	0.21
Both group and individual unchecked	43	4.46	0.5		
Mean SOP- Education of Foodservice Director					
High school/ GED	41	4.46	0.5	0.99	0.40
Associate's degree/some college	24	4.63	0.5		
Bachelor' degrees/ some graduate school	23	4.46	0.5		
Master's degree or higher	22	4.60	0.4		
Mean SOP- Daily Meal Participation					
Under 500	32	4.49	0.5	0.32	0.81
500-1,999	34	4.51	0.5		
2,000-9,999	25	4.60	0.5		
≥ 10,000	21	4.57	0.4		

Note. [a] A Likert Scale was used as follows: 5= Strongly Agree, 4= Agree, 3= Neutral, 2= Disagree, 1= Strongly Disagree.

Note. Results for Analyses of Variance ($p < 0.05$) show no significant differences.

HACCP

Pearson's Product Moment Correlation was used to determine if there was a significant relationship in the extent of HACCP implementation and the number of hours spent on food safety training each month and director experience in school foodservice. It was determined there was no significant relationship in the extent of HACCP implementation and the number of hours spent on food safety training each month (See Table 24) or director experience (See Table 25).

Table 24

Relationship Between Steps of HACCP in Place to the Number of Hours Spent on Training Each Month (N=120)

	r	*p*
HACCP (n^a=113)		
A hazard analysis of menu items and food handling procedures has been conducted for each menu cycle.	-0.080	0.42
Critical control points of potentially hazardous foods and procedures have been determined for each menu cycle.	-0.157	0.11
Critical limits of potentially hazardous foods have been established for each menu cycle.	0.132	0.18
Monitoring procedures for critical control points and critical limits are in place.	0.063	0.52
Corrective actions have been identified if a critical limit has not been met.	-0.028	0.77
The food safety system has been verified to be reliable.	-0.002	0.98
Procedures for record keeping and documentation have been established.	-0.091	0.35
One person or a group of employees other than a manager leads the effort of the HACCP program.	-0.069	0.49
Time and temperatures monitoring records are being used daily while operation is open.	-0.143	0.15
Food safety training records of employees are kept and updated after each food safety training session.	0.022	0.82

Note. Results for Pearson Product Moment Correlation analyses ($p < 0.05$) show no significant correlations.

Note. [a] The actual number of respondents to questions varied due to missing data, invalid data or multiple choices checked.

Table 25

Relationship Between Steps of HACCP in Place to Director Experience in School Foodservice (N=120)

	r	*p*
HACCP (n^a=113)		
A hazard analysis of menu items and food handling procedures has been conducted for each menu cycle.	0.125	0.20
Critical control points of potentially hazardous foods and procedures have been determined for each menu cycle.	0.062	0.52
Critical limits of potentially hazardous foods have been established for each menu cycle.	0.091	0.35
Monitoring procedures for critical control points and critical limits are in place.	0.051	0.60
Corrective actions have been identified if a critical limit has not been met.	0.031	0.75
The food safety system has been verified to be reliable.	-0.009	0.92
Procedures for record keeping and documentation have been established.	0.019	0.85
One person or a group of employees other than a manager leads the effort of the HACCP program.	0.078	0.42
Time and temperatures monitoring records are being used daily while operation is open.	0.021	0.83
Food safety training records of employees are kept and updated after each food safety training session.	0.148	0.13

Note. Results for Pearson Product Moment Correlation analyses ($p < 0.05$) show no significant correlations.

Note. [a] The actual number of respondents to questions varied due to missing data, invalid data or multiple choices checked.

Analyses of Variances (ANOVA) was used to determine if there was a significant difference in the extent of HACCP implementation based on the food safety certification requirement of foodservice managers/ supervisors, food safety certification requirement of foodservice employees, methods of food safety training, how the training is provided, director education and average daily meal participation. The mean of each participant's HACCP responses were taken and compared to the variables. It was determined there was no significant difference in the extent of HACCP implementation based on the food safety certification requirement of foodservice managers/ supervisors, food safety certification requirement of foodservice employees, methods of food safety training, how the training is provided, director education or average daily meal participation (See Tables 26 and 27).

Table 26

Differences in Mean HACCP Based on Food Safety Requirement of Managers/ Supervisors, Food Safety Requirement of Employees, and Method of Food Safety Training. (N=120)

	n	Mean [a]	SD	*F*	*p*
Mean HACCP- Manager/ Supervisors Food Safety Certification					
Certified manager checked	57	4.55	0.4	0.26	0.61
Certified manager nonchecked	55	4.51	0.5		
ServSafe checked	28	4.54	0.5	0.01	0.94
ServSafe nonchecked	84	4.53	0.5		
Mean HACCP- Employee Food Safety Certification					
State/ local government training checked	42	4.46	0.5	1.57	0.21
State/ local government training unchecked	70	4.58	0.5		
None checked	45	4.49	0.5	0.37	0.41
None unchecked	67	4.56	0.5		
Mean HACCP- Method of Food Safety Training					
Hands on training checked	85	4.55	0.5	0.74	0.39
Hands on training unchecked	27	4.47	0.5		
Handouts checked	78	4.56	0.5	1.11	0.30
Handouts unchecked	34	4.46	0.5		

Note. [a] A Likert Scale was used as follows: 5= Strongly Agree, 4= Agree, 3= Neutral, 2= Disagree, 1= Strongly Disagree.

