DEVELOPMENT AND IMPLEMENTATION OF A “COUNTER-TOP” TRAINING PROGRAM TO INCREASE RETENTION OF FOOD SAFETY KNOWLEDGE, ALTER BEHAVIOR, IMPROVE ATTITUDE, AND INCREASE SKILLS OF SPANISH-SPEAKING RETAIL EMPLOYEES

A Thesis in
Food Science
by
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Submitted in Partial Fulfillment
of the Requirements
for the Degree of

Master of Science

May 2011
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ABSTRACT

Foodborne illness is a major concern for retail industries. This issue is compounded by lack of food safety training, cultural differences, and language barriers. In this study, researchers developed a customized, Spanish food safety training program that was used with employees of delicatessens (carnicerías) in Reading, Pennsylvania. The training program was designed to increase retention of food safety knowledge, improve attitude, alter behavior, and increase skills. Initially, needs assessments of employees were conducted by concealed-direct observations, a demographic survey, and a manager preference survey. Needs assessment data were used to develop a customized “counter-top” food safety training program that included images and oral supplementation in Spanish and addressed common food safety issues occurring in the carnicerías. Due to the low literacy level of participants, training was conducted on site via face-to-face (FTF) and in Spanish. The inclusion criteria for the carnicerías required that they have a meat display case, a meat slicer, employees >18 years, and employees who spoke Spanish as their first language. Twenty carnicerías were assigned randomly to two treatments groups: control-no training or FTF-training. The food safety “counter-top” training program included four different assessments: knowledge, attitude, behavior, and performance of a skill (hand washing). The assessments were given pre-training (2 weeks prior), post-training (2 weeks after) and delayed- post training (3 weeks after the post-test). Analysis using ANCOVA for knowledge and skill results demonstrated a significant difference in post-test and delayed post-test scores when controlling for the pre-test scores of the FTF-trained group, as compared to the control group. The findings of this current study demonstrated that food safety attitude and behavior changes were not significant, although numerical improvements were observed. A “counter-top” food safety
training program could impact positively on retail establishments to improve food safety practices of their low literacy, Spanish-speaking, employees.
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1 Literature Review

1.1 Foodborne Illness

Food safety is a major concern in the United States. According to the Centers for Disease Control (CDC), an estimated 48 million cases of foodborne disease occur each year in the United States (affecting approximately 1 in 6 people). The CDC also estimates that there are 128,000 hospitalizations and 3,000 deaths related to foodborne diseases each year (CDC 2010). According to the USDA Economic Research Service (USDA-ERS), outbreaks associated with foodborne illness cost over $6.9 billion per year in lost wages, recalls, and lawsuits (CFI 2010). These costs are nearly double the estimates for what foodborne illness outbreak costs were in 1999. Costs associated with foodborne illness range from $2 billion to upwards of $4 billion yearly (McCabe-Sellers and Beattie 2004). In addition, most of these costs do not include foodborne illness caused by the consumer, as it is generally unreported (Byrd-Bredbenner and others, 2007A).

A study in the United Kingdom demonstrated that out of 577,893 food establishments (including restaurants), 176,207 (30.4%) enforcement actions were issued, including written warnings, improvement notices, closures, prosecutions, and prohibition orders (Rudder 2004). Of all foodborne illnesses associated with catering companies, 97.0% are thought to be associated with improper food handling (Howes and others, 1996). Compounding these problems with foodborne outbreaks is that many consumers, due to hectic lifestyles, demand foods that are ready to eat (such as delicatessen products), minimally processed (such as
fruits and vegetables), take out foods, and “instant meals” (Troxell and Buckner, 2000). Consumers also are concerned with the quality and safety of their food products and want to purchase food that is as safe as possible (Senauer 2001). However, these types of foods often require additional handling, thereby making them more susceptible to contamination (Troxell and Buckner, 2000).

Tansey and Worsley (1995) determined six changes in society that may stress the food system: (1) increased longevity of the human population (leading to more immuno-compromised individuals); (2) increased urbanization (consumer demand for instant meals and less food preparation); (3) globalization (increased distance from food processing centers to the consumer); (4) ever-evolving technology (and how it affects convenience foods); (5); changes in belief systems (such as eating three full meals every day); and (6) the decline of the “traditional woman” (i.e., the home-maker). Most of these issues reinforce that the current “on-the-go” lifestyle may lead to food safety issues.

Researchers have demonstrated that mishandling food plays a significant role in the occurrence of foodborne illness (Green and others, 2006). A large part of the problem is that certain critical behaviors can lead to the incidence of outbreaks. These critical behaviors include: lack of proper personal hygiene, cross-contamination issues, and improper temperature holding of foods (McCabe-Sellers and Beattie, 2004). Of these behaviors, the single most critical factor in the spread of foodborne illness is thought to be through worker hand contact with pathogens from their gastrointestinal tracts or other contaminated objects. This factor makes hand washing extremely important in the prevention of communicable diseases (Green and others, 2006). Lubran and others (2010) conducted studies observing food handlers in retail delicatessens. Researchers found that out of 712 recommended times,
proper hand washing occurred only 78 times (about 11%). Hand washing, however, does not remove all pathogens. When working with ready-to-eat (RTE) foods (such as delicatessen meats or cheeses), other barriers should be used by employees, such as disposable gloves or utensils (Green and others, 2006). Another critical issue is that more people are handling food than ever before: low-paying, high turnover, fast food jobs are filled by less educated people. For food safety behaviors to be effective, there is a need to allocate resources to properly educate these individuals (Troxell and Buckner, 2000).

A study conducted in the United Kingdom found that those employees trained in proper food hygiene techniques had a tendency to be more hygienic than those who did not receive any training (Kirby and Gardiner 1997). Since mishandling of food by food handlers (including incidents caused by home kitchen mishandling, [Byrd-Bredbenner and others 2006A]) is among the main causes of foodborne illness (and the associated costs), the World Health Organization (WHO 2000) suggests that the food safety education and training of food handlers (including consumers) is important in preventing foodborne illness.

1.2 Food Safety Training

Food safety education can be defined as the delivery of facts and skills to any person who handles food at any step in the food system to ensure compliance with food safety issues (Hazelwood and McLean 1994). Since many large companies do not want to lose business due to foodborne illness, food safety training or education has become a lucrative business (Nieto-Montenegro and others 2000). However, for many smaller food companies, the investment in food safety education can be costly to the business’ bottom line (Nieto-Montenegro 2000).
An effective food safety program requires sufficient resources, appropriate facilities, relevant training, good communication channels, as well as motivated workers and management (Nieto-Montenegro and others 2004). Recent evidence suggests that current training methods may not meet the educational needs of retail employees since foodborne illness and outbreaks at the retail level continue to occur (Mathiasen and Powell 2005). Current food safety training materials for food handlers may include but are not limited to: training videos, posters, PowerPoint™ presentations, booklets, discussion techniques (including problem solving and role-playing) as well as other skill sets, practice scenarios or other food safety-related exercises (Nieto-Montenegro and others, 2006). In order to be a more effective instructor, amending teaching styles and learning environments may be critical to accommodate adult learners’ needs (Worsfold 1992). Malcolm Knowles (1984) wrote that there are several components of motivation that an adult learner needs include: self-concept (needing to know the reason for learning, and the involvement of the adult learner in planning the education), experience (a foundation for learning), readiness to learn (adult learners want to learn things that are relevant in their life or work), orientation to learn (problem-centered learning, as opposed to content-centered learning) and motivation to learn (wanting to know more).

1.2.1 The Strengths and Weaknesses of Face-to-Face Training

Face-to-face (FTF-training) is a teaching method wherein an instructor and students/learners are in a place devoted to instruction; it is also known as traditional classroom instruction (Purdue University 2009). The characteristics of FTF-training are that it: is widely used; tends to rely on spoken communication, but visual cues can be used (Neuhauser 2002); allows participants to become more knowledgeable about a particular
subject (including learning why a problem exists, how to fix the problem, and when to use that knowledge); can be used in a large group, but tends to be more effective with smaller groups of people (Neuhauser 2002); and more importantly, numerous possibilities for different teaching styles exist, including role-play and practice on a particular subject.

Some advantages of FTF-training (Dutton and others, 2002) are that most people can relate to this style because they have experienced it at one time or another; it is relatively inexpensive, thereby allowing for many interactions to occur; participants can demonstrate knowledge gain in a short time frame; and teaching and learning occurs in the same place, which is conducive for a reciprocal atmosphere between teacher and student. Additional advantages for FTF-training include: uniqueness, depending on teaching style, instructor, or audience; spontaneity for individuals; and allowing individuals to learn new things or update their knowledge on a particular subject.

Conversely, there are some disadvantages to FTF-training (Dutton and others, 2002). Such issues include: limited size of audience, since too large of an audience can set the teacher up for failure or not allow the student the proper attention; lack of flexibility since a class is scheduled at a specified time and may not allow everyone to participate; and students have to want to participate since disinterested individuals will not undergo the same experience as someone who wants to be there. However, the advantages of FTF-training outweigh the disadvantages.

1.2.2 Spanish Language Training

Food safety is a worldwide issue and it makes no difference whether the individual is English or non-English speaking. All food handlers working in the United States (U.S.), regardless of their nationality, should be educated enough to comprehend and follow the
regulations of the U. S. food system (WHO 2000). Since differences exist in various cultures, including literacy, economical, and societal factors, it is difficult to apply a “one-size-fits-all” approach to food safety education. For food safety practices to work effectively, one must recognize and work with socio-cultural factors and beliefs of the audience (Nieto-Montenegro and others 2008).

While hundreds of food safety educational materials are available, most of these materials were designed for the English-speaking individual (Nieto-Montenegro and others, 2008). Because there have been relatively few studies involving Hispanic workers (Nieto-Montenegro and others, 2008; Bell and others 1999; Diaz-Knauf and others 1995; Meer and Misner 2000) very little is known about food safety knowledge and practices of these workers. While Spanish is the main language of most Latin-American countries, one word can have a different connotation, depending upon the country and context in which a word is used. This issue can cause confusion if a word is translated incorrectly. According to a study by Ackerley (1989), inadequate or poorly designed training could impact training more negatively than receiving any training at all. Language and communication problems are not the only barriers to proper food safety training with non-English speaking audiences. For example, personal hygiene and food safety perception varies from culture to culture (Woteki and Kineman 2003). Other barriers include financial and transportation issues that may impact participation by Hispanics in other venues, such as clinical trial programs or cancer support programs (Stevenson-Perez 1998).

Several Spanish-language food safety programs have been adapted from successful English-language programs and used to educate Spanish-language food handlers. Such programs include the ServSafe® course offered by the National Restaurant Association and
the Super Safe Mark™ course offered by the Food Marketing Institute. However, these courses are intended for employees of grocery stores or restaurants, rather than retail establishments that encompass carnicerías (Spanish delicatessens or meat shops). These programs also require individuals to be literate in their native language in order to pass the course successfully. In some areas, illiterate and comparably uneducated individuals have no exposure to food safety training. Therefore, a Spanish-speaking training program directed to this underserved audience could be an important step in creating a safer food environment.

There is no evidence that worker practices improve when food safety training programs only provide information (Rennie 1994). Foster and Kaferstein (1985) recommend that researchers examine target audience food safety beliefs and behaviors before planning any food safety intervention. For example, an increasing body of research demonstrates health disparities exist among various ethnic and socio-economic groups because of the beliefs, attitudes and the experiences of each of these groups (Kreuter and Skinner 2000). These findings highlight the importance of understanding cultural backgrounds and experiences of community members (Kreuter and Skinner 2000) and utilizing this information in the development and dissemination of food safety training.

1.2.3 Effectiveness of Food Safety Training

A few studies have measured the effectiveness of food safety training. Rennie (1994) examined evaluations in food safety courses that had been offered in the United States and around the world, primarily in more developed countries. These courses failed to improve food handling practices because they focused more on knowledge gain rather than the application of skills. Rennie (1994) concluded that if the goal of the training was to improve public relations, the training program was successful. However, if it was to actually decrease
the risk of foodborne illness, most education programs were not effective because behavior changes were not observed.

Psychologists have distinguished two types of learning: declarative knowledge (the knowledge of “what is,” such as knowing that cleaning and sanitizing must occur every four hours) and procedural knowledge (the knowledge of “how to do things”, such as washing one’s hands; Worsley 2002). The key to an effective training intervention is to increase declarative knowledge while changing procedural knowledge.

While most Extension educators research the needs and develop programs for a target audience, many times a thorough evaluation of these programs is lacking (Radhakrishna and Martin 1999). To demonstrate the effectiveness of a program, barriers such as time, lack of resources, and employee turnover must be overcome (Radhakrishna and Martin 1999). A way to approach these issues would be to create in-service training in program evaluation and accountability and research methods (Radhakrishna and Martin 1999). Evaluation of the program is important in the determination of whether or not a program can be used effectively in different situations.

Little research exists to determine if any changes in long-term behavior have been gained from food safety programs. Program sustainability is a key component in any successful project (Lodl and Stevens 2002). One study utilized a follow-up survey which found that behaviors had changed and practices had been implemented several months after the initial food safety training (McElroy and Cutter 2004). It should be noted that results for this study were focused on self-reported behavior and can be somewhat biased. This same study, however, did conclude that the translation of knowledge to actual food safety behavior would involve a complete “environmental” change in the workplace and would likely require
financial resources. To be able to properly implement a food safety training program, a
handler would have to properly address how behavior affects actual performance.

1.2.4 Theory-based Training

A theory presents a systematic way of understanding events or situations. A theory is
a set of concepts, definitions or propositions that can explain or predict the situation or event
by illustrating the relationships between variables. Theory is used to investigate the answers
to the questions of “why,” “what,” and “how.” Theory guides the search for reasons why
people do or do not engage in certain behavior. Theory can pinpoint when an educator
develops public health programs and it can suggest how to advise program strategies that
reach target audiences and have an impact (Rimmer and Glanz 2005).

Program planning, implementation, and a monitoring process based in theory are
more likely to succeed than those developed without the benefit of a theoretical perspective
(Rimmer and Glanz 2005). There have been a few studies that advocate models using theory-
based research, design, and evaluation in food safety programs that have been used elsewhere
in health education (Rennie 1994; Ehiri and others, 1997; Nieto-Montenegro and others,
2008; Seaman 2010). Obayashi and Song (2003) reported that educational programs aimed at
behavior change were likely to be more effective if they are theory-based. The programs that
are most likely to achieve desired outcomes are those that are based on a clear understanding
of targeted health behaviors and the environmental context in which they occur (Rimmer and
Glanz 2005).

Theory also gives an educator the tools for moving beyond intuition and knowledge
to design and evaluate health behavior and health promotion interventions based on an
understanding of behavior (Rimmer and Glanz 2005). Most health behavior theories can be
applied to diverse cultural and ethnic groups (Rimmer and Glanz 2005). A useful theory makes assumptions “about a behavior, health issue, target population, or environment that are logical, consistent with everyday observations, similar to those used in previous successful programs and supported by past research in the same or related area” (Rimmer and Glanz 2005).