Note. Results for Analyses of Variance ($p < 0.05$) show no significant differences.

Table 27

Differences in Mean HACCP Based on How Food Safety Training is Provided, Education of Foodservice Director, and Daily Meal Participation (N=120)

	n	Mean [a]	SD	*F*	*p*
Mean HACCP- How is Food Safety Training Provided?					
Group training checked	52	4.50	0.5	0.63	0.43
Group training unchecked	60	4.57	0.5		
Individual training checked	10	4.33	0.4	2.21	0.14
Individual training unchecked	102	4.55	0.5		
Both group and individual checked	69	4.58	0.5	1.59	0.21
Both group and individual unchecked	43	4.46	0.5		
Mean HACCP- Education of Foodservice Director					
High school/ GED	41	4.46	0.5	0.99	0.40
Associate's degree/some college	24	4.63	0.5		
Bachelor's degree/ some graduate school	23	4.46	0.5		
Master's degree or higher	22	4.60	0.4		
Mean HACCP- Daily Meal Particpation					
Under 500	32	4.49	0.5	0.32	0.81
500-1,999	34	4.51	0.5		
2,000-9,999	25	4.06	0.5		
≥ 10,000	21	4.53	0.4		

Note. [a] A Likert Scale was used as follows: 5= Strongly Agree, 4= Agree, 3= Neutral, 2= Disagree, 1= Strongly Disagree.

Note. Results for Analyses of Variance ($p < 0.05$) show no significant differences.

Test of Null Hypotheses

1. There was no significant relationship between perceived effectiveness of food safety training and director experience in school foodservice, job tenure in current position, and age of director. Pearson Product Moment Correlation showed there were no significant relationships. Therefore, this hypothesis was accepted.
2. There was no significant difference in perceived effectiveness of food safety training based on food safety certification of director, director education, and average daily meal participation. Analyses of Variance (ANOVA) showed there were no significant differences. Therefore, this hypothesis was accepted.
3. There was no significant relationship between attitudes concerning food safety training and director experience in school foodservice, job tenure in current position, and age of director. Pearson Product Moment Correlation showed there were no significant relationships. Therefore, this hypothesis was accepted.
4. There was no significant difference in attitudes concerning food safety training based on food safety certification of director, director education, and average daily meal participation. An Analyses of Variance (ANOVA) showed there was a difference in foodservice director food safety certification and the attitudes concerning food safety training. Therefore this part of the hypothesis was rejected. However, there were no differences concerning attitudes on food safety training

based on director education and average daily meal participation. Therefore, these two parts of the hypothesis were accepted.

5. There was no significant relationship between perceived barriers to food safety training and director experience in school foodservice, job tenure in current position, and age of director. A Pearson Product Moment Correlation showed there were no significant relationships. Therefore, this hypothesis was accepted.
6. There was no significant difference in perceived barriers to food safety training based on food safety certification of director, director education, and average daily meal participation. An Analysis of Variance (ANOVA) showed there were no differences in perceived barriers to food safety training and food safety certification. This part of the hypothesis was accepted. There were differences found in director education and perceived barriers to food safety training. Significant differences were also found between perceived barriers to food safety training and average daily meal participation. Therefore these two parts of this hypothesis were rejected.
7. There was no significant relationship in the extent of SOP and HACCP implementation and the number of hours spent on training each month and director experience in school foodservice. Pearson's Product Moment Correlation found a significant relationship in the extent of SOP implementation and the number of hours spent training each month. This part of the hypothesis was rejected.

However, there was no significant relationship between SOP implementation and the director experience in school foodservice. This part of the hypothesis was accepted. There was no significant relationship between SOP and HACCP implementation and the number of hours spent training each month or director experience. This part of the hypothesis was also accepted.

8. There was no significant difference in the extent of SOP and HACCP implementation based on the food safety certification requirement of foodservice managers/ supervisors, food safety certification requirement of all foodservice employees, method of food safety training, how the training is provided, director education, and average daily meal participation. An Analyses of Variance (ANOVA) found no significant differences. This hypothesis was accepted.

CHAPTER V

DISCUSSION AND CONCLUSIONS

Discussions

In 2004, a national study determined that 90% of participants had standard or formal food safety procedures in their schools but only 65% had begun a HACCP program (National Foodservice Management Institute, 2005). The CNRA of 2004 required all schools participating in the NSLP to have a food safety program in place that complied with HACCP by the end of the 2005-2006 school year (Child Nutrition, 2004). This study showed that most Texas school foodservice directors have standard operating procedures and a HACCP plan in place.

Food Safety Training

In regard to food safety certification of foodservice directors, this study showed that 38% of the participants had completed a Certified Manager Program by the Texas State Health Services and 31% had completed a ServSafe course. This study also showed that 42% of the school districts required their managers/supervisors to attend a Certified Manager Program by the Texas State Health Services, twenty one percent required managers/ supervisors to attend a ServSafe course while 13% had no food safety training requirements. In this study, 34% of foodservice directors required their foodservice

employees to attend a state or local health class, and 38% had no food safety certification requirement for their foodservice employees. These certification results in Texas were slightly better than a 2006 national study where only 7% of the participants had certification requirements for the school foodservice director, and only 21% of the participants had requirements for foodservice supervisors and employees (Sneed et al, 2006).