1.3 Transtheoretical Mode (TM)

Developed by Prochaska and DiClemente (conceived in 1977 and refined numerous times), the TM is intended to explain or predict a person’s success or failure in achieving a proposed behavior change (Rimmer and Glanz 2005). The TM can help determine both unfelt needs and felt needs of the individual (in this case, food safety practice). Unfelt needs can be described as the behavior an individual is unaware of, but one that needs changing. Conversely, a felt need is known by an individual and one that needs to be changed. This approach leads a person to prepare to change behavior (training intervention). Action is then taken (using intervention techniques) and measured (through the delayed assessments) where it can be determined if the intended behavior is learned (Prochaska and others, 1991). If a relapse were to occur, then the unfelt needs become a felt need and if necessary, the process can repeat (Prochaska and others 1991). The basic premise of the model is that change is a process, not an event (Rimmer and Glanz 2005).

Pre-contemplation is the first stage in the model. This stage occurs when an individual has no intention of changing behavior in the near future (Prochaska and Norcross 2001). Many times an individual is aware or under-aware of an issue or problem. Contemplation, the next stage, occurs when an individual is aware of the problem, but has not yet taken any action or commitment to ameliorate the situation (Prochaska and Norcross
2001). The third stage, preparation, occurs when intention is combined with behavior that will lead to change. Generally, this systematic process means an individual has taken the first steps to change, without changing (Prochaska and Norcross 2001). The following stage (action) occurs when an individual changes a behavior. This modification affects the attitude and sometimes the surrounding environment of the individual, who is concentrated on making the changes (Prochaska and Norcross 2001). Maintenance is the next stage of the model. This stage occurs when an individual works on making the new behaviors become ritual, thereby preventing relapse to the old, undesirable behaviors (Prochaska and Norcross 2001). The model works such that even if a relapse were to occur, the individual would know what would need to happen for the repair of the issue or behavior that initially needed change. Under these circumstances, individuals are considered to be back to the “contemplation stage.” Unlike most theory based models, TM is circular, not linear. In other words, people do not graduate from one stage to the next, leaving one process for another. Instead, the change process could begin at any stage, with opportunities for regression, suggesting that the entire process could take a very long time (Rimmer and Glanz 2005).
Figure 1.1: The Transtheoretical Model (Prochaska and others 1991)

While this model has been used for numerous purposes, it was developed primarily to help individuals quit smoking (Prochaska, and others, 1991). There has been some success using TM when it is tailored to nutrition education interventions, such as reducing fat consumption (Ounpuu and others, 1999) or increasing exercise (Sarkin and others, 2001). In these instances, both interventions were considered successful. Kristal and others, (1999) investigated the TM in relation to dietary interventions and concluded that TM can be effective in enabling change.

Very little information has addressed the use of the TM with food safety behavior or attitude. Takeuchi and others (2005) conducted a successful food safety intervention in which food thermometers were promoted and used in the cooking of meat. The study was considered a success by the authors because they noted that the participants in the study had changed their behavior about using the food thermometers, as well as their attitude about using them. Byrd-Bredbenner and others, (2007B) conducted a study to measure food safety behavior in young adults; a portion of the study was completed using TM as part of the methodology of the study. The study determined that while most young adults overestimated
their food safety skills, if given the opportunity, these same young adults would be willing to change. A generally positive food safety attitude among young adults also was surmised.

In relation to the TM, a food-safety training program can be used in the preparation stage. The action stage will be based on the knowledge, attitude and behavioral change towards food safety and what needs to happen to be successful at preventing outbreaks of foodborne illness. The maintenance stage occurs when a delayed post-test is administered to determine if the individual has changed because of the training intervention.

As an instruction method, the TM will require some advanced planning. This approach can be combined with a face-to-face teaching style – plans can be altered to ensure a particular learning experience. The benefits of the face-to-face teaching methodology while using the TM will help ensure that food safety behavior is improved. Using TM as a supportive (and historically successful) guide, a Spanish language-training program can be designed to positively influence proper food safety techniques. While there has been little research with TM as a model for a Spanish language food safety training program, the success of TM as a behavior deterrent for smokers (Prochaska, and others, 1991) and those with poor diets (Ounpuu and others, 1999), can be applied to food safety behaviors (such as hand washing, cross-contamination issues, or temperature abuse (Takeuchi and others, 2005)), which should be monitored continually.

1.4 Needs Assessment

A needs assessment can be defined as "…any systematic approach to setting priorities for future action" (Witkin 1984). Three basic survey methods for collecting needs assessment data include: questionnaires, interviews, and the critical incident technique. Of these, the written questionnaire is the most common method of collecting
needs assessment data (Witkin and Altschuld 1995). The advantage to using written questionnaire is that you can collect a large amount of data from many individuals rapidly and consistently. However, a disadvantage is the participants must be able to “read” and “write.” In comparison, both methods of interviewing and critical incident technique do not require “reading” and “writing” and this approach is beneficial. The drawback of these methods is the amount of time required, which can lead to higher costs as well.

Additionally, there are seven questions that one should be asked during any formative evaluation: (a) Are the needs assessment tasks being performed to the benefit of the resolution of the project? (b) Can the needs assessment activities be modified if necessary? (c) Are the data complete? (d) Do the data adequately represent the desired needs? (e) How useful are the data for developing action plans? (f) Are the action plans executable with regard to detail, realism and flexibility? And (g) are the key decision makers and stakeholders receiving adequate progress reports? (Witkin and Altschuld, 1995). For a summative evaluation, possible questions might include: (a) What extent did the assessment meet its goals? (b) What were the assessments strengths and weaknesses? (c) Were there any unanticipated outcomes? and (d) What changes could be recommended for future assessments? (Witkin and Altschuld, 1995).

In the event a needs assessment survey/questionnaire including “demographic” questions, “knowledge” questions or “preferred types of training” fails and participants do not complete the survey, an alternate method of collecting the needs assessment data should be considered. One such method is direct observation, or more commonly known as “mystery shopping.”
1.4.1 Mystery Shopping or Concealed-Direct Observations

Mystery shopping or concealed-direct observation is a form of observation where researchers deceive customer service personnel into believing they are servicing real or potential customers. The goal of mystery shopping is to monitor the consistency used in the delivery of a process (Wilson 2001). With such emphasis in the market research approach, mystery shopping is used frequently in many industries, including financial services, hotel and travel industries, governmental departments, and retail stores (Wilson 2001). However, Godwin and Chambers (2009) suggested that direct observations are an underused method for collecting data during a needs assessment. For mystery shopping, the researchers are concealed so they can properly observe without any changes in normal behavior, which generally may happen when an individual knows they are being watched (Wilson 2001). Gupta (1999) noted that a main problem with direct observation occurs when people can change their behavior after they know they are being observed. Mystery shoppers can be trained to be systematic observers and be attentive to the aspects of the service experience such that regular customers may not notice (Norris 2004). The anecdotal records procedure (when the observer records any behaviors of specific individuals, specific activities, events or interactions) also is a good way to collect research data when in concealment (Henerson and others, 1988).

Mystery shopping is often performed in public settings such that an individual’s actions can be observed by numerous members of the public. This approach is considered an ethical practice to gather the true behavior of that individual (Wilson 2001). During a mystery shopping study, there should be a concentrated effort to protect the interests of the individuals being observed (including not releasing information about
the individuals being observed; Norris 2004). A general theme of every research plan using concealed observation is to be able to justify itself to the members of the scientific community, as well as those in the study (Grove and Fisk 1992). To properly measure the quality of services provided, an adequate sample has to be taken, using a realm of possibilities, and including both male and female “shoppers” at different times of the week or day (Norris 2004). It should be noted that direct human observation is regarded as the observational form with the broadest services application (Grove and Fisk 1992). This method allows for the establishment to be observed in order to help the workers in their greatest areas of need.

To date, there have been relatively few studies using concealed-direct observation for food safety research. One study conducted by Rheinlander and others, (2008) used general observations to ascertain street vendor food safety in Ghana. Worsfold and Griffith (1997) used direct observation in a consumer study measuring standards of food safety behavior (emphasizing temperature abuse), finding that most participants participated in risky behaviors for a variety of normal cooking activities. There is a need to build upon existing literature, as using concealed-direct observations for food safety research can be effective.

1.4.2 Personal Hygiene

As discussed previously and validated by Foster and Kaferstein (1985), poor personal hygiene is a negative practice that affects the food system worldwide. Hygiene, as defined by Webster’s Dictionary Online (2010), is considered to be the “…science of the establishment and maintenance of health.” This maintenance should include a person’s overall cleanliness and practices that are necessary to maintain the safety of the
food system. Medeiros and others (2001) suggested that of the critical factors that could control foodborne illness (including personal hygiene, adequate cooking, cross contamination avoidance, holding food at safe temperatures, and avoiding food from unsafe sources) personal hygiene was considered the most important factor.

Hand washing, a part of personal hygiene, can be used as an example on how difficult it is to change a behavior, independent of ethnicity. A study found that while 96.0% percent of people surveyed indicated they washed their hands after using a public restroom, only 85.0% of individuals actually were observed washing their hands after such an occurrence (ASM 2010). A similar experiment conducted three years prior showed 92.0% of people said they always washed their hands after using a public bathroom, but only 77.0% actually did wash their hands (ASM 2010). Hand washing affects not only the food industry, but other critical industries as well, including the health care industry. A study by Teare and others, (1999) demonstrated that hospitals in the United Kingdom failed to meet hand washing requirements. In health care, hand washing is considered the main method of infection control because it can reduce microbial activity on the hands so the contagion risk to others is minimized (Texier 2000). A study by Pittet (2000) investigated reasons that hospital employees avoided hand washing. Responses included ignorance, belief that gloves erased the need to wash, forgetfulness, high workload, and lack of hand washing stations. This example demonstrates the difficulty in creating a training program that not only imparts knowledge upon the target audience, but also compels the individual to change the risky behavior.

1.4.3 Literacy Levels
Literacy, according to the National Center for Education Statistics (NCES 2002) is defined as: “Using printed and written information to function in society, to achieve one’s goals, and to develop one’s knowledge and potential.” Conversely, low literacy can be defined as: “…an inability to read, write, and use numbers effectively” (Pignone and others, 2005). As recently as 2002, approximately 90 million U.S. adults scored in the lowest two levels of literacy – comprising around 47% of all adults (NCES 2002). Adults at these levels have trouble processing information from complex texts and performing calculations requiring two or more sequential operations (DeWalt and others, 2004). Adults exhibiting low literacy levels can have a direct, negative effect on health, as well as being a marker for other conditions, such as poverty or lack of access to healthcare, which also leads to poor health (Pignone and others, 2005). According to the CDC (2009), health literacy does not always reflect “the health care context, (such as information received from a health care professional)” but rather “public health,” since a majority of decisions are made in homes and communities. This approach implies that a person may not know certain food safety attributes, which could lead to foodborne illness. The CDC (2009) also recommends that educators (which could include Extension educators) in a position to influence those with low literacy issues keep the educational material simple, and involve the target audience while considering the cultural values of the persons in need.

A strong relationship exists between education and literacy (NCES 2002). Hispanics living in the U.S. reported, on average, the least amount of schooling (10.2 years), as compared to other ethnicities (NCES 2002). Comparatively, Asian/Pacific Islanders led all ethnicities with an average of 13 years of schooling, followed by Whites, American Indians, and Blacks at 12.8, 11.7 and 11.6 years of education,
respectively (NCES 2002). With this difference in education, the National Center for Education Statistics determined that Whites outscored (on a weighted average of three proficiency averages [being prose, document and quantitative comprehension] between the pairs of groups across all levels of education) Hispanics by an average of 71 points (as far as total percentages). Unusan and others (2004) and Sudershan and others (2007) conducted similar studies that demonstrated significant associations between illiteracy and negative food safety behaviors.

1.5 Census of Reading, Pennsylvania

Reading, Pennsylvania is a city located in eastern Pennsylvania (United States). According to the 2000 census, of the 81,183 inhabitants, approximately 37.3% are Hispanic. As such, the city of Reading has the highest percentage of Hispanics in the state (Census 2009). First used in the 1980 census, the term “Hispanic” describes persons of Mexican, Puerto Rican, Cuban, Central or South American or other Spanish descent/heritage, regardless of race (Marin and Marin 1991). According to the U.S. Census (2009), many citizens of Reading lack secondary and higher education: 62.0% have a high school degree, while 8.6% have a college degree. These statistics are lower than the total Pennsylvania population which claims 82.0% and 22.0% of its citizens have high school and college degrees, respectively.

Another interesting finding from the census demonstrates the relatively low average median income per household, when compared to the rest of Pennsylvania. Reading’s household income averages $26,698, which is approximately two thirds of the state median income of $40,106, and well below the United States median of $50,233. According to The New York Times (2009), approximately 12.0% of the residents of Berks County, where the
city of Reading is located, receive food stamps, exceeding the U.S. state average of 11.0%. Even more compelling is that food stamp usage increased 20.0% over the previous two years. Like the rest of the nation, Reading has suffered during the economic crisis of the first decade of the 21st century. According to the Pennsylvania Department of Labor (2010), Reading’s unemployment rate was about 14.7%, which exceeds the national average of 9.7% (BCTV 2010).

In another census, Reading had more retail trade establishments (23.5%) than any other business in the city (U.S. Economic Census 2002). However, most residents (34.0%) worked in manufacturing. Of all the businesses in Reading, 7.0% were Hispanic-owned, making it second only to Allentown, Pennsylvania as a percentage of total Hispanic-owned businesses in the entire state (Census 2009).

An example of a popular Hispanic-owned business in Reading is the “carnicería or bodega,” which is Spanish for “butcher or meat shop.” From this point on, the term “carnicería” will be used for consistency. In Reading, approximately eighty carnicerías are found throughout the city. Carnicerías are much like a local grocery store and delicatessen. In some cases, these establishments are more like a convenience store, with other perishable and non-perishable items available for sale. For others, the establishment maintains a restaurant-style atmosphere as a “sandwich shop.” In Reading, the majority of the carnicerías sell a combination of ready-to-eat delicatessen products, sandwiches, and/or raw meat products.

Since the majority of people in Reading live with little income, and a large portion of the population are unemployed, the carnicerías in Reading cater to those receiving food stamps or WIC (Women, Infants and Children) assistance. WIC is a program that is designed to help provide nutrition to low income, pregnant, post-partum and breast feeding women, as
well as infants and children up to the age of five who are at nutritional risk (FNS 2010). WIC is funded by the Food and Nutrition Services, which is part of the United States Department of Agriculture. In Pennsylvania alone, grants for WIC total over $200 million for 2010 (FNS 2010).