In 2002, Daniels et al. concluded that many outbreaks were preventable if proper training and food handling practices were in place in school foodservice facilities. This study shows that foodservice directors in Texas are taking steps to prevent outbreaks from occurring by holding regular training sessions that cover multiple food safety and food handling topics. Hands on training (21%) handouts (19%) and training videos/ DVDs (16%) and were shown in the study as the top methods of teaching food safety. Online training/ interactive CD-Rom (5%) was one of the least used methods to teach food safety training. This could be attributed to lack of knowledge/ skills of working on a computer for training of employees and the lack of financial funding for computers and softwares. These findings are similar to a 2002 study, which concluded video based instruction had a high preference index and computer based training had a low preference index when teaching food safety (Sullivan et al., 2002). It has also been shown that activity based training is very effective in teaching food safety because people learn by

doing instead of just being told (National Restaurant Association Education Foundation [NRAEF], 2008).

Effectiveness, Attitudes, and Barriers to Food Safety Training

This study also showed that school foodservice directors were in agreement (mean = 4.2) to the effectiveness of food safety training in their district. This can be linked to the high awareness of food safety not only in school foodservice but currently throughout the nation. Evidently, foodservice directors understand their responsibility of food safety training to prevent outbreaks. This is similar to a 2007 study, where foodservice directors felt food safety training was effective in improving food handling practices and employee confidence (Sneed & Henroid, 2007).

Foodservice directors had a high level of agreement (mean = 4.5) to the attitude statements concerning food safety training in this study. One would expect the foodservice directors to have a good understanding of the importance of food safety training in creating a safe school foodservice operation. Foodservice directors who held food safety certifications also had higher agreement to the attitude statements concerning food safety. This supports that food safety education can bring a sense of awareness to school foodservice directors' attitudes about the importance of safe food handling and training of their employees. Richards et al. (1993) contended that foodservice directors had to have positive attitudes towards food safety training, since children have a high susceptibility to foodborne illness which could lead to a foodborne outbreak.

This study showed that foodservice directors were neutral (mean = 3.28) about barriers to food safety training. The barriers had a large range of answers over the Likert scale compared to effectiveness and attitude statements on the survey. The majority of foodservice directors showed they were neutral about having barriers in their school districts that prevented them from providing food safety training. The barriers they felt neutral about included length of training session, funding and time for food safety training. This contradicts a 2002 study where researchers determined that schools need to look at resource allocation and reallocate funds for food safety training because of critical health and safety issues (Sneed & Youn, 2002). However, this study also showed a majority of directors remained neutral that language and lack of motivation of employees to participate in food safety training were barriers. This can be attributed to some foodservice directors being bilingual or that they offer their training in Spanish in Texas schools. A study in 2002 stated that barriers to food safety training are seen in school foodservice includes lack of motivation, language barriers and learning curves were seen in school foodservice (Sneed & Youn 2002).

The present study showed that foodservice directors with higher education levels tended to agree that there were barriers to food safety training in their school districts. It was also determined that foodservice directors at larger schools with higher daily meal participation perceived that they faced more barriers than smaller schools with lower daily meal participation.

Standard Operating Procedures

This study showed that the foodservice directors in Texas had high agreement (4-5) with statements concerning standard operating procedures at their foodservice facilities. Standard operating procedures are intended to be a prerequisite to the process of implementing a full HACCP plan. School foodservice directors may have used the resource, "Guidelines for School Food Authorities: Developing a School Food Safety Program based on the Approach to HACCP Principles" which was designed to help schools create a food safety program (USDA, 2005). Sneed and Henroid (2007) found that 64% of foodservice directors thought that setting up standard operating procedures as part of their HACCP plan was very important and useful to their facility.

In this study more hours of food safety training for employees led to higher agreement that the standard operating procedures for handwashing were in place. This can be a result of food safety training teaching that the food handler and their actions are the number one defense against foodborne illness. In a 2002 study Daniels et al. concluded that improper food handling by food handlers at the site of production was linked to 115 of 607 outbreaks. In 2005, employees practicing good hygiene were seen as a benefit to implementation of a HACCP plan (National Foodservice Management Institute, 2005).

HACCP

Larger schools throughout the nation are creating teams to help implement and run HACCP plans over a group of schools (National Foodservice Management Institute, 2005). In this study, it was shown that many directors remained neutral or disagreed that their foodservice facility had a team in plan to run the HACCP program. This may be because this study had a majority of smaller school district participants rather than larger school district participants. In this study, foodservice directors had high agreement that they had time and temperature logs in place as part of their HACCP plan. A 2005 study showed time and temperature logs as the most frequent record keeping tools for HACCP plans in school foodservice operation (National Foodservice Management Institute, 2005).

This study showed that most Texas school foodservice directors agree (4), that they have all the essential components to a HACCP plan in place. This is in agreement with The School Nutrition Operations Report of 2007 which reported that 88.7% of elementary, 84.4% of middle schools, and 85.4% of high school now have a HACCP program in place. Having a food safety program in place that complied with HACCP was made mandatory by the end of the 2005-2006 school year (Child Nutrition, 2004).

Conclusions

HACCP implementation and food safety training is important to ensure the health and safety of children while eating in school foodservice. This study revealed some

significant differences and correlations in current food safety practices, food safety training and foodservice director / district characteristics. Overall, the study results showed the Texas school foodservice facilities have basic SOP's and HACCP plans in place.