The previous information, suggests that carnicerías do not have a large profit margin. Additionally, a lack of regulations within the city, (especially concerning food safety/inspections), make it easy for residents to become store owners. Given the flexibility of businesses hours associated with owner-operated businesses, carnicerías may be an ideal business choice for Hispanics living in Reading.

Food establishments in Reading are inspected by a city health inspector. Due to time constraints, resources, and manpower, carnicerías are not inspected regularly (J. Sanocki, personal communication). As a result, these stores are not under the threat of shutdown for using improper food safety practices. Additionally, the City of Reading does not require these establishments to undergo mandatory food safety training. This situation can be a potential risk for the population that uses the carnicerías. Many of the approximate 25,000 Hispanics in Reading are likely to use these stores. A store that does not practice proper food safety behavior could result in foodborne illness, economic loss, and a possible fatality. This basic premise led to the creation of a customized table-top or counter-top training intervention for this underserved audience. This methodology has been used successfully in the past with training for Hispanic workers of both mushroom and meat processing establishments (personal communication, Sergio Nieto-Montenegro and Catherine N. Cutter), and could be applied to retail delicatessens that serve RTE meats. The aforementioned study in meat processing establishments demonstrated an
increase in food safety knowledge after training was provided. Comments from participants indicated the usefulness and ease of delivery for training employees.

In order for carnicerías in Reading, PA to be considered for this research project, there were various criteria: Spanish-speaking employees, 18 years of age or older; use of a meat slicer for RTE meats; and a meat display case for fresh raw meats. Because there is a need for further food safety research with Spanish-speaking employees, a grant has been furnished by the United States Department of Agriculture (USDA) to further explore this area of concern.

1.6 Considerations for Evaluation of Experimental Research Designs

Quantitative educational research has three main types of evaluation for experimental designs: experimental, quasi-experimental, and non-experimental (Urdan 2005). The main difference between these three evaluation designs is rigor and threats of validity. Experimental research is the most powerful tool for determining if a relationship is cause-and-effect through the manipulation of one variable (Gall and others 1996; Fraenkel and Wallen 2003). Experimental research is the “gold standard” for quantitative research and uses random assignment, a treatment, and a control group (for comparison) and measures pre, post and delayed post of the intervention. Quasi-experimental does not use random assignment, but rather, uses a control group for comparison and still tests the pre, post and delayed post of intervention. Finally, the least rigor is found in the non-experimental design, which does not use random assignment or a control group for comparison purposes (Campbell and Stanley 1966).

There are several key considerations in designing and conducting experimental research. These considerations include the use of a control group, randomness, sample
size, the study population and sample, the research design, validity and reliability. These considerations are briefly discussed in the following sections.

There are also two types of evaluation methods: qualitative and quantitative. Qualitative evaluation is an intense process of contrasting, comparing, replicating, cataloguing and classifying the data through watching and listening. The evaluator is the instrument in this method (Urdan 2005). On the other hand, quantitative data collection occurs through test, surveys, and structured interviews. In this study, a confirmatory mixed-methods design was employed. This approach means the quantitative data (intervention) can be developed based on the previously collected qualitative data (direct observations; Jick 1979).

1.6.1 Use of an Experimental Control Group

In a test of a causal hypothesis, interventions use an experimental control group to compare to a treatment group. The experimental control and treatment groups must be identical in all relevant ways except for the introduction of training into the treatment group. If the training is a causal factor of some event, then logic dictates that the event should manifest itself more significantly in the treatment than in the experimental control group (Fraenkel and Wallen 2003).

1.6.2 Randomness

Both random selection and random assignment are essential to experimental research (Fraenkel and Wallen 2003). Random selection requires participants to be chosen at random from a larger population, all of which have an equal chance of being selected for the sample. Random assignment assumes that all participants in the sample
have an equal chance of being assigned to either the experimental control group or the treatment group, thereby reducing bias by equalizing groups. Randomization is a means of controlling extraneous variables, which assumes that random assignment makes the affects of those groups’ differences more equal (Fraenkel and Wallen 2003).

1.6.3 Sample Size

Sample size is the amount or number of observations that is collected during the research intervention. The larger the number, the better the precision since the variability becomes smaller, allowing for generalizations of the research to other populations (Van Belle 2008). It is recommended that a minimum of 30 individuals per group for experimental research be used (Fraenkel and Wallen 2003). However, these researchers noted that very tightly controlled studies of smaller groups could be defended (Gall and others 1996). A sample size of ten may be judged adequate for certain types of homogeneous or critical case sampling, too small to achieve maximum variation of complex phenomenon, or too large for certain kinds of narrative analyses (Sandelowski 1995).

1.6.4 Statistical Validity of Conclusions

One of the most important attributes of an intervention is validity. As defined by Norland (1990), validity addresses the amount of systematic or “built-in” error contained in the measure. Threats to the validity of research can be both internal and external. Internal validity addresses the "true" causes of the outcomes that are observed in the study. Strong internal validity means that it has reliable measures of both independent and dependent variables, but a strong justification that causally links to independent
variables and dependent variables. Then, extraneous variables can be ruled out, or alternative, often unanticipated, causes for dependent variables. Thus, strong internal validity refers to the unambiguous assignment of causes to effects. Internal validity is about causal control.

External validity addresses the ability to generalize your study to other people and other situations. To have strong external validity (ideally), a probability sample of subjects or respondents drawn using "chance methods" from a clearly defined population is needed. Ideally, there will be a good sample of groups and sample of measurements and situations. With strong external validity, the data can be generalized to other people and situations with confidence. Public opinion surveys typically place considerable emphasis on defining the population of interest and drawing good samples from that population. On the other hand, laboratory experiments also can employ "criterion based samples," with an example being a college class taught by a friend (CUNY 2010). With this method type, the researchers may not make a generalized statement about a population.

1.6.5 Instrumental Reliability

The reliability of an instrument or training program refers to the extent that same results can be found multiple times, using the same instrument (Fraenkel and Wallen 2003). There are several ways to increase the reliability of an instrument. A pilot test can be conducted where all evaluation tools are delivered, along with the use of the instrument. This method is done with a small group of individuals who match the target audience and who provide feedback on both the instrument and the evaluation tools. The reaction and feedback are recorded so that the proper modifications can be made to the
instrument (Norland 1990). This method also provides the researchers with data that can be analyzed for reliability scores. The standard reliability score for research should be 0.70 or higher (Fraenkel and Wallen 2003). If a score lower than 0.70 is found, it is generally expected that the range of scores will fluctuate greatly each time the instrument is implemented, even if the same group is tested twice. The test that determines this score is the Kuder-Richardson approach. This test uses the mean scores in combination with the standard deviation to calculate the reliability score using a mathematical formula. Another method is to have a panel of experts review the instrument and evaluation tools before use of the documents (Norland 1990). The best solution is to do a combination of both methods to help ensure the instrument is reliable before the program is implemented.

1.7 Statement of the Problem

Given the growing number of Spanish-speaking food handlers and the risk of foodborne illness, a need exists for a food safety educational program targeted specifically to Hispanics working in carnicerías located in Reading, PA. To date, few research programs have addressed food safety training programs for Spanish-speaking food handlers (Nieto-Montenegro and others 2008). The carnicería workers in Reading, PA, are likely low-income, low-educated individuals (Census 2009), working in establishments that lack regular food inspection. Mishandling of food by food handlers is one of the leading causes of foodborne illness (WHO 2000; Byrd-Bredbenner and others 2007). The Transtheoretical Model has been used successfully to change health related behaviors (Prochaska and others 1991; Kristal and others 1999; Takeuchi and others
Because of the risks involved with uneducated workers and implications for food safety, an intervention program using table-top/counter-top training modules for Hispanic workers at the carnicerías of Reading, Pennsylvania should be developed, disseminated, and evaluated.

*Research Questions:*

- What are carnicerías workers’ current needs in food safety?
- Which method of training do Hispanic managers prefer receiving for both themselves and their employees?

*Null Hypotheses*

1. The intervention group will *not* show a significant increase in knowledge scores and performance of a skill, as compared to the current standard (no training).
2. The intervention group will *not* show significant improvement in attitude or alter behavior, as compared to the current standard (no training).

The expected outcome is to reject the Null Hypothesis.

**1.8 Objectives of the Research**

Because a majority of the owners and employees of carnicerías have no formal food safety training and these establishments are not regularly inspected, there is concern that foodborne illness may occur as a result of purchasing foods from these establishments due to poor personal hygiene and lack of cleaning and sanitizing practices. The development of a food safety training module (consisting of two training lessons) and its evaluation will help researchers develop comprehensive and effective food safety training programs for Spanish-speaking employees. Through the application
of knowledge, it is anticipated that the module (following a variation of TM) will help to positively influence attitudes and behaviors concerning food safety in the work place.

The objectives of the research are:

1. To determine the food safety training needs of Spanish-speaking employees of carnicerías using mystery shopping;

2. To develop, pilot, and test food safety training modules directed to Spanish-speaking food handlers of carnicerías;

3. To demonstrate a retention of food safety knowledge, improved attitude, and altered behavior of Spanish-speaking employees of carnicerías who undergo food safety training from pre-test to post-test and following delayed post-test; and

4. To demonstrate a change in a food safety skill of Spanish-speaking employees of carnicerías from pre-test to post-test as well as a delayed post-test following participation in the training modules.
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2 Methodology

2.1 Screening

A comprehensive survey of carnicerías in Pennsylvania was conducted in the following Pennsylvania cities: Kennett Square, West Chester, Philadelphia, Allentown, Pottstown, Reading, West Grove, Oxford, Coatesville and Phoenixville. In addition, health inspectors and/or County-based food safety Extension educators were contacted in the cities of Lancaster, Reading and York. Reading, Pennsylvania was selected as the sole city for the research study due to the relatively large number of carnicerías and reports that current employees at carnicerías did not have any previously documented, formal food safety training. In Reading, the local health inspector currently does not require any food safety training and inspects these stores approximately once a year. In the future, the city may require food safety training to educate employees of the carnicerías.

Once the city was identified, a list of inclusion criteria was developed: (1) employees must be over the age of 18 and (2) Spanish speaking; the carnicería have a working (3) meat slicer and a (4) refrigerated meat display case. In order to determine whether the Reading stores fell into either the inclusion group or the exclusion group, the researchers visited and “window-shopped” in each store. The researchers walked by stores or entered the stores, but did not buy anything, to determine if the store met the basic inclusion criteria.
2.2 Needs Assessment

Rather than using a survey, the needs assessment was accomplished using a technique known as “mystery shopping” or “concealed-direct observations.” These concealed-direct observations were conducted in ten random carnicerías selected as a criterion-based sample (Patton 2002) and were observed three times each: in the morning, in the afternoon and in the evening, for a total of thirty visits. At each visit, the researchers purchased ready-to-eat (RTE) ham to observe how employees used the meat slicer. An evaluation sheet was developed for each observation (Appendix A). The evaluation targeted common food safety practices that should be followed during food preparation. The practices that were observed included hand washing, use of gloves, proper attire, chewing gum, and correct storage of food products. Two observers participated in each visit and both individuals filled out the evaluation sheet together, immediately following the visit. The responses were agreed upon before continuing to the next observation.

After the concealed-direct observations were completed, the researchers returned to each observed carnicería to debrief the owner/manager, gain consent for further research, and ask them to complete a six-question survey (Appendix B, and C; consent form, Appendix D, and E). The researchers found that sharing the data obtained from the concealed-direct observations with the owner/manager provided these individuals with an impetus for food safety training. This approach encouraged store owners to participate in this program, hence increasing “buy-in” by the community. This survey was completed by the store owner/manager of the carnicería in order to understand the
work environment that employees were exposed to daily and helped to determine the managers’ stage of Prochaska and DiClemente’s Transtheoretical Model: pre-contemplation or contemplation. As explained before, the pre-contemplation stage occurs when an individual is most likely to not make a change in the foreseeable future. Conversely, an individual in the contemplation stage is thinking about making a change, but has not yet done so. The model also determines if the need is a felt need or an unfelt need. Questions 1 and 6 of the survey were developed to address this issue. The other questions in the survey were used to develop training materials to meet the needs of the carnicerías. The English and Spanish debriefing statement used to guide verbal conversation about the project can be found in Appendix F and G, respectively. All managers completing the six-question survey received a $15 gift card to a local retail store. At this point in the project, the researchers also recruited food handlers for the food safety training using a recruitment flyer (Appendix H and I).

2.3 Development of the Lesson

After completion of a needs assessment, it was determined that food safety training of employees of carnicerías in Reading, Pennsylvania was needed. The behaviors and skills that were witnessed during the concealed-direct observations were crucial to customizing the food safety training for employees of the local carnicerías.

Prior to writing the text for the lessons of the food safety training program, learning objectives were developed such that the employees were able to accomplish the following tasks by the end of the training lesson:
Lesson 1

1) State and understand the importance of the four steps involved in cleaning and sanitizing food contact surfaces;

2) Describe four elements (Temperature-Activity-Concentration-Time) required to effectively clean and sanitize food contact surfaces;

3) Understand safety precautions for chemicals used during the cleaning and sanitizing of food contact surfaces;

4) Understand terms such as cross-contamination and ready-to-eat (RTE) foods; and

5) Identify surfaces that need to be cleaned and sanitized and the frequency of this process.

Lesson 2

1) State how poor personal hygiene directly affects the safety of food;

2) Demonstrate correct usage of gloves and attire for working in a retail deli;

3) State the importance of hand washing and the use of gloves to avoid cross contamination;

4) Identify situations when hand washing is required; and

5) Demonstrate appropriate hand washing techniques.

The existing ServSafe® Essentials 5th Edition and a sanitation manual (Ecolab; St. Paul, MN) were used as background material to develop the text for the customized lessons. Food safety training material encompassed those behaviors deemed
unacceptable and/or a lack of skill demonstrated during the concealed-direct observations (see the summary of direct observations on page 58 of this thesis).

The written text is an important part of developing any training program. Given the low literacy levels of the target audience, content was supplemented with photographs and the training program delivered verbally. All photographs were taken on campus at the Pennsylvania State Meats Laboratory (University Park, PA) with Hispanic graduate students as models. This approach ensured that carnicerías or employees from carnicerías were not involved in the development of the food safety training program and ensured that employees or businesses could not be harmed if a negative connotation was associated with the behaviors displayed in the food safety training program. Photographs were staged in order to get proper examples of correct and incorrect behaviors, as well as proper cleaning and sanitizing procedures.

The table-top/counter-top training program relied on illustrations and visual aids containing simple messages in two separate lessons. The lessons were designed to be set on a table top/counter top, allowing an instructor to flip through the pages. Each page contained an illustration that corresponded to the text on the following page. This written content was presented in script form so the instructor could read to participants. During the training session, the instructor flipped the pages and proceeded through the lesson. It was not necessary for the instructor to memorize all of the text. However, to make the training session more effective (as to present the information the same way each time the training is given), it is advisable for him/her to become familiar with it and thoroughly understand it.
Additional information was provided to the instructor [within brackets] to improve the learning experience but was not read to participants. Each text page also contained a small box with a visual aid showing the picture that is on the other side of the page.