The study showed that many Texas foodservices have different food safety certification requirements for the managers/ supervisors and employees. However, these requirements could be stricter by requiring all foodservice employees to be food safety certified. This would provide stronger food safety plans in Texas foodservice. Food safety training is provided through group training, individual training and a combination of the two. In these training sessions a variety of methods are being used to teach numerous food safety topics. Many Texas foodservice directors feel food safety training is effective and have positive attitudes towards food safety training. Texas school foodservice directors feel neutral about having barriers that would limit food safety training.

Foodservice directors feel their current food safety plan includes all 11 SOP areas. The directors also feel their current food safety plan includes all the required steps of a HACCP plan. Foodservice directors should utilize their HACCP plan daily in managing and directing school foodservice. If all parts of the HACCP plan are followed, school foodservice will be a healthy and safe place for the nation's children to eat meals.

Limitations

The major limitation of this study was the reliance on self reporting of data by the participants. Participants may have answered what they thought would be a "correct" response due to legislation and regulations concerning food safety and HACCP implementation. Another limitation was the inability to include all Texas school foodservice directors in the study. For this study, there was a higher participation of smaller school districts than larger school districts; therefore, the results may not be an accurate representation of all schools in Texas.

Recommendations

Based on study results, the following recommendations are made:

1. School foodservice facilities should consider requiring all foodservice directors and employees to earn some type of food safety certification.
2. School foodservice directors should consider using more effective training methods such as games and activities for a better learning environment.
3. Additional studies of national school districts are needed to further investigate the extent of HACCP implementation in school foodservice nationwide.
4. More research needs to be conducted focusing mainly on training methods and materials to understand what types of food safety training are most effective.

5. Additional research is needed to determine the actual methods or tools used to implement HACCP in school foodservice facilities.

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APPENDIX A

TWU Institutional Review Board Approval Letter

TWU
TEXAS WOMAN'S UNIVERSITY
DENTON DALLAS HOUSTON

Institutional Review Board
Office of Research and Sponsored Programs
P.O. Box 425619, Denton, TX 76204-5619
940-898-3378 Fax 940-898-3416
e-mail: IRB@twu.edu

September 26, 2008

Ms. Tyler Johnmeyer
834 Holly Oak Drive
Lewisville, TX 75067

Dear Ms. Johnmeyer:

Re: Food Safety Training in Texas School Foodservice Facilities in Relationship to the Implementation of a HACCP Program

The above referenced study has been reviewed by the TWU Institutional Review Board (IRB) and appears to meet our requirements for the protection of individuals' rights.

If applicable, agency approval letters must be submitted to the IRB upon receipt PRIOR to any data collection at that agency. A copy of the annual/final report is enclosed. A final report must be filed with the Institutional Review Board at the completion of the study. Because you do not utilize a signed consent form for your study, the filing of signatures of subjects with the IRB is not required.

This approval is valid one year from September 26, 2008. According to regulations from the Department of Health and Human Services, another review by the IRB is required if your project changes in any way, and the IRB must be notified immediately regarding any adverse events. If you have any questions, feel free to call the TWU Institutional Review Board.

Sincerely,

Dr. David Nichols, Chair
Institutional Review Board - Denton

enc.

cc. Dr. Chandan Prasad, Department of Nutrition & Food Sciences
Dr. Carolyn Bednar, Department of Nutrition & Food Sciences
Graduate School

APPENDIX B

Online Survey

Food Safety Training in Texas School Foodservice in Relationship to the Implementation of a HACCP Program

The completion of this questionnaire constitutes your informed consent to act as a participant in this research.

Section I Demographic Data

This section is designed to obtain demographic information about you and your school district. Please respond to each question by selecting the statement that best applies to you or by filling in the blanks.

*1) How many students are enrolled in your district?

2) How many schools are in your district?

_____ Elementary Schools

_____ Middle Schools

_____ High Schools

_____ Other (Learning centers, early development centers, alternative schools, etc.)

3) What is your district's average daily participation?

	Total meals served daily

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		Years	Months
4)	How long have you worked in school foodservice?		

***5)** What is your job title?

		Years	Months
6)	How long have you been in your current position?		

7) What food safety certification(s) do you have? (Check all that apply)

- Certified Manager Program offered by the Texas Department of State Health Services
- Servsafe
- Learn2serve
- Texas Restaurant Association
- National Registry of Food Safety Professionals
- Thomson Prometric
- Other (Please specify)

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***8)** What is the highest education level you have achieved?

- High School Diploma or GED
- Some College Work
- Associate's Degree

- Bachelor's Degree
- Some Graduate Work
- Master's Degree or Higher

***9)** What is your age?

***10)** Is your school foodservice:

- Self Operated
- Contract Managed
- Other (Please specify)

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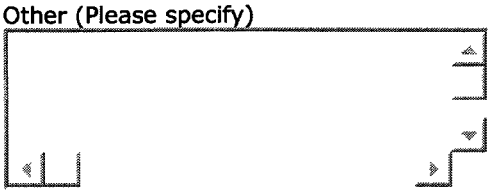
Section II Food Safety Training

In this section you will be asked questions about your current food safety training. Please respond to each question by selecting the statement that best applies to you or fill in the blank.