After the content was reviewed and proofread by the instructors, the food safety training lessons were printed at the Pennsylvania State University Multimedia and Print Center.

Figure 2.1: The Front of the Table-Top/Counter-Top Training (For the Participants).

Figure 2.2: The Back of the Table-Top/Counter-Top Training (For the Instructor).
Figure 2.3: The Portable Flip-Chart Style Makes it Easy for Both the Teacher and Learner.

2.4 Mini Pilot Test

A pilot test of the counter-top training program and an evaluation instrument (post-test) was performed to determine reliability. The training was conducted at three carnicerías that sold RTE meat products and with five employees who were in the contemplation stage of the TM. The pilot test also established content validity, since the participants were asked to evaluate the information provided in each module, visual aids, instructor presentation, and grammar. These three carnicerías were not included as part of the intervention treatment. Instead, these sessions allowed the instructor to practice the presentations in front of an audience and to gain verbal feedback on the delivery and use of the materials, as well as test the reliability of the evaluation instruments. It should be noted that the number of participants in this phase of the project was fewer than typically seen in a pilot test (Babbie 2005).
2.5 Research Design

The intervention for this study used a modified pre-test/post-test/delayed post-test, experimental control group design. True experimental participant research requires random assignment of participants to treatment groups. The participants in this study were not randomly selected, since all eligible and willing employees were asked to participate. Each participant had an equal chance of being assigned to one of the two treatment groups; therefore assignment was considered random. After collecting the pre-test information, all carnicería names were placed on a master list. A random assignment was done by placing each participant’s name on a small sheet of paper. The equally-sized strips of paper were folded in half and placed in a small bucket. A non-partial party was asked to draw names from the bucket. As the names were drawn for each treatment group, the first half was assigned to the FTF-training group. The second half was assigned to the control group. All carnicerías agreed to allow the pre-test, training, post-test and delayed post-test during regular work hours. The participants were compensated with a $15 gift card each for the pre-test, post-test and delayed post-test and a $25 gift card for participating in the training.

The experimental design used was a modified, randomized pre-test/post-test/delayed post-test control group design (Table 2-1). As previously noted, all carnicerías were randomly assigned to treatment groups. Food safety knowledge, attitude, behavior, and skill were gauged before and after the training intervention. A control group was used to make comparisons as to the effectiveness of the food safety training compared to those having no training. This design allowed the researchers to establish a baseline level of the change that could be attributed to the treatment or to a
testing effect since participants in both the control and the treatment group saw the test questions three times within three months.

Table 2.1: Experimental Design

<table>
<thead>
<tr>
<th>Intervention Group</th>
<th>Objective 1</th>
<th>Objective 2</th>
<th>Objective 3</th>
</tr>
</thead>
</table>
| Control: no training | NEEDS ASSESSMENT (concealed-direct observations & managerial survey) | INTERVENTION 1. Pre-test, (KA, AA, BA test a skill)  
At least a 2 week time lapse  
2. No training  
At least a 2 week time lapse  
3. Post-test, (KA, AA, BA test a skill) | At least 3 weeks later  
1. Delayed Assessment: Post-test, (KA, AA, BA test a skill) |
| FTF in Spanish | | INTERVENTION 1. Pre-test, (KA, AA, BA test a skill)  
At least a 2 week time lapse  
2. FTF training (2 lessons)  
At least a 2 week time lapse  
3. Post-test, (KA, AA, BA test a skill) | At least 3 weeks later  
1. Delayed Assessments: Post-test, (KA, AA, BA test a skill) |

Key:
KA: Knowledge Assessment  
AA: Attitude Assessment  
BA: Behavioral Assessment/s  
FTF: Face-to-Face
A pre-test, including food safety knowledge, attitude, behavior questions, and a performance of a skill (handwashing) was administered to the remaining 20 stores that were in the contemplation stage. This approach was designed to determine the employee’s baseline food safety knowledge, attitudes, behaviors, and skill. The pre-test data were analyzed to ensure treatment group were being treated as equals. There was at least a two-week delay period between the pre-test and the intervention.

The two training lessons were administered to the treatment group only. The control group did not receive any treatment. The two lessons provided the treatment group with the necessary materials to take action(s) that ensure proper food safety practices. After the lessons were provided there was at least a two week delay period before the post-test was administered to both treatment groups.

Approximately three weeks after the treatment, a delayed-post-test was administered to both treatment groups. The post-test and the delayed post-test were identical and had five additional attitude questions compared to the pre-test. These questions were added to determine change in the employee’s behaviors but also to observe if they were entering the maintenance stage of the model. Also, at the final visit, employees felt comfortable enough with the researchers to answer the demographic questionnaire (Appendix J and K). Appendix L and M have the consent forms for the demographic questionnaire.

Finally, the researchers returned to the experimental control groups to gain consent (Appendix N, and O) and offered the food-safety training program (Appendix P, and Q). All participants were debriefed on the study blinding of treatment groups and received a certificate of completion (Appendix R).
2.5.1 Six-month Follow-up (Second Round of Observations)

In order to ascertain the long-term effects of the training program, a second research group conducted concealed-direct observations six months after the completion of the intervention. This research group was trained on observations and used the same checklists from the initial concealed-direct observations. The research group consisted of at least two members (to prevent bias; each researcher independently monitored the store) and observed the stores in the treatment group.

2.6 Instrumentation and Data Collection

The food safety training program, or intervention, used Face-to-Face (FTF) instruction, in Spanish and augmented by pictures (as visual aids). This method was used for the treatment group; the control group did not receive any training until all evaluation tools were completed. The control group did not undergo training to mirror other carnicería employees within the city of Reading. If any type of training was implemented, it would have confounded the results, since the employees would have been learning and improving their basic food safety knowledge. Additionally, the literacy issues made it impossible to drop off a flyer or paper and expect the individuals to be able to read and understand the documents. Disinterest in the program was another reason for the lack of participation (unfelt need).

In the current study, basic food safety knowledge, attitudes, behaviors, and a skill were examined. The independent variable was exposure to lessons. The dependent variables were knowledge gain, as measured by (1) scores on a pre-test, post-test and delayed post-test; (2) change in attitude based on attitude questions; (3) alterations of behaviors based on behavioral questions and finally; (4) change in skill based on a
demonstration of how to wash hands properly. All answers to pre- and post-test questions were in a multiple-choice format and read to the employees in Spanish. A pre-test was administered to collect baseline data of the employee’s knowledge, attitudes, behaviors and skill set (see Appendix S and T for versions of the pre-test). The pre-test was administered to both the experimental control group and the treatment group approximately two weeks before the intervention to help reduce recall of the information. The learning objectives were used as a guideline when writing all multiple choice questions. “I do not know” answers were included to discourage employees from guessing if they did not know the answer. The post-test was administered to both groups approximately two weeks after the intervention. This test was identical to the pre-test except for the addition of another set of behavioral questions. The post-tests were identical to the delayed post-test (Appendix U and V). The delayed post-test was administered to both groups approximately three weeks after the post-test.

2.7 Model

The Transtheoretical Model (TM) is used to guide the study and increase retention by only using participants that are in the “contemplation stage.” This model can be followed loosely and was modified to fit the audience of this study. During initial screening, all participants were assumed to be in the “pre-contemplation stage,” as they expressed an “unfelt need,” and were not willing to answer any surveys or partake in any training. At this time, the needs assessment was conducted by concealed-direct observations. The findings of the concealed-direct observations were shared with the participants during the debriefing step, shared with the other carnicerías in Reading, and were used to bring about food safety awareness to the employees working at these stores.
Afterwards, researchers returned to the stores to ask the managers to complete a survey (measuring the stage of contemplation). At this point in the project, all managers who expressed a “felt need” for food safety training were considered to be in the contemplation stage and were used to complete the mini pilot. The other stores were used for the table-top/counter-top training intervention. It is important to note that none of the stores where the concealed-direct observations took place were used in the intervention. The “preparation stage” of the model was where the translator conducted the food safety training lessons based on the needs assessments. The “action” or use of the training was not measured. The goal was for the participants to have their own will power to practice the skills learned in the training. A post-test and a delayed post-test were then administered to measure the “maintenance” stage or short-term retention of knowledge, change in attitudes, alterations of behavior or increased skill (See Figure 2.4). Finally, a six-month follow up (again using concealed-direct observations), was conducted to determine the stage of the participant carnicerías. This stage was conducted by a different set of researchers, who were trained to know what observations to make.

**Figure 2.4: Food Safety Training, Adapted from Transtheoretical Model (TM; Prochaska and others 1991)**
2.8 Approval from Internal Review Board

Preceding data collection, an on-line application for approval to use human subjects was submitted to the Internal Review Board (IRB) through the Office for Research Protections at The Pennsylvania State University. All evaluation tools, all recruitment flyers, all consent forms/debriefing statement, all training modules, demographic questionnaires, and certificate of completion of the program were submitted in both English and Spanish with the application. In addition, all documents were reviewed by a native Spanish speaker not related to the study for translation purposes. Approval to work with human subjects was granted for IRB #33387 on February 24th, 2010 and a final modification including all changes materials was approved on May 24th, 2010.

2.9 Data Analysis and Interpretation

All data were entered into the Statistical Package for Social Sciences (SPSS V.18) for statistical analysis (SPSS Inc 2001). Statistical tests used in the current study include Chi-square analyses, descriptive statistics, paired sample t-tests, one-way ANOVA, ANCOVA, Wilcoxon, and Kruskal-Wallis. Reliability was determined using the split- half method (knowledge and skill) and Cronbach’s alpha (attitude). Results were considered to be significant at 0.05 or less ($p \leq 0.05$).

2.10 Demographic Data

The demographic data were divided according to group assignment: experimental control and treatment group. Demographic data were tabulated as nominal data and the
descriptive statistics are shown as percentages (Table 3-3). Mean and standard
deviations were calculated for variables that represented interval or ratio data. The age of
participants, number of years in the food industry, number of years as owner of the
carnicería, number of people working in the carnicería, and number of customers were
measured in categories and therefore, represent ordinal categories. The following
categories/questions used were as follows. The age variable was divided into the
following categories: 18-25, 26-35, 35-44, 45-55, 56-65, 66 and older. The results for the
question “How many people shop at your carnicería in one week?” were divided into the
following categories: 0-25 people, 26-50 people, 51-75 people, 76-100 people, and 101
or more people. The question “How long have you worked with deli foods?” was asked
and results divided into the following categories: 0-1 year, 2-5 years, 6-10 years, 11-19
years, or 20 or more years. The question “How long have you owned the carnicería?”
was asked and divided into the following categories: 0-1 year, 2-5 years, 6-10 years, 11-
19 years, 20 or more years, or NA-Not Applicable. The results to the question “How
many people work at this carnicería?” were divided into the following categories: 1
person, 2-5 people, 6-10 people, 11-19 people, or 20 or more people. The question
“Years of school completed,” was divided into the categories: 8th grade or less, some
high school, completed high school, and some college/trade school. Nationality (Country
of Origin) was asked and the results divided into the following categories: Mexican,
Dominican Republic, Puerto Rican, or Other. Gender was asked as part of the survey and
was measured nominally. Chi-square analyses were performed to compare the
distribution of these demographic characteristics. In addition, ANOVA tests were
completed to see if differences exist between knowledge of treatment groups’ pre-test
scores and select demographic characteristics such as education, country of origin, and years of experience.

2.11 Knowledge Data (N=20)

First, a reliability analysis was conducted on the pre-test using the split-half method. Descriptive statistics were calculated for the control group and the treatment group including the mean, the standard deviation and the total number of participants in each group. The knowledge scores for employees were averaged within a given store so there are a total of ten knowledge score values (one for each store).

One-way ANOVA tests were used to determine if the pre-test scores were statistically equal between control and treatment group. Similar ANOVA analyses were used for post-test and delayed post-test. Paired sample t-tests also were performed on pre-test, post-test and delayed post-test for each group (control and treatment). ANCOVA was used to determine if a difference exists between the delayed post-test scores, post-test scores between treatment groups when controlling for the pre-test scores. Pre-test scores were the covariate, post-test or delayed post-test were the dependent variables, and treatment group was the independent variable. ANCOVA also was completed on the control group to determine if a significant testing bias was observed when controlling for the pretest. The statistical assumptions of normality and homogeneity (equal variance) were assessed with skewness/kurtosis values and Levene’s test respectively.
2.12 Attitude and Behavioral Data (N=20)

First, a Cronbach’s alpha reliability (internal consistency) analysis was conducted using the summated score of statements. Each of the five attitude statements had five response options: very much disagree, disagree, neutral, agree or very much agree. The attitude data were treated as ordinal data. The employee attitude data were combined by store so there was a total of ten data points for each treatment group (control and treatment) for each of the five questions. Each question was analyzed separately with Kruskal-Wallis for pre-test, post-test and delayed post-test to determine if there was statistical significance for any of the five questions.

The behavioral data had four choices for each of the five items: hardly ever, sometimes, often, and always. The behavioral data were treated as ordinal data. The behavioral data were combined by store so there was a total of ten data points for each treatment group for each of the five items. The data were graphed in Excel to demonstrate differences in pre-test to post-test and delayed post-test values. Then a Wilcoxon ranked test was completed for each question separately to determine if statistical significance existed.

2.13 Skill Data

The researchers collected the skill data by observing employees wash their hands after being asked to do so. This skill test had a total of five possible points. This approach was used such that each step completed in the correct order was assigned one point. Proper steps are as follows: (1) rinsing hands; (2) applying soap on wet hands; (3) vigorously applying action to the palms of hands, fingers and top of hands for ten to
fifteen seconds; (4) rinsing hands; (5) and drying hands with paper towel or clean hand
cloth. If any steps were not completed, completed incorrectly or in the wrong order, the
employee was given zero points for that part of the skill. First, a reliability analysis was
conducted on the pre-test using the split-half method. Descriptive statistics were
calculated for the control group and the treatment group including the mean, the standard
deviation and the total number of participants in each group. The mean score and
standard deviation were calculated for each employee and averaged within a given store
so that there was a total of ten results (one for each store). The mean and standard
deviation were calculated for the pre-test, post-test and delayed post-test. One-way
ANOVA was used for the pre-test, post-test and delayed post-test to see if there was a
difference at each observation time between treatment groups. ANCOVA was used to
determine if a difference exists between the delayed post-test scores, post-test scores
between treatment groups when controlling for the pre-test scores. Pre-test scores were
the covariate, post-test or delayed post-test were the dependent variables, and treatment
group was the independent variable. ANCOVA also was completed on the control group
to determine if a significant testing bias was observed when controlling for the pretest.
The statistical assumptions of normality and homogeneity (equal variance) were
assessed with skewness/kurtosis values and Levene’s test respectively.