11) What food safety certification is required of all foodservice managers/ supervisors in your district? (check all that apply)

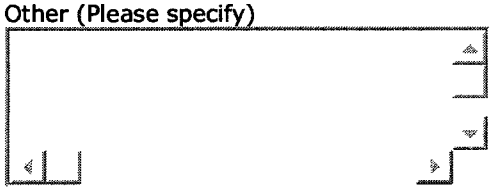
- Servsafe
- Learn2Serve
- Texas Restaurant Association
- National Registry of Food Safety Professionals
- Thomson Prometric
- Certified Manager Program offered by the Texas Department of State Health Services

- [ ] None
- [ ] Other (Please specify)



12) What food safety certification is required of all foodservice employees in your district? (check all that apply)

- [ ] Servsafe
- [ ] Learn2Serve
- [ ] State or Local Government Food Safety Training
- [ ] None
- [ ] Other (Please specify)



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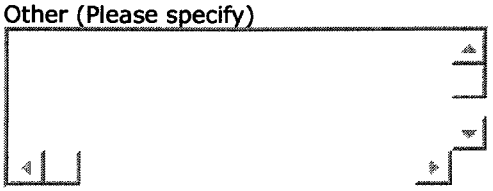
13) How frequently are food safety training sessions held at your facilities with line employees who directly work with the food from the beginning to the end of production? (check all that apply)

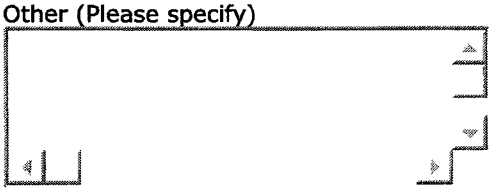
- [ ] When an employee is hired
- [ ] Weekly for all staff
- [ ] Monthly for all staff
- [ ] Yearly for all staff
- [ ] Other (Please specify)



14) What types of training methods are used in your district to teach food safety? (check all

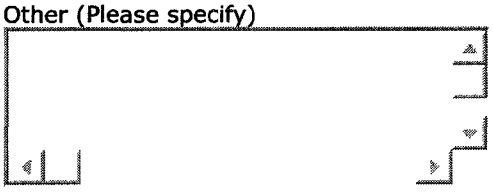
that apply)

- ☐ Classroom lecture
- ☐ Hand on training
- ☐ Training videos & DVDs
- ☐ Handouts
- ☐ Online training or interactive CD-roms
- ☐ Games & Activities
- ☐ Role Playing
- ☐ Posters
- ☐ Other (Please specify)



15) Is food safety training provided as: (check all that apply)

- ☐ Group training
- ☐ Individual "one on one" training
- ☐ Both group & individual "one on one" training
- ☐ Other (Please specify)



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16) If you hold training sessions, what material content do you use for food safety training in your school district? (check all that apply).

- ☐ ServSafe
- ☐ HACCP Certification
- ☐ National Sanitation Foundation Material
- ☐ Information from local health departments

Other (Please specify)

17) Approximately how much time do you spend each month for food safety training with your foodservice employees in your district excluding supervisors and managers?

Hours per month

18) Which of the following food safety topics have you covered in training at your facility within the past year? (check all that apply)

- Procedures for deliveres
- Cooking and reheating of potentially hazardous foods
- Proper hand-washing and personal hygiene
- Food handling/ glove usuage
- The use of logs (time, temerature, cleaning etc.) in the facility
- Storage of poisonous chemicals
- Hot and cold food holding procedures
- Appropriate storage temperature of cooked and uncooked food
- Proper Cooling Procedures
- Proper equipment temperatures
- Cleaning and Sanitizing utensils and equipment
- Other (Please specify)

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Section III Food Safety Training Barriers, Effectiveness and Attitudes

This section is designed to obtain your perceptions of food safety training effectiveness, attitudes and barriers.

Effectiveness of Training

Indicate how much you agree or disagree with the following statements.

		Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
*19)	Employees are confident after food safety training:	○	○	○	○	○
*20)	Food safety training is effective in reducing the risk of foodborne illness:	○	○	○	○	○
*21)	Food safety training is effective in my district:	○	○	○	○	○
*22)	The frequency of food safety training in my district is adequate:	○	○	○	○	○
*23)	The methods of food safety training in my district are effective:	○	○	○	○	○

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Attitudes concerning Food Safety Training

Indicate how much you agree of disagree with the following statements.

		Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
*24)	My staff considers training and learning procedures for safe food handling part of their job:	○	○	○	○	○
*25)	I feel teaching safe food handling is an important part of my job:	○	○	○	○	○
*26)	Being certified in food safety has or will help me do my job better:	○	○	○	○	○
*27)	Children can easily get foodborne illness compared to a healthy adult:	○	○	○	○	○

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Barriers to Food Safety Training

Indicate how much you agree or disagree with the following statements.

		Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
*28)	Length of time for our training sessions is adequate:	○	○	○	○	○
*29)	I feel we have adequate funding to offer food safety training:	○	○	○	○	○
*30)	I feel we have adequate time to provide training on food safety:	○	○	○	○	○
*31)	Language barriers between management and employees make food safety training difficult:	○	○	○	○	○
*32)	Lack of motivation of staff to participate in training is a barrier in our district:	○	○	○	○	○

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Section IV Current Food Safety Plan

This section is designed to obtain information pertaining to your current food safety program in place.

Please indicate on your degree of agreement with the following statements on whether it is part of your foodservice's current food safety program.

		Strongly Agree	Agree	Neutral	Diagree	Strongly Disagree
*33)	Standard operating procedures are in place for cooking potentially hazardous foods.	○	○	○	○	○
*34)	Standard operating procedures for cooling potentially hazardous foods are in place.	○	○	○	○	○
*35)	Standard operating procedures are in place for holding hot and cold potentially hazardous foods.	○	○	○	○	○
*36)	Standard operating procedures for date marking ready-to-eat potentially hazardous foods are in place.	○	○	○	○	○
*37)	Standard operating procedures for personal hygiene are in place.	○	○	○	○	○
*38)	Standard operating procedures for reheating potentially hazardous foods are in place.	○	○	○	○	○
*39)	Standard operating procedures are in place for receiving deliveries.	○	○	○	○	○
*40)	Standard operating procedures to store poisonous and toxic chemicals are in place.	○	○	○	○	○
*41)	Standard operating procedures of using suitable utensils when handling ready-to-eat foods are in place.	○	○	○	○	○
*42)	Standard operating procedures for washing fruits and vegetables are in place.	○	○	○	○	○

*43)	Standard operating procedures for handwashing are in place.	○	○	○	○	○

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Please indicate your degree of agreement with the following statements describing the Hazard Analysis Critical Control Program at your foodservice facility.

		Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
*44)	A hazard analysis of menu items and food handling procedures has been conducted for each menu cycle.	○	○	○	○	○
*45)	Critical control points of potentially hazardous foods and procedures have been determined for each menu cycle.	○	○	○	○	○
*46)	Critical limits of potentially hazardous foods have been established for each menu cycle.	○	○	○	○	○
*47)	Monitoring procedures for critical control points and critical limits are in place.	○	○	○	○	○
*48)	Corrective actions have been identified if a critical limit has not been met.	○	○	○	○	○
*49)	The food safety system has been verified to be reliable.	○	○	○	○	○
*50)	Procedures for record keeping and documentation have been established.	○	○	○	○	○
*51)	One person or a group of employees other than a manager leads the effort of the HACCP program.	○	○	○	○	○
*52)	Time and temperatures monitoring records are being used daily while operation is open.	○	○	○	○	○

*53)	Food safety training records of employees are kept and updated after each food safety training session.	○	○	○	○	○

Please click on "Submit"

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APPENDIX C

Cover Letter for Online Survey

TWU
TEXAS WOMAN'S UNIVERSITY
DENTON DALLAS HOUSTON

Department of Nutrition and Food Sciences
P.O. Box 425888, Denton, TX 76204-5888
940-898-2636 FAX 940-898-2634

January 12, 2009

Dear School Foodservice Director:

You are invited to participate in a survey on food safety training and HACCP (Hazard Analysis Critical Control Point) implementation in your school district. The purpose of this study is to investigate food safety training currently offered in Texas school foodservice facilities and perceived effectiveness, attitudes and barriers to food safety training in relation to the implementation of HACCP.

Your name, address and school district were obtained from the Texas Department of Agriculture. Your opinions will be collected to 1) determine content, method and frequency of current food safety training in Texas school foodservice facilities, 2) assess effectiveness, attitudes and barriers concerning food safety training as perceived by school foodservice directors, 3) investigate current food safety standard operating procedures and HACCP procedures that have been implemented in Texas school foodservice facilities.

Participation in the survey is completely voluntary, and you may withdraw your participation from the study at any time without penalty. Direct benefits of completing in the survey will be a chance to win one of two $50 gift cards. The researcher will enter the participant into the drawing once the school district name is turned into the researcher per a completed survey. Also a summary of the results can be emailed to you with a request at the end of the survey.

If you would like to participate please go to the website (https://www.psychdata.com/s.asp?SID=127701) and complete the survey. After the completion of the survey, you will be taken to a different link. Please enter your school district name. The name of your school district and your responses will not be linked. Your school district name will then be paired up with the number previous assigned to your school district alphabetically. This number will be entered into the drawing for the gift cards. Completion of this survey should take no longer than 30-45 minutes.

If you have questions about this research study, you should ask the researchers; their phone numbers are at the bottom of this letter. If you have any questions about your rights as a participant in this research or the way this study has been conducted, you may contact the Texas Woman's University Office of Research and Sponsored Programs at 940-898-3378 or via email as IRB@twu.edu.

Your participation will be greatly appreciated.

Sincerely,

Tyler Johnmeyer
Graduate Student
Phone: 940-367-8615
Email: tyler.johnmeyer@yahoo.com

Carolyn M. Bednar, Ph. D., R.D., L.D.
Professor
Phone: 940-898-2658
Email: CBednar@twu.edu

APPENDIX D

Reminder Postcard

Dear School Foodservice Director:

Reminder! You have been invited to participate in a 15-20 minute survey on food safety training and the HACCP (Hazard Analysis Critical Control Point) program in your school district. Direct benefits of completing the survey include a chance to win one of two $50 gift cards and the opportunity to receive a summary of the results.
If you would like to participate, please go to the website (https://www.psychdata.com/s.asp?SID=127701) to take the survey. You will then be taken to separate links to enter your name for the drawing for gift cards and an email address for the summary of results. Participation in the survey is completely voluntary, and you may withdraw at any time without penalty
Thank you in advance for your help!