The current study utilized a pilot test of training materials with five individuals at
three different locations with feedback. In addition, all materials were reviewed by a
bilingual expert (who had no involvement with the program) to ensure content
consistency since the program is available in both Spanish and English. A letter from the
reviewer can be found in Appendix W. Suggestions to improve the presentation and
appearance, as well as instrumentation, were collected from nine bilingual individuals. These approaches increased the reliability and validity of the training.
3 Results

3.1 Screening

As of January 2010, it was determined that there were seventy-nine carnicerías in Reading. From these, sixty-five carnicerías were identified for the inclusion group and fourteen were excluded (due to lack of adequate refrigeration or inoperable meat slicers).

The key to the success of this project was gaining buy-in from the community. This approach was difficult in Reading since the health inspector did not enforce food safety training. The researchers located stores that employed individuals who believed they had a need for food safety training. These findings were not discovered until evidence was collected during concealed-direct observations. This information was shared later with the storeowners as an awareness step.

Figure 3.1: Experimental Design Flow Chart

<table>
<thead>
<tr>
<th>Treatment Group (n=16)</th>
<th>2 Weeks</th>
<th>3 Weeks</th>
<th>6 Months</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pretest</td>
<td>O1</td>
<td>X</td>
<td>O3</td>
</tr>
<tr>
<td>Program</td>
<td></td>
<td></td>
<td>O5</td>
</tr>
<tr>
<td>Posttest</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Delayed Posttest</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Long Term Follow-Up</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

| Control Group (n=13)   |         |         |          |
| Pretest: Knowledge, Behavior, Attitude, Skill Tests, Demographics |         |         |          |
| O = Observations/Tests |         |         |          |
| Program: FTF Training = X |         |         |          |
| Post-test: Knowledge, Behavior, Attitude, Skill Tests |         |         |          |
| Delayed Post-test: Knowledge, Behavior, Attitude, Skill Tests |         |         |          |
| Long Term Follow-up: Observations on Treatment Group Stores |         |         |          |
3.2 Needs Assessment

The qualitative data collected from the concealed-direct observations also were used to help develop the training program and quantitative evaluation tools such as the pre-test, post-test and delayed post-test. Using this information, it was determined that three food safety topics could have the largest impact on improving food safety in carnicerías: hand washing, sanitation/cross contamination, and personal hygiene. From these three topics, learning objectives were developed and the training program created.

The researchers visited ten of the carnicerías in the criterion-based sample, as well as an additional fifty-five carnicerías for inclusion in the main intervention. Of the sixty-five carnicerías surveyed, twenty-three carnicerías were in the contemplation stage and qualified for the main intervention. The other forty-two carnicerías remained in the pre-contemplation stage and were not used for the main intervention. Results of concealed-direct observations can be found in Table 3-2.

**Table 3.2: Results of the Concealed-Direct Observations used to Determine the Needs Assessment**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Personal Hygiene</th>
<th>Sanitation/ Cross-Contamination</th>
<th>Hand Washing</th>
</tr>
</thead>
<tbody>
<tr>
<td>Percent compliance or non-compliance</td>
<td>27% Employees wearing hairnets or hats</td>
<td>10% Employees using gloves properly</td>
<td>3% Employees washing hands before waiting on customers</td>
</tr>
<tr>
<td></td>
<td>77% Employees not wearing jewelry</td>
<td>13% Employees working with clean slicers</td>
<td>23% Stores with operational handwashing stations</td>
</tr>
<tr>
<td></td>
<td>83% Employees not eating or chewing gum</td>
<td>10% Employees working with clean display cases *</td>
<td>37% Stores with handwashing stations and paper towels</td>
</tr>
</tbody>
</table>
40% Stores with handwashing stations and soap

*Cases were evaluated on organization, storage of product (trays or no trays), presence or absence of spoiled product, and general grease or level of cleanliness in the display case.

3.3 Study Population and Sample

Carnicerías are small delicatessens or meat shops. Employees of carnicerías were the participants of the current intervention in the city of Reading, Pennsylvania. All participants were at least eighteen years of age and worked directly with food. All participants were able to speak Spanish, but based on personal interactions, it was determined that they lacked reading and writing comprehension in both English and Spanish. Since few individuals work at the carnicerías, it was decided to include both carnicería owners and their employees in the program intervention, if possible. It was determined that there were seventy-nine carnicerías in Reading as of January 2010, but only sixty-five carnicerías met the inclusion criteria for the study (see Data Collection Procedures). Prochaska and DiClemente’s Transtheoretical Model requires the participants in the study be in the contemplation stage in order to attain greater acceptance, retention and behavioral change. The consequence of this method is that it narrows the usable sample of the total population (See Table 3-2).

In this study, it was not possible to use random selection. Therefore, a criterion-based sample was used for selection purposes. A criterion-based sample occurs when the subjects are selected, in part or in whole, at the convenience of the researchers. The
researchers make no attempts, or only a limited attempt, to ensure that this sample is an accurate representation of some larger group or population. The classic example of a criterion-based sample is standing at a shopping mall and selecting shoppers as they walk by to fill out a survey (Simon 1998). Convenience sampling was used because recruitment was challenging; many of the carnicerías employees and owners were not willing to participate in the research, leaving most carnicerías in the pre-contemplation group. However, this study did use random assignment for treatment groups.

The goal was to have a minimum of twenty carnicerías in the main intervention; allowing for ten carnicerías in the FTF-training group and ten carnicerías in the control group. Based on these criteria, approximately thirty employees (including owners), working at twenty carnicerías, were used and represents a large sample of the total population of the sixty-five usable stores. All of the carnicerías stored and served RTE meat, had a meat slicer, and spoke Spanish. The data collected for number of carnicerías and employees in each stage of the project are listed in Table 3-2.
Table 3.3: Number of Carnicerías and Employees in Each Stage of the Experiment.

<table>
<thead>
<tr>
<th></th>
<th>Concealed-direct observation</th>
<th>Managerial survey</th>
<th>Pilot test</th>
<th>Pre-test</th>
<th>Intervention</th>
<th>Post-test</th>
<th>Delayed post-test</th>
</tr>
</thead>
<tbody>
<tr>
<td>Participating carnieerías</td>
<td>10</td>
<td>65 23 *C 42 PC</td>
<td>3</td>
<td>20</td>
<td>10</td>
<td>20</td>
<td>20</td>
</tr>
<tr>
<td>Total number of employees in *C</td>
<td></td>
<td>36</td>
<td>5</td>
<td>31</td>
<td>16</td>
<td>29</td>
<td>29</td>
</tr>
<tr>
<td>Female in *C</td>
<td></td>
<td>Total: 10 2 control 6 treatment</td>
<td>2</td>
<td>8</td>
<td>6</td>
<td>7</td>
<td>7</td>
</tr>
<tr>
<td>Males in *C</td>
<td></td>
<td>Total: 26 13 control 10 treatment</td>
<td>3</td>
<td>23</td>
<td>10</td>
<td>22</td>
<td>22</td>
</tr>
</tbody>
</table>

**Key:**
*C*: Contemplation  
PC: Pre-Contemplation

### 3.3.1 Internal Validity

Gall and others (1996) identify the following list of possible threats to internal validity:

1) Experimenter bias threat occurs when the researchers who are administering the intervention unintentionally influence the experimental control group or the treatment group and therefore, alter the outcome of the study.

2) Experimental mortality occurs when individuals participating in the intervention drop out before it is completed. If the subjects in two comparison groups differ with respect to the independent variable, then they may be more likely to
discontinue their participation part way through an experiment than subjects in another group when that dependent variable is measured at the end of the experiment.

3) Background is a threat when outside events (other than the intervention) influence subjects in the course of the experiment or between repeated measures of the dependent variable.

4) Regression to the mean is a threat when tests and retests are completed; the outlying scores have a tendency to fall closer to the mean.

5) A ceiling effect is a threat to the research when the individuals participating have previous knowledge about the subject matter and therefore score high on the pre-test which does not allow room for improvement on the post-test and delayed post-test.

6) Selection is a threat when a difference exists between the treatment group and the experimental control group prior to considering the effect of the intervention. Examples include sex, height, weight, color, attitude, personality, motor ability, or mental ability.

7) Repeated testing is a threat when scores improve simply by the participants being exposed to the test multiple times and without receiving any intervention.

8) Resentful demoralization of the experimental control group occurs when the participants in the control group feel mediocre or undeserving because they are not receiving any treatment. This observation occurs when the experimental control group is told they are only the control group or it is deduced since no
intervention is provided. It is best if the individuals are blinded so participants give their true responses and not give a response below the norm.

3.3.2 External Validity

External validity refers to how confident the research is that the findings can be generalized to other populations, settings, or treatment variables. Population generalizations indicate how sufficient the sample represents the population being studied (Fraenkel and Wallen 2003).

3.4 Mini Pilot test

The training was developed and pilot-tested at three of the twenty-three stores that were in the contemplation stage. After completion of the pilot-test, the training was optimized with little content changes.

The mean score on the post-test for the pilot test was 4.6/5 for the knowledge score. Based on the feedback from the pilot test participants and the knowledge scores, some of the questions in the evaluation instruments were reworded to make it easier for participants to comprehend the questions when asked in Spanish. Also, the script for the training was modified for simplicity and clarity during training. Most participants in the pilot test indicated they felt no changes to the materials were necessary and the content that was covered was adequate. Guttman Split-half method was conducted as a reliability test for the knowledge portion of the post training assessment and determined to be 0.75. As discussed previously, the test is deemed reliable with a number 0.70 of greater.
3.5 Demographic Profile

In this research intervention, a demographic profile of the participants was assembled from the data collected using an eight-question demographic questionnaire (Table 3-3). From the twenty carnicerías experiencing contemplation and used in this intervention, twenty-nine employees were recruited for the intervention (and employees made the decision to participate). Approximately 80.0% of the individuals were male with nearly 40.0% of the men being in each treatment group (37.9% control and 41.4% FTF-trained). Most participants were Dominican (72.4%), followed by Mexican (20.7%), and Puerto Rican (6.9%). Nearly all of the employees lacked education beyond high school, with 27.6% completing high school and 13.8% continuing their education after high school). The mode age was 36-45 years with an age range of 18-65 years. The remaining employees have been working in the retail environment for at least 6 years and in some cases, beyond 20 years. Only 51.7% of the employees who completed this study owned the current carnicería, with the majority (13 of 15 owners) being owners within the last five years. The carnicerías are small with 69.0% of the stores having 2 to 5 deli employees. None of the carnicerías had more than 19 deli employees. Interestingly, all of the carnicerías reported having more than 101 different customers during a week (even with 79 carnicerías in Reading).

Six of the eight demographic questions were examined by Pearson’s Chi-square to assess whether the actual frequency distribution deviates statistically from the theoretical distribution. The results demonstrate that for age, gender, country of origin, education, and number of employees, there was not a significantly different distribution, with statistically equal amounts of employees in each of the categories. However, number of
years working in the retail environment was significantly different in distribution as compared to the expected theoretical distribution of categories. (Tables 3-4, 3-5, 3-6, 3-7, 3-8, and 3-9).

Three of the demographic questions were: evaluated with ANOVA to see if they correlated with knowledge pre-test scores. These demographic characteristics were education, number of years working in retail, and country of origin. Pre-test scores did not differ significantly for any of the three demographic variables (Tables 3-10, 3-11, 3-12).

Table 3.4: Demographic Profile of Participants by Treatment Assignment

<table>
<thead>
<tr>
<th>Demographic characteristics</th>
<th>Control (n=13)</th>
<th>Treatment (n=16)</th>
<th>Total (n=29)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>37.9%(11)</td>
<td>41.4%(12)</td>
<td>79.3%(23)</td>
</tr>
<tr>
<td>Female</td>
<td>6.9% (2)</td>
<td>13.8%(4)</td>
<td>20.7%(6)</td>
</tr>
<tr>
<td></td>
<td><strong>44.8%(13)</strong></td>
<td><strong>55.2%(16)</strong></td>
<td><strong>100.0%(29)</strong></td>
</tr>
<tr>
<td>Country of origin</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dominican</td>
<td>34.5%(10)</td>
<td>37.9%(11)</td>
<td>72.4%(21)</td>
</tr>
<tr>
<td>Mexican</td>
<td>3.5%(1)</td>
<td>17.2%(5)</td>
<td>20.7%(6)</td>
</tr>
<tr>
<td>Puerto Rico</td>
<td>6.9%(2)</td>
<td>0.0%(0)</td>
<td>6.9%(2)</td>
</tr>
<tr>
<td></td>
<td><strong>44.8%(13)</strong></td>
<td><strong>55.2%(16)</strong></td>
<td><strong>100.0%(29)</strong></td>
</tr>
<tr>
<td>Years of school completed</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8th grade or less</td>
<td>17.2%(5)</td>
<td>6.9%(2)</td>
<td>24.1%(7)</td>
</tr>
<tr>
<td>Some high school</td>
<td>20.7%(6)</td>
<td>13.8%(4)</td>
<td>34.5%(10)</td>
</tr>
<tr>
<td>High School</td>
<td>3.5%(1)</td>
<td>24.1%(7)</td>
<td>27.6%(8)</td>
</tr>
<tr>
<td>Some college</td>
<td>3.5%(1)</td>
<td>10.3%(3)</td>
<td>13.8%(4)</td>
</tr>
<tr>
<td>Bachelors degree</td>
<td>0.0%(0)</td>
<td>0.0%(0)</td>
<td>0.0%(0)</td>
</tr>
<tr>
<td></td>
<td><strong>44.8%(13)</strong></td>
<td><strong>55.2%(16)</strong></td>
<td><strong>100.0%(29)</strong></td>
</tr>
<tr>
<td>Age in years</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>18-25</td>
<td>6.9%(2)</td>
<td>10.3%(3)</td>
<td>17.2%(5)</td>
</tr>
<tr>
<td>26-35</td>
<td>6.9%(2)</td>
<td>13.8%(4)</td>
<td>20.7%(6)</td>
</tr>
<tr>
<td>36-45</td>
<td>20.7%(6)</td>
<td>17.2%(5)</td>
<td>37.9%(11)</td>
</tr>
<tr>
<td>46-55</td>
<td>6.9%(2)</td>
<td>6.9%(2)</td>
<td>13.8%(4)</td>
</tr>
<tr>
<td>56-65</td>
<td>3.5%(1)</td>
<td>6.9%(2)</td>
<td>10.4%(3)</td>
</tr>
</tbody>
</table>
Table 3.5: Distribution of Age of Participants

<table>
<thead>
<tr>
<th>Age</th>
<th>18-25 years</th>
<th>26-35 years</th>
<th>36-45 years</th>
<th>46-55 years</th>
<th>56-65 years</th>
<th>Chi-Square</th>
<th>df</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>65 and over</td>
<td>0.0%(0)</td>
<td>0.0%(0)</td>
<td>0.0%(0)</td>
<td>44.8%(13)</td>
<td>55.2%(16)</td>
<td>100.0%(29)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Years worked with food in a retail setting**