Sincerely,

Tyler Johnmeyer
Graduate Student
Phone: 940-367-8615
Email: tyler.johnmeyer@yahoo.com

Carolyn M. Bednar, Ph.D., RD, LD
Professor
Phone: 940-898-2658
Email: CBednar@twu.edu

APPENDIX E

Paper Survey Cover Letter

TWU
TEXAS WOMAN'S UNIVERSITY
DENTON DALLAS HOUSTON

Department of Nutrition and Food Sciences
P.O. Box 425888, Denton, TX 76204-5888
940-898-2636 FAX 940-898-2634

February 10, 2009

Dear Foodservice Director:

You are invited to participate in a survey on food safety training and HACCP (Hazard Analysis Critical Control Point) implementation in your school district. The purpose of this study is to investigate food safety training currently offered in Texas school foodservice facilities and perceived effectiveness, attitudes and barriers to food safety training in relation to the implementation of HACCP.

Your name, address and school district were obtained from the Texas Department of Agriculture. Your opinions will be collected to 1) determine content, method and frequency of current food safety training in Texas school foodservice facilities, 2) assess effectiveness, attitudes and barriers concerning food safety training as perceived by school foodservice directors, 3) investigate current food safety standard operating procedures and HACCP procedures that have been implemented in Texas school foodservice facilities.

Participation in the survey is completely voluntary, and you may withdraw your participation from the study at any time without penalty. Direct benefits of completing the survey will be a chance to win one of two $50 gift cards. To participate in the drawing, you must return the survey along with the information section on the last page giving your name and contact information. Also you may indicate if you would like a summary of the results emailed to you. Completion of this survey should take no longer than 15-20 minutes. If you would like to participate, please fill out the enclosed questionnaire and return it in the postage- paid envelope.

If you wish to complete an online version of the survey, please go to the website (https://www.psychdata.com/s.asp?SID=127701). After the completion of the survey, you will be taken to a different link. Please enter your school district name. The name of your school district and your responses will not be linked. Your school district name will then be paired up with the number previously assigned to your school district alphabetically. This number will be entered into the drawing for the gift cards.

If you have questions about this research study, you should ask the researchers; their phone numbers are at the bottom of this letter. If you have any questions about your rights as a participant in this research or the way this study has been conducted, you may contact the Texas Woman's University Office of Research and Sponsored Programs at 940-898-3378 or via email as IRB@twu.edu Your participation will be greatly appreciated.

Sincerely,

Tyler Johnmeyer
Graduate Student
Phone: 940-367-8615
Email: tyler.johnmeyer@yahoo.com

Carolyn M. Bednar, Ph. D., R.D., L.D.
Professor
Phone: 940-898-2658
Email: CBednar@twu.edu

APPENDIX F

Paper Survey

Food Safety Training in Texas School Foodservice in Relationship to the Implementation of a HACCP Program

The return of your completed questionnaire constitutes your informed consent to act as a participant in this research

Section I Demographic Data

This section is designed to obtain demographic information about you and your school district. Please respond to each question by selecting (checking) the statement that best applies to you or by filling in the blanks.

1. How many students are enrolled in your district?

_____

2. How many schools are in your district:

Elementary School _____ Middle School _____

High School _____ Other (Please specify type):_____

3. What is your district's average daily participation? _____ Total meals served daily

4. How long have your worked in school foodservice? _____ years _____ months

5. What is your job title?_____

6. How long have you been in your current position? _____ years _____ months

7. What food safety certification(s) do you have? (check all that apply)

- ☐ Certified Manager Program offered by Texas Department of State Health Services
- ☐ ServSafe
- ☐ Learn2Serve
- ☐ Texas Restaurant Association
- ☐ National Registry of Food Safety Professionals
- ☐ Thomson Prometric

☐ Other (Please Specify):_____

_

☐ None

8. What is the highest education level you have achieved? (Please check only one)

☐ High School diploma or GED
☐ Some College Work
☐ Associate's Degree
☐ Bachelor's Degree
☐ Some Graduate work
☐ Master's degree or higher

9. What is your age: _____

10. Is your school foodservice: (Please check only one)

☐ Self-Operated
☐ Contract Managed
☐ Other:_____

Section II Food Safety Training

In this section you will be asked questions about your current food safety training. Please respond to each question by selecting (checking) the statement that best applies to you or fill in the blank.

11. What food safety certification is required of all foodservice managers/ supervisors in your district? (check all that apply)

☐ ServSafe
☐ Thomson Prometric
☐ Learn2Serve
☐ Certified Manager Program offered by Texas Department of State Health Services
☐ Texas Restaurant Association
☐ Other (Please Specify)_____
☐ National Registry of Food Safety Professionals
☐ None

12. What food safety certification is required of all foodservice employees in your district? (check all that apply)

☐ ServSafe
☐ Other (Please specify):_____
☐ Learn2Serve
☐ None
☐ State or Local Government Food Safety Training

13. How frequently are food safety training sessions held at your facilities with line employees who directly work with the food from the beginning to the end of production? (check all that apply)

- ☐ When an employee is hired
- ☐ Weekly for all staff
- ☐ Monthly for all staff
- ☐ Yearly for all staff
- ☐ Other (Please specify):_____

14. What types of training methods are used in your district to teach food safety? (check all that apply)

- ☐ Classroom lecture
- ☐ Online training or interactive CD-roms
- ☐ Hands on Training
- ☐ Games & activities
- ☐ Training videos & DVDs
- ☐ Role Playing
- ☐ Handouts
- ☐ Posters
- ☐ Other

15. Is food safety training provided as: (check all that apply)

- ☐ Group training
- ☐ Individual "one on one" training
- ☐ Both group & individual "one on one" training
- ☐ Other:_____

16. If you hold training sessions, what material content do you use for food safety training in your school district? (check all that apply).