<table>
<thead>
<tr>
<th>Age</th>
<th>0 (do not own)</th>
<th>2-5</th>
<th>6-10</th>
<th>11-19</th>
<th>20+</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 (do not own)</td>
<td>3.5%(1)</td>
<td>20.7%(6)</td>
<td>24.1%(7)</td>
<td>6.9%(2)</td>
<td>17.2%(5)</td>
</tr>
<tr>
<td>2-5</td>
<td>6.9%(2)</td>
<td>20.7%(6)</td>
<td>27.6%(8)</td>
<td>6.9%(2)</td>
<td>3.5%(1)</td>
</tr>
<tr>
<td>6-10</td>
<td>10.3%(3)</td>
<td>3.5%(1)</td>
<td>13.8%(4)</td>
<td>3.5%(1)</td>
<td>0.0%(0)</td>
</tr>
<tr>
<td>11-19</td>
<td>6.9%(2)</td>
<td>6.9%(2)</td>
<td>13.8%(4)</td>
<td>3.5%(1)</td>
<td>3.5%(1)</td>
</tr>
<tr>
<td>20+</td>
<td>17.2%(5)</td>
<td>3.5%(1)</td>
<td>20.7%(6)</td>
<td>3.5%(1)</td>
<td>0.0%(0)</td>
</tr>
</tbody>
</table>

**Years owning this store**

<table>
<thead>
<tr>
<th>Age</th>
<th>0-1</th>
<th>2-5</th>
<th>6-10</th>
<th>11-19</th>
<th>20+</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-1</td>
<td>0.0%(0)</td>
<td>20.7%(6)</td>
<td>20.7%(6)</td>
<td>0.0%(0)</td>
<td>0.0%(0)</td>
</tr>
<tr>
<td>2-5</td>
<td>20.7%(6)</td>
<td>3.5%(1)</td>
<td>24.1%(7)</td>
<td>3.5%(1)</td>
<td>0.0%(0)</td>
</tr>
<tr>
<td>6-10</td>
<td>0.0%(0)</td>
<td>0.0%(0)</td>
<td>0.0%(0)</td>
<td>3.5%(1)</td>
<td>0.0%(0)</td>
</tr>
<tr>
<td>11-19</td>
<td>0.0%(0)</td>
<td>3.5%(1)</td>
<td>3.5%(1)</td>
<td>3.5%(1)</td>
<td>0.0%(0)</td>
</tr>
<tr>
<td>20+</td>
<td>3.5%(1)</td>
<td>0.0%(0)</td>
<td>3.5%(1)</td>
<td>0.0%(0)</td>
<td>0.0%(0)</td>
</tr>
</tbody>
</table>

**Number of employees at this store; part-time or fulltime**

<table>
<thead>
<tr>
<th>Age</th>
<th>0-1</th>
<th>2-5</th>
<th>6-10</th>
<th>11-19</th>
<th>20+</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-1</td>
<td>3.5%(1)</td>
<td>0.0%(0)</td>
<td>3.5%(1)</td>
<td>0.0%(0)</td>
<td>0.0%(0)</td>
</tr>
<tr>
<td>2-5</td>
<td>24.1%(7)</td>
<td>44.8%(13)</td>
<td>69.0%(20)</td>
<td>6.9%(2)</td>
<td>0.0%(0)</td>
</tr>
<tr>
<td>6-10</td>
<td>17.2%(5)</td>
<td>3.5%(1)</td>
<td>20.7%(6)</td>
<td>0.0%(0)</td>
<td>0.0%(0)</td>
</tr>
<tr>
<td>11-19</td>
<td>0.0%(0)</td>
<td>6.9%(2)</td>
<td>6.9%(2)</td>
<td>0.0%(0)</td>
<td>0.0%(0)</td>
</tr>
<tr>
<td>20+</td>
<td>0.0%(0)</td>
<td>0.0%(0)</td>
<td>0.0%(0)</td>
<td>0.0%(0)</td>
<td>0.0%(0)</td>
</tr>
</tbody>
</table>

**Number of different customers per week**

<table>
<thead>
<tr>
<th>Age</th>
<th>0-25</th>
<th>26-50</th>
<th>51-75</th>
<th>76-100</th>
<th>101+</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-25</td>
<td>0.0%(0)</td>
<td>0.0%(0)</td>
<td>0.0%(0)</td>
<td>0.0%(0)</td>
<td>0.0%(0)</td>
</tr>
<tr>
<td>26-50</td>
<td>0.0%(0)</td>
<td>0.0%(0)</td>
<td>0.0%(0)</td>
<td>0.0%(0)</td>
<td>0.0%(0)</td>
</tr>
<tr>
<td>51-75</td>
<td>0.0%(0)</td>
<td>0.0%(0)</td>
<td>0.0%(0)</td>
<td>0.0%(0)</td>
<td>0.0%(0)</td>
</tr>
<tr>
<td>76-100</td>
<td>0.0%(0)</td>
<td>0.0%(0)</td>
<td>0.0%(0)</td>
<td>0.0%(0)</td>
<td>0.0%(0)</td>
</tr>
<tr>
<td>101+</td>
<td>44.8%(13)</td>
<td>55.2%(16)</td>
<td>100.0%(29)</td>
<td>44.8%(13)</td>
<td>55.2%(16)</td>
</tr>
</tbody>
</table>

Chi-square Test Results (n=29)

<table>
<thead>
<tr>
<th>Age</th>
<th>18-25 years</th>
<th>26-35 years</th>
<th>36-45 years</th>
<th>46-55 years</th>
<th>56-65 years</th>
<th>Chi-Square</th>
<th>df</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>17.2%</td>
<td>20.6%</td>
<td>37.9%</td>
<td>14.0%</td>
<td>10.3%</td>
<td>1.0</td>
<td>4</td>
<td>0.91</td>
</tr>
</tbody>
</table>
Table 3.6: Distribution of Gender of Participants

<table>
<thead>
<tr>
<th>Gender</th>
<th>Male</th>
<th>Female</th>
<th>Chi-Square</th>
<th>df</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>76.0%</td>
<td>24.0%</td>
<td>0.99</td>
<td>1</td>
<td>0.32</td>
</tr>
</tbody>
</table>

Table 3.7: Distribution of Country of Origin of Participants

<table>
<thead>
<tr>
<th>Country of origin</th>
<th>Dominican</th>
<th>Mexican</th>
<th>Puerto Rican</th>
<th>Chi-Square</th>
<th>df</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>72.4%</td>
<td>20.7%</td>
<td>6.9%</td>
<td>4.45</td>
<td>2</td>
<td>0.11</td>
</tr>
</tbody>
</table>

Table 3.8: Distribution of Educational Background of Participants

<table>
<thead>
<tr>
<th>Educational background</th>
<th>8th grade or less</th>
<th>Some High School</th>
<th>High School</th>
<th>Some college</th>
<th>Chi-Square</th>
<th>df</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>24.1%</td>
<td>34.5%</td>
<td>27.6%</td>
<td>13.8%</td>
<td>7.0</td>
<td>3</td>
<td>0.07</td>
</tr>
</tbody>
</table>

Table 3.9: Distribution of Years Working with Food of Participants

<table>
<thead>
<tr>
<th>Years working with food</th>
<th>0-1 years</th>
<th>2-5 years</th>
<th>6-10 years</th>
<th>11-19 years</th>
<th>20+ years</th>
<th>Chi-Square</th>
<th>df</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>24.1%</td>
<td>27.6%</td>
<td>13.8%</td>
<td>13.8%</td>
<td>20.7%</td>
<td>11.5</td>
<td>4</td>
<td>0.02*</td>
</tr>
</tbody>
</table>
Table 3.10: Distribution of Number of Employees of Participants

<table>
<thead>
<tr>
<th>Number of employees</th>
<th>0-1</th>
<th>2-5</th>
<th>6-10</th>
<th>11-19</th>
<th>Chi-Square</th>
<th>df</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>3.4%</td>
<td>69.0%</td>
<td>20.7%</td>
<td>6.9%</td>
<td>7.2</td>
<td>3</td>
<td>0.07</td>
</tr>
</tbody>
</table>

3.6 Knowledge Assessment

The means of pre-test scores from both treatment groups (control and FTF-trained) were calculated and were determined to be 0.7 and 0.6 respectively. The means of post-test scores were 0.6 and 4.3, respectively, for treatment groups. Finally, the means of delayed post-test were 0.7 and 4.5, respectively, for treatment groups. The one-way ANOVA results indicate the pre-test scores were not significantly different between the two treatments groups (control and FTF-trained). However, there was a significant difference between pre-test to post-test scores and pre-test to delayed post-test scores when evaluated between the two treatment groups. This observation is explained by the knowledge gained in the FTF-trained group, as compared to the control group (by the paired sample t-test results). Guttman Split-half method was conducted to test the reliability of the five knowledge questions for pre-test, post-test and delayed post-test. The knowledge reliability coefficient was determined to be 0.9 for post-test and 0.9 for delayed post-test; the test is considered reliable at 0.7 or greater. A Levene’s test was completed and determined to be 0.02, meaning there is unequal variances. Unequal variances, post-hoc analysis using Games-Howell were used, and did not indicate any differences. ANCOVA tests indicate a significant difference in the post-test and delayed
post-test scores, when controlling for pre-test scores (using adjusted means for baseline knowledge) (Table 3-13).

Table 3.11: Knowledge Results by Country of Participant (n=29)

<table>
<thead>
<tr>
<th>Country of Participant</th>
<th>N</th>
<th>Pre-test Mean</th>
<th>SD</th>
<th>df</th>
<th>F1</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dominican Republic</td>
<td>21</td>
<td>0.6</td>
<td>0.7</td>
<td>1</td>
<td>1.7</td>
<td>0.21</td>
</tr>
<tr>
<td>Mexican</td>
<td>6</td>
<td>0.8</td>
<td>0.8</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Puerto Rican</td>
<td>2</td>
<td>1.0</td>
<td>0.0</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 3.12: Knowledge Results by Education Level of Participants (n=29)

<table>
<thead>
<tr>
<th>Education Level</th>
<th>N</th>
<th>Pre-test Mean</th>
<th>SD</th>
<th>df</th>
<th>F1</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>8th grade or less</td>
<td>7</td>
<td>0.7</td>
<td>0.8</td>
<td>1</td>
<td>0.6</td>
<td>0.64</td>
</tr>
<tr>
<td>Some high school</td>
<td>10</td>
<td>0.7</td>
<td>0.4</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>High school</td>
<td>8</td>
<td>0.4</td>
<td>0.5</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Some college</td>
<td>4</td>
<td>1.3</td>
<td>0.9</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 3.13: Knowledge Results by Years Working with Food of Participant (n=29)

<table>
<thead>
<tr>
<th>Years Working with Food of Participant</th>
<th>N</th>
<th>Pre-test Mean</th>
<th>SD</th>
<th>df</th>
<th>F1</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-1 Years</td>
<td>7</td>
<td>0.6</td>
<td>0.8</td>
<td>1</td>
<td>1.5</td>
<td>0.25</td>
</tr>
<tr>
<td>2-5 Years</td>
<td>7</td>
<td>0.6</td>
<td>0.8</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6-10 Years</td>
<td>4</td>
<td>0.3</td>
<td>0.50</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>11-19 Years</td>
<td>4</td>
<td>1.3</td>
<td>0.50</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>20+ Years</td>
<td>7</td>
<td>0.9</td>
<td>0.4</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Table 3.14: ANCOVA Test Results for Knowledge Assessment (n=20)

<table>
<thead>
<tr>
<th></th>
<th>Control</th>
<th>FTF-trained</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N</td>
<td>SD</td>
</tr>
<tr>
<td>Pre-test</td>
<td>1</td>
<td>0.5</td>
</tr>
<tr>
<td>Post-test</td>
<td>1</td>
<td>0.7</td>
</tr>
<tr>
<td>Delayed Post-test</td>
<td>1</td>
<td>0.5</td>
</tr>
</tbody>
</table>

*Significant at 0.05 level

3.7 Attitude Assessment

For the five attitude questions, the carnicerías were averaged and grouped by treatment (FTF-trained or control). Each question was analyzed separately by Kruskal-Wallis to determine if a significant difference existed by treatment. This test was used since data were analyzed as ordinal non-parametric data. Five statements were given: I believe sanitizers will reduce contamination regardless of when applied to food contact surfaces; I believe proper sanitation can prevent illness in local deli’s (or our deli); I feel it is important for food safety to hand wash thoroughly before putting on gloves; I feel it is important for food safety to make a fresh sanitizing solution every-day; I believe it is critical for food safety to store raw meat separately from cheese. For these statements the possible responses were attached to a numerical response: Strongly Disagree (1), Disagree (2) Neutral (3), Agree (4), Strongly Agree (5).

Most of the questions were not found to be statistically significant, with only question three in the post-test demonstrating statistical significance compared to the
control group. In addition, Cronbach’s alpha reliability testing was completed to
determine reliability score for attitude. The reliability of the attitude evaluation
assessment was determined to be 0.7 for post-test and 0.8 for delayed post-test (if
question 1 was eliminated it would also have a reliability of 0.7 and 0.8 for the post-test
and delayed post-test, respectively.

3.8 Behavioral Assessment

The five behavioral questions were analyzed separately with a Wilcoxon-ranked
test to determine if statistically significant differences existed between treatment groups
(FTF-trained and control). The data were treated as ordinal non-parametric data. Little
significant difference was found; question #4 in the post-test and delayed post-test was
an exception and was found to be significant. All other data were found not to be
significantly different, as compared to the control group. However, numerical
differences exist when comparing the sum of the ten stores’ responses between control
and treatment groups for each behavioral question (employees scores were averaged if
they were employed in the same store; 10 responses to each question). The highest score
possible is 40 (4 X 10). Figures 3-1 through 3-5 were developed to demonstrate changes
in treatment groups summed behavioral scores for the pre-test, post-test and delayed
post-test for each of the five questions. For this section, a question was asked (When
working with food, how often do you wash your hands after completing the following
activities?) and five different scenarios were presented (Handling cash; After a meal;
Going to the bathroom; Touching your face; After handling raw meat). The responses
for each of the scenarios were: hardly ever, sometimes, often and always, respectively.
In addition, reliability testing was completed by Cronbach’s alpha, and it was
determined that the summated behavioral assessment was not reliable.

**Figure 3.2: Behavioral Question 1; Pre-test, Post-test and Delayed Post-test Score Comparison**

**Figure 3.3: Behavioral Question 2; Pre-test, Post-test and Delayed Post-test Score Comparison**
Figure 3.4: Behavioral Question 3; Pre-test, Post-test and Delayed Post-test Score Comparison

Figure 3.5: Behavioral Question 4; Pre-test, Post-test and Delayed Post-test Score Comparison
Figure 3.6: Behavioral Question 5; Pre-test, Post-test and Delayed Post-test Score Comparison

3.9 Skill Assessment- Hand washing

Hand washing was the skill that was assessed; included were five steps that must be completed in the correct order. The five steps were wetting hands, applying soap, lathering for 10 sec, rinsing and drying with a paper towel. If these steps were not completed, completed incorrectly, or were not completed in the correct order, the participant received a zero score for that step. If the step was completed correctly, in the correct order, then the participant received a score of one for that step. Total possible points totaled five, which equals perfect hand washing. The means of pre-test scores from both treatment groups (control and FTF-trained) were calculated and determined to be 2.9 and 2.9, respectively. The means of post-test scores were 2.9 and 5.0, respectively, for control and FTF trained groups. Finally, the means of delayed
post-test scores were 2.8 and 5.0, respectively, for control and FTF-trained groups. The one-way ANOVA results demonstrated the pre-test scores were not significantly different between the two treatments groups. However, there was a significant difference between both pre-test to post-test scores and pre-test to delayed post-test scores between the two treatment groups. This observation is explained by the skill gained in the treatment group, compared to the control group, as demonstrated by the paired sample t-test results. Cronbach’s alpha reliability test was completed for skill items 1-5 (wetting hands, applying soap, lathering for 10 sec, rinsing and drying with a paper towel, in that order). The reliability for the skill was determined to be 0.65 for post-test and 0.8 for delayed post-test. The test is considered to be reliable with a score of 0.7 or higher. However, Sax (1997) indicates that in a first generation test it is acceptable to be below 0.7 and 0.5-0.6 is fairly common. Levene’s test results indicated there was unequal variance (p=0.01). Unequal variances post-hoc analysis using Games-Howell was used. Lastly, the ANCOVA tests indicated that there was a significant difference in the post-test and delayed post-test scores, when controlling for pre-test scores (using adjusted means for baseline skill) (Table 3-14).
Table 3.14: ANCOVA test results for Skill Assessment (N=20)

<table>
<thead>
<tr>
<th></th>
<th>Control</th>
<th>FTF-trained</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N</td>
<td>SD</td>
</tr>
<tr>
<td>Pre-test</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Post-test</td>
<td>10</td>
<td>1.3</td>
</tr>
<tr>
<td>Delayed Post-</td>
<td></td>
<td></td>
</tr>
<tr>
<td>test</td>
<td>10</td>
<td>1.3</td>
</tr>
</tbody>
</table>

*Significant at 0.05 level

3.10 Six Month Follow-up (2\textsuperscript{nd} Round of Observations)

At the 6 month assessment, all areas had improvement in the behaviors listed in Table 3.15, except hand washing before waiting on the customer. At the time of the assessment, it was observed that 50% of the carnicerías that participated in the training intervention were pre-slicing all of their products in the morning to prevent cross contamination during busy hours of the day. Therefore, the product was already bagged and employees did not have to handle the product, thereby explaining the lack of hand washing before waiting on the customer. The observers witnessed efforts being made to follow appropriate food safety training procedures, including proper glove use and use of sanitizers. Some of the stores no longer sold raw meat; this observation was most likely to reduce the risk involved with handling this product. Observers asked some stores with pre-sliced meat to slice them fresh ham and the employees responded, “…that the slicer needed to be cleaned and sanitized and they should come back later, since it was a busy time of day.” Finally, one store the manager asked one of his employees to handle the ready-to-eat meat since he was, “really busy.”
employee disputed, “But I don’t have gloves on and I am handling cash!” From these observations, it is clear that the training intervention had an impact on the participants. While food safety improvements are still needed with this audience, these observations indicate that the training was a promising start.

Table 3.15: Results of the Second Round of Concealed-Direct Observations Used to Determine Post-intervention Behaviors

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Personal Hygiene</th>
<th>Sanitation/ Cross-Contamination</th>
<th>Hand Washing</th>
</tr>
</thead>
<tbody>
<tr>
<td>Percent compliance or non-compliance</td>
<td>50% Employees wearing hairnets or hats</td>
<td>38% Employees using gloves properly</td>
<td>0% Employees washing hands before waiting on customers</td>
</tr>
<tr>
<td></td>
<td>88% Employees not wearing jewelry</td>
<td>88% Employees with clean slicers</td>
<td>63% Stores with operational hand washing stations</td>
</tr>
<tr>
<td></td>
<td>100% Employees not eating or chewing gum</td>
<td>100% Employees with clean display cases *</td>
<td>63% Stores with hand washing stations and paper towels</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>75% Stores with hand washing stations and soap</td>
</tr>
</tbody>
</table>

Thirty-one participants took the pre-test in its entirety. There was good retention in this small sample with only two individuals dropping out of the study. Both of these employees came from the control group, making the two treatment groups unequal in
total employees, but equal in number of carnicerías. Both employees completed the pre-test; when the researchers returned to complete the post-test and delayed post-test, the employees were no longer working at the carnicería. Therefore, twenty-nine individuals completed the study, originating from twenty different carnicerías (ten in each treatment group). The two individual’s scores that were incomplete (only completing the pre-test) were removed from the results to be consistent throughout the analyses.
4 Discussion

A training intervention was developed for employees of Hispanic delicatessens (also known as carnicerías). The training intervention was designed to teach four basic tenets of food safety to a Spanish speaking, illiterate audience. The intervention was accomplished using a “table-top/counter-top training” that reinforced concepts using photographs and oral instruction. Using the Transtheoretical Model as a guide, a training group was selected, along with a control group.

A summative evaluation method was used throughout the project, as compared to a formative evaluation method, as summative evaluation allowed the researchers to adapt their methodology based on the challenges that arose during the project (Trochim 2006). The design was a continual process throughout the development and dissemination of intervention as well as after the intervention was completed (Trochim 2006). This approach allowed the researchers to continually adjust for unexpected occurrences, such as an unwillingness to complete the demographic survey. This issue was mitigated by the addition of a monetary (ex. gift card) incentive. A combination of evaluation methods was used to gather information, both qualitative and quantitative. Data collection was based off these initial results. During the recruitment phase of the program, mystery shopping or concealed-direct observation (qualitative method) was implemented to observe current food safety-related behaviors. The workers were surveyed using a combination of interview and survey techniques because most participants are illiterate (quantitative method) and to determine areas of emphasis during the testing and training phases. The questions in the survey were worded to
determine if contemplation about changing food safety practices occurred. This approach is important because the Transtheoretical Model (TM) is based upon the subject wanting to change. An Evaluability Assessment (EA) was used as part of this project. EA is a systematic process that helps identify whether program evaluation is justified, feasible, and likely to provide useful information (JJEC 2003). The EA not only demonstrates whether a program can be evaluated meaningfully, but also whether conducting the evaluation is likely to contribute to improved program performance and management (JJEC 2003). An evaluator needs to answer important questions about a program before a process and/or outcome evaluation occurs (JJEC 2003). An EA has five crucial tasks that an evaluator must successfully complete (JJEC 2003):

Study the program design: does the program have a model that lays out its goals and objectives? See Table 4-1.

**Table 4.1: Logic Model: Spanish Language Food Safety Intervention**

<table>
<thead>
<tr>
<th>Audience</th>
<th>Inputs</th>
<th>Outputs</th>
<th>Outcomes</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Activities</td>
<td>Participation</td>
</tr>
<tr>
<td>Enhancing food safety practices, and skills at carnicerias in Reading, Pennsylvania</td>
<td>Guiding Principles: This intervention will help ensure proactive, preventative food safety measures</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Workers at carnicerías</td>
<td>Time (Research about location)</td>
<td>Initiate needs assessments</td>
<td>29 workers and managers</td>
</tr>
<tr>
<td>------------------------</td>
<td>--------------------------------</td>
<td>---------------------------</td>
<td>------------------------</td>
</tr>
<tr>
<td></td>
<td>Mystery shopping (needs assessments)</td>
<td>Take pre-test (to determine baseline)</td>
<td>Primary investigator and translator</td>
</tr>
<tr>
<td></td>
<td>Investigator time (with translator, if necessary)</td>
<td>Initiate intervention</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Trans-theoretical model</td>
<td>Take post-test</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Penn State training certificate upon completion</td>
<td>Take delayed post-test</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Minimal incentive (gift card)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Managers at carnicerías**

<table>
<thead>
<tr>
<th>Time (Research about location)</th>
<th>Initiate needs assessments</th>
<th>Take pre-test (to determine baseline)</th>
<th>Primary investigator and translator</th>
<th>Test measured marked improvement in baseline scores</th>
<th>Delayed post-test also demonstrated marked improvement</th>
<th>Workers can take their new skills to new jobs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mystery shopping (needs assessments)</td>
<td>Take delayed post-test</td>
<td>Initiate intervention</td>
<td></td>
<td>Many workers showed gratitude upon receipt of the intervention</td>
<td>Upon receipt of gift card, recipients mentioned how they can use the gift card to buy cleaning supplies and other items because of what was learned in the intervention</td>
<td>Workers can retain jobs better</td>
</tr>
<tr>
<td>Investigator time (with translator, if necessary)</td>
<td></td>
<td></td>
<td></td>
<td>Observations indicated carnicerías were following the guidelines of the training and behavior was changed positively</td>
<td></td>
<td>Pride upon receiving PSU certificate</td>
</tr>
<tr>
<td>Trans-theoretical model</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Managers can better train new employees</td>
</tr>
<tr>
<td>Penn State training certificate upon completion</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Managers can maintain a safe working environment, and prevent recall lawsuit or shutdown</td>
</tr>
<tr>
<td>Minimal incentive (gift card)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Environment**

**Carnicería workers/managers**: Currently, establishments are not required to have any food safety training. Many locations are unregistered with the state. Participants are uneducated about many food safety practices.

**Reading, PA consumers**: Primarily Hispanic, generally unaware about the food safety issues at carnicerías.

**Local health inspector**: Generally disregards carnicerías; - needs a way to help train the workers.
• Task 2. Watch the program in action: Is the program working? Can it be improved?

There were a number of indicators that helped the researchers gain confidence that the program was having an impact and leading to positive outcomes. Such indicators were observed during the post-test and delayed post-test time period only in the FTF-trained group. An indicator is the first evidence that the program is working (Gajda and Jewis 2004). Some indicators in the current study included the participants purchasing soap, paper towels, gloves, and disinfecting solutions at a carnicería where training occurred. The trained employees had prepared disinfections solutions in labeled spray bottles ready for use. Also, meat display cases were reorganized with boards separating ready-to-eat and raw products and the cases had a cleaner appearance in the carnicería where training occurred. The clean appearance also was true for the meat slicers. In addition, researchers observed employees hand washing before preparing sandwiches for other customers in the store and using gloves during the sandwich preparation that did not appear to be reused. It is possible these observations occurred while the researchers were present in the store and may not have been a consistent practice. This observation was not evaluated formally either. Lastly, researchers observed the hand washing sinks were free of dirty dishes and were being used for hand washing, instead of the all-purpose sink. One objective of this study was to improve knowledge scores of the FTF-trained group, which reflected positively on the employees’ behavior. The researchers also observed small behavioral changes, meaning the indicators were in agreement with the objectives of the intervention.
• Task 3. Determine the program’s capacity for data collection analysis: Can the program collect sufficient data?

Based on procedures and results, the program was able to collect sufficient data. A comprehensive review of available data narrowed the whole of Eastern Pennsylvania to the city of Reading. Inclusion criteria for the study were: employees needed to be over the age of 18, Spanish speaking; the carnicería needed to have a meat slicer and a meat display case; some carnicerías were excluded if stores did not have operating refrigeration and/or meat slicers. The FTF-trained group demonstrated capacity for change. A pre-test to measure baseline knowledge two benefits (Jayaratne 2010). If any participant leaves as an aspired individual, he or she can be considered as a potential candidate for behavior or practice change (Jayaratne 2010).

• Task 5. Demonstrate why an evaluation will or will not help the program and its stakeholders: Are the participants learning from the program?

The educational intervention appeared to be well received by workers at all the carnicerías. Employees seemed to embrace the material beyond the knowledge aspect given to them. For example, employees included in the FTF-trained group were offered gift cards as an incentive to participate in the training. Upon receipt of the gift card (after the intervention), most participants told the investigators that they bought food safety supplies (or similar). It was expected that the provision of knowledge and skills may have affected the belief system and influenced behavioral intent, although beliefs were not measured. When developing food safety training programs and methods for those working in the food processing industry, it is necessary to consider the characteristics of
the target audience. There can be a wide variety of educational backgrounds, experience, and need. There are limited employees working at the carnicerías. As such, the training must be convenient so the employees can continually wait on customers during the training and while at their workstation. In this intervention, the researchers made an effort to control threats of internal and external validity to the intervention. Limiting internal threat was initiated by randomly assigning employees/carnicerías to treatment groups (control and FTF-training). Nevertheless, additional threats to the intervention continue to exist; especially since there were limited carnicerías that were able to be included in this study. This approach can lead to selection and FTF-trained mortality of participants. These threats are a concern since the control group was not equal in number of employees to the FTF-trained group. These threats were minimized by averaging employees at each carnicería and conducting the statistical analysis on the carnicerías, not the employees. One threat to this study was the background of employees. Many of the employees came from different environments, locations and social upbringings, including education and experience working with retail deli meats (ranging from inexperienced to over a decade of experience). Demographic questions were designed to target these differences and statistical analyses were conducted to ensure the differences were not significant. The researchers justified the employees’ background as a threat since none of the employees had previous food safety training. All individuals were operating under the same city laws and are all inspected by the same health inspector of Reading. The researchers also attempted to control the threat of testing in this intervention. A minimum of two weeks between all tests was employed to reduce the recall ability of employees during testing. The pre-test, post-test, delayed post-test
design was used to determine if testing was a threat. The control did not demonstrate a significant improvement in post-test or delayed post-test scores, therefore lessening the threat of testing. Statistical data analysis also may have been a threat since a ceiling effect was observed in both the attitude and the behavioral questions; the pre-test scores were already high, leaving little room for improvement. The ceiling effect could be attributed to socially acceptable answers on the pre-test for both treatment groups.

Another concern is that the pre-test, post-tests were designed to be brief, to encourage participation. Therefore, only five questions for each section of the test (knowledge, attitude, behavior and skill) were administered. Another possible threat is implementation of the training since the same researchers that gave the training also gave the pre-test, post-test and delayed post-test. However, this approach also could be construed as limiting the implementation threat since the training was consistently delivered in the same way throughout the study. The same observer, who also delivered the program, conducted all the observations, and might have affected worker behavior. However to minimize this issue, a helper accompanied the observer during the visits, ensuring proper procedure (Nieto-Montenegro 2006). Statistically, bias was refuted because control scores were not significantly different throughout the assessments. The pre-test was given to all twenty carnicerías before the treatment groups were chosen, and the treatment groups were not significantly different at baseline values. There also might have been a conflict of interest with respect to the translator: The translator/primary observer is a proprietor of a consultant business that assists with the safety training of Hispanic workers, primarily in the mushroom industry. The USDA (2009) says that Extension systems should avoid a conflict of interest at all costs, as it could possibly
deter trust in the system. This conflict of interest was minimized due to several factors, the research involved a different industry (retail delicatessens) and history (the translator was a graduate of The Pennsylvania State University).