- ☐ ServSafe
- ☐ National Sanitation Foundation Material
- ☐ HACCP Certification
- ☐ Information from local health departments
- ☐ Other (Please specify):_____

17. Approximately how much time do you spend each month for food safety training with your foodservice employees in your district excluding supervisors and managers?

_____Hours per month

18. Which of the following food safety topics have you covered in training at your facility within the past year? (check all that apply)

- ☐ Procedures for deliveries
- ☐ Cooking and reheating of potentially hazardous foods
- ☐ Proper hand-washing and personal hygiene
- ☐ Food handling/ glove usage
- ☐ The use of logs (time, temperature, cleaning etc.) in the facility
- ☐ Storage of poisonous chemicals
- ☐ Hot and cold food holding procedures
- ☐ Appropriate storage temperature of cooked and uncooked food
- ☐ Proper cooling procedures
- ☐ Proper equipment temperatures
- ☐ Cleaning and sanitizing utensils and equipment
- ☐ Other:_____

Section III Food Safety Training Barriers, Effectiveness and Attitudes This section is designed to obtain your perceptions of food safety training effectiveness, attitudes and barriers. For the following statements, indicate how much you agree or disagree with the following statements:

	Effectiveness of Training	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
19.	Employees are confident after food safety training:	1	2	3	4	5
20.	Food safety training is effective in reducing the risk of foodborne illness:	1	2	3	4	5
21.	Food safety training is effective in my district:	1	2	3	4	5
22.	The frequency of food safety training in my district is adequate:	1	2	3	4	5
23.	The methods of food safety training in my district are effective:	1	2	3	4	5

	Attitudes concerning Food Safety Training	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree

24.	My staff considers training and learning procedures for safe food handling part of their job:	1	2	3	4	5
25.	I feel teaching safe food handling is an important part of my job:	1	2	3	4	5
26.	Being certified in food safety has or will help me do my job better:	1	2	3	4	5
27.	Children can easily get foodborne illness compared to a healthy adult:	1	2	3	4	5

	Barriers to Food Safety Training	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
28.	Length of time for our training sessions is adequate:	1	2	3	4	5
29.	I feel we have adequate funding to offer food safety training:	1	2	3	4	5
30.	I feel we have adequate time to provide training on food safety:	1	2	3	4	5
31.	Language barriers between management and employees make food safety training difficult:	1	2	3	4	5
32.	Lack of motivation of staff to participate in training is a barrier in our district:	1	2	3	4	5

Section IV Current Food Safety Plan

This section is designed to obtain information pertaining to your current food safety program in place. Please indicate on your degree of agreement with the following statements on whether it is part of your foodservice's current food safety program.

		Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
33.	Standard operating procedures are in place for **cooking** potentially hazardous foods.	1	2	3	4	5
34.	Standard operating procedures for **cooling** potentially hazardous foods	1	2	3	4	5

	are in place.					
35.	Standard operating procedures are in place for **holding** hot and cold potentially hazardous foods.	1	2	3	4	5
36.	Standard operating procedures for **date marking** ready-to-eat potentially hazardous foods are in place.	1	2	3	4	5
37.	Standard operating procedures for **personal hygiene** are in place.	1	2	3	4	5
38.	Standard operating procedures for **reheating** potentially hazardous foods are in place.	1	2	3	4	5
39.	Standard operating procedures are in place for **receiving** deliveries.	1	2	3	4	5
40.	Standard operating procedures to **store** poisonous and toxic chemicals are in place.	1	2	3	4	5
41.	Standard operating procedures of **using** suitable utensils when handling ready-to-eat foods are in place.	1	2	3	4	5
42.	Standard operating procedures for **washing** fruits and vegetables are in place.	1	2	3	4	5
43.	Standard operating procedures for **handwashing** are in place.	1	2	3	4	5

Please indicate your degree of agreement with the following statements describing the Hazard Analysis Critical Control Program at your foodservice facility.

		Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
44.	A hazard analysis of menu items and food handling procedures has been conducted for each menu cycle.	1	2	3	4	5
45.	Critical control points of potentially hazardous foods and procedures have been determined for each menu cycle.	1	2	3	4	5
46.	Critical limits of potentially hazardous foods have been established for each menu cycle.	1	2	3	4	5
47.	Monitoring procedures for critical control points and critical limits are in place.	1	2	3	4	5
48.	Corrective actions have been identified if a critical limit has not been met.	1	2	3	4	5
49.	The food safety system has been verified to be reliable.	1	2	3	4	5
50.	Procedures for record keeping and documentation have been established.	1	2	3	4	5
51.	One person or a group of employees other than a manager leads the effort of the HACCP program.	1	2	3	4	5
53.	Time and temperatures monitoring records are being used daily while operation is open.	1	2	3	4	5
54.	Food safety training records of employees are kept and updated after each food safety training session.	1	2	3	4	5

Thank you very much for your participation. If you would like to participate in the drawing, please fill out your name and school district. This will not be linked to your survey responses.

Name:_____ School District_____

If you would like results of the study emailed to you, please write your email address.

Email:_____