The major external validity threat is generalizability. This issue is a concern since the city of Reading did not require previous food safety training. As such, the results can be generalized to the population in Reading and not to other cities across the United States.

An additional threat to the study is sample size. Although the sample size is low for most interventions, the city of Reading has a total of sixty-five carnicerías, with twenty carnicerías participating in the study. In this case, 30% represents a minimal sampling of the total number of carnicerías.

The lack of training for the control group also could be a confounding variable since the employees may have felt undervalued, leading to lower scores on the post-test and delayed post-test. Since most carnicerías did not know they were being treated differently than other stores and the statistics do not demonstrate an increase or decrease in post-test or delayed post-test scores, (as compared to the pre-test), this observation is unlikely. Conversely, the researchers attempted to control internal and external threats, though a copious number of confounding variables including small sample size and researchers’ bias may have manipulated the results of this intervention. It is also important to note that ANCOVA assumes low measurement of error of the covariate (i.e. reliability of 0.80 or greater) and assumes equal variance (Garson 2002). Therefore, caution should be used when evaluating ANCOVA results since this study violates these assumptions.
It was decided that no training would be used for the control group since this approach is the standard of control currently being practiced in the city of Reading. Analysis using ANCOVA for knowledge and skill indicated a significant difference in post-test and delayed post-test scores when controlling for the pre-test scores. When comparing pre-test scores, it was determined the FTF-trained group and the control group were not significantly different in knowledge or skill results. When working with humans, employee turnover is a major concern, due to various work-related stresses, such as being over-worked or under-paid (CDC 2008). This issue is especially true when trying to complete an intervention. In the intervention, both managers and general employees were included in the study as long as they met the other inclusion criteria. This observation is equally confounding in both treatment groups (control and FTF-trained group) since the number of managers was equal, with seven managers in each group. The food safety training was completed by the same instructor verbally in Spanish for all training sessions, including the pilot test and training of the control group. In addition, all assessments (pre-test, post-test and delayed post-test) were completed verbally by the same instructor in Spanish. This approach was done to increase consistency and reliability by minimizing external validity bias. There were four different food safety assessments; knowledge, attitude, behavior, and skills. The FTF-training intervention attempted to positively influence these four assessments. Demographic characteristics were not equal in both treatment groups and there was a concern if these characteristics were influencing the knowledge scores. Therefore, knowledge scores were compared with certain notable demographic characteristics using ANOVA. It was determined that education, number of years working in retail, and
country of origin (evaluated because of different dialects in Spanish) did not have a significant impact on the knowledge scores.

### TABLE 4.2: Education levels: mean pre-test scores

<table>
<thead>
<tr>
<th>Education level</th>
<th>8th grade or less</th>
<th>Some high school</th>
<th>High school</th>
<th>Some college</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>0.67 ± 0.76</td>
<td>0.70 ± 0.41</td>
<td>0.38 ± 0.52</td>
<td>1.25 ± 0.96</td>
</tr>
</tbody>
</table>

These findings were a concern since the FTF-trained group was slightly more educated than the control group. However, there were more employees in the FTF-trained group, allowing for higher numbers of educated individuals. On the other hand, the control group had more experience working in retail than the FTF-trained group, thereby explaining why this characteristic was chosen for further evaluation.

### TABLE 4.3: Experience working with food: mean pre-test scores

<table>
<thead>
<tr>
<th>Experience working with food</th>
<th>0-1 years</th>
<th>2-5 years</th>
<th>6-10 years</th>
<th>11-19 years</th>
<th>20 + years</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>0.57 ± 0.79</td>
<td>0.57 ± 0.79</td>
<td>0.25 ± 0.50</td>
<td>1.25 ± 0.50</td>
<td>0.86 ± 0.38</td>
</tr>
</tbody>
</table>

Statistical results demonstrated that there was a significant gain in knowledge by the FTF-trained group and a significant improvement in ability to perform a food safety-related skill correctly. The control group used in the study did not receive any training, thereby allowing the researchers to attribute all improvement in scores, from all assessments, to the FTF-trained method. The knowledge gained for the FTF-trained group for the post-test was 3.70 ± 0.78. For the delayed post-test, scores were 3.85 ±
0.76, which were greater than the pre-test scores. The control group did not show any improvement in knowledge post-test or delayed post-test when compared to the pre-test. A one-way ANOVA revealed the difference between treatment groups was significant. The knowledge part of the assessments was determined to be reliable, with a score greater than 0.70 (Appendix X). The improvement scores in attitude were not significant between treatment groups (FTF-trained and control) for the Kruskal-Wallis test. However, Question 3 exhibited the difference between treatment groups for post-test.

One explanation for the majority of the questions not exhibiting a significant difference could be limited room for improvement since most participants scored relatively high on the pre-test, and a ceiling effect was observed. The attitude portion of the assessments was determined to be reliable, having a score of greater than 0.70 (It was also 0.70 only if question #1 was eliminated) (Appendix X).

A similar effect was observed with behavior, except that the observation was not found to be statistically significant for either treatment group. This observation may be due to socially accepted responses. When surveying individuals about hand washing, statistics demonstrated that nearly 100% of people say they wash their hands after going to the bathroom. However, when researchers observed people, only about 85% of them actually washed their hands after using the restroom (ASM 2010). It is believed a similar response was found in this study. This observation is especially noticeable with behavioral question three: “How often do you wash your hands after using the bathroom,” where all participants said “Always.” It is possible the number is reported higher since the questions were asked verbally and participants answered with the socially acceptable responses. Since behavioral results were not found to be reliable or
significant, a figure was made for each behavioral question (1-5) in order to demonstrate the slight improvement of post-test and delayed post-test scores for FTF-trained, in comparison to the control group. Little improvement was observed for scores since participants scored high on the pre-test, resulting in a ceiling effect. Finally, the skill improvement scores are noteworthy. The FTF-trained group demonstrated an improvement of $2.15 \pm 0.00$ for the post-test and $2.15 \pm 0.00$ delayed post-test, as compared to the pre-test. The control scores did vary but ultimately did not show improvement in performing a skill, as compared to pre-test. The skill part of the assessments was determined to be reliable, having a score of greater than 0.70 (Appendix X).

Null Hypotheses

1. The FTF-trained group will not show a significant increase in knowledge and skills scores, as compared to the control group.

2. The intervention group will not show significant improvement in attitude or altered behavior, as compared to the current standard.

The expected outcome is to reject the Null Hypothesis.

Null hypothesis #1 is rejected as the FTF-trained group demonstrated significant increase in knowledge and skill scores when compared to the control. However, due to ceiling effect and socially acceptable answers, we failed to reject null hypothesis #2. Meaning, there was not a significant improvement in improved attitudes or altered behaviors.
The findings of this current study determined that knowledge retention is difficult to associate with improved attitude and altered behavior. A model was developed by Allport (1935) that linked information with attitudes and behaviors. Allport’s model stated that people first acquire information about a behavior, which leads to development of an attitude, which then leads to a behavior that is in agreement with the attitude. A high correlation for testing any of the points of the model (information versus attitude or attitude versus behavior) would indicate support for the model. Rennie (1995) reports that limited success has been gained from this type of model; more so where there is a low knowledge base of the target group. However, with this particular model, Bettinghaus (1986) suggests that plying an individual with knowledge does not immediately change an attitude or behavior. Bettinghaus (1986) also indicated that while there is a positive correlation for processing information and subsequent change of behavior, it is insignificant. Because of this issue, researchers have increasingly supported more complex models of behavior change, recognizing that multiple factors can affect any of these three indicators (Bettinghaus 1986). One such model is the Transtheoretical Model (TM), developed by Prochaska and DiClemente. This model operates under the assumption that people operate on a continuum of change, and numerous factors (including environment, timing, and beliefs) can affect behavior, good or bad. It was primarily developed for smoking cessation: in the time TM was initially developed, the abundance of literature on the dangers of smoking was not as transparent is it is today. TM proposed that teaching/showing the dangers of smoking could start a
cycle of new behavior (not smoking) that even for a short duration before the old behavior (smoking) resumes, it is possible the cycle could start over in the future.

The assumption of the model is that behavior change is a circular process, not linear. In other words, one does not graduate from one stage to the next, leaving one process for another. Instead, the change process could begin at any stage, with opportunities for regression, suggesting that the entire process could take a very long time (Rimmer and Glanz 2005). One of the reasons for the selection of this model is the fact that motivation and personal change are (according to theorists) linked (Miller, 1999) and that because of this observation, it may be that willingness to change must be internal, so a greater possibility for that change to occur could happen.

What this model did for the study was to identify individuals who truly wanted to change (as indicated by the pre-survey and willingness to participate) and determine if the model worked for those individuals. The key to the model is the launch of an individual into the stages of change; this approach can be accomplished by some type of intervention, which could be as simple as an advertisement, to something more complex, such as a training session. This study used the training intervention to give the participants an opportunity to get into the next level of this circular process, with the intent that once the participants have received this initial training (which could have helped to allay pre-conceived misconceptions, taught new information and showed how to properly do a skill), they would want to continue with these new behaviors. At the very least, if these behaviors do not last a prolonged period of time, it is possible, according to the model, that training lessons could re-enter a participant’s normal routine in the future.
Lown (2007) proclaims that behavior change and new practice realization are a more desired outcome of consumer education programs, than either knowledge acquisition or skill development. The current study did not demonstrate statistically significant attitude or behavior changes. Numerous other studies have attempted to turn the effect of training into a positive behavior or attitude change. Fabrigar and others (2006) attempted to understand the effect of knowledge on attitude and behavior consistency. They concluded that the amount of knowledge gain was less important than the complexity of the knowledge gain, which was more likely to lead to enhanced attitude-behavior consistency.

The current study attempted to influence specific food safety behaviors and skills in a retail delicatessen setting. After determining which behaviors/skills were of importance, a training intervention was developed and disseminated. The intervention was designed to give the most amount of information in a few specific areas of food safety. Guion and Free (2010) developed a conceptual framework, based primarily on the TM (as well as the Diffusion of Innovation Theory and Ecological Systems Theory, with evaluation of the model by Targeting Outcomes of Programs model), to assist with the delivery of a financial education program.

To begin the process of changing behaviors, the authors suggested a creation of awareness (primarily through advertising), to begin the pre-contemplation stage, which would lead to the contemplation stage. The authors also indicated their work could be translated to different research disciplines, including food safety. Chapman and others (2010) staged an intervention designed to create awareness of food safety issues for food handlers using “infosheets;” while improvements in important tenets of food safety (such
as hand washing or cross-contamination) were found, significant improvements or elimination of risky behaviors were not seen.

In a study (on environmental degradation presented at the 2007 Northeastern Recreation Research Symposium) conducted by Graefe and Vogelsong (2007), the authors concluded that while knowledge can be a “precursor” to behavior change, it does not necessarily mean that behavior will change. The study also demonstrated a significant, positive relationship between knowledge gain and change in behavior. However, the study also demonstrated that changes in behavior were “nonexistent to moderate,” while knowledge gains on the issues studied were “moderate to considerable.” The results of this study were somewhat biased, as they were self-reported and a limited sample size was attained from a magazine subscription.

Brossard and others (2005) conducted research on an informal science education project and whether or not it had a positive effect on attitude change. This “citizen science project” was based on The Birdhouse Network (TBN) of the Cornell Laboratory of Ornithology. The researchers describe a “citizen science project” as a public-professional partnership that can give individuals the opportunity to interact and participate in scientific research. The results of the study indicated that while there was some knowledge gained on the subject, no statistically significant attitude changes occurred because of the project. A study (funded through Microfinance Opportunities, a non-profit agency) was conducted by Gray and others (2009) in Bolivia and Sri Lanka to determine if financial literacy could change money management behavior. The study suggested that when financial education is developed with input of the participants, it could not only improve knowledge in that particular area, but also can positively
influence altered behaviors. The study also suggested that the opportunity to put the newfound knowledge into practice can help immediately with the development of more effective, positive behaviors. The current food safety intervention was completed with input from the carnicerías’ owners and was able to be used by them immediately upon completion of the study. Upon receipt of a monetary gift card, the participants indicated that they would the funds to buy proper cleaning supplies or sanitary items (like rubber gloves) to assist with their newfound knowledge and learned skills.

The second round of concealed direct observations (6-months after training) showed that the training intervention had some impact on its participants. The new observation team followed the same methodology that was used to obtain needs assessment data. The responses of the participants (Section 3.10) displayed the lessons of the program. That being said, while improvements were made, more is needed until Table 3.15 is at 100% compliance. A limitation of this second round of observations would be that it is possible that the participants recognized they were being observed and thus changed their behaviors according to what they were taught as being correct.

Another limitation of the current study was the model used to develop the intervention. The Transtheoretical Model immediately eliminated any individual in the pre-contemplation stage (those who did not see a need for change). This approach directly led to a much larger limitation, which was the sample size. Also contributing to the limited sample size was the participation of a number of stores. There were owners who did not see the value in the intervention, or they thought that the researchers were there to close (shutdown) their business. Another limitation of the study was retention,
since 7% (2 out of 31) of the participants dropped out; though the two who dropped out were in the control group).

Literacy was also a limitation of the study, as the entire intervention had to be designed to address this issue. As such, the training intervention utilized a picture-based flipchart with oral instruction in Spanish to reinforce the message of the food safety training.

The results of this study have limited generalizability to the total population since the criterion-based sample selected was in the contemplation stage, while where the rest of the population remains in the pre-contemplation stage. For example, if the city (Reading) required food safety training or a larger awareness step occurred, such as people in the community becoming ill from a food linked to a carnicería, then it is possible the rest of the population would enter the contemplation stage; therefore allowing the results be more generalizable. The ability to extend the study results to other cities or towns in Pennsylvania is defined as ecological generalizability (Fraenkel and Wallen 2003). This situation is difficult since Reading, PA is unique in that there was no previous food safety training offered or required in this city. All food establishments in other cities across Pennsylvania are required to undergo food safety training; therefore, the outcome could be extremely different.
5 Conclusions

One should not generalize the results from this study since certain internal and external threats exist (See Chapter 4). In the current study, some of the limitations of the experiment included use of the TM as the backbone of the intervention model. TM limited the already small sample size further as it excluded individuals not thinking about changing their respective food safety behavior. Combined with the initial mistrust or misunderstanding of the merits of the food safety intervention (as many owners of carnicerías did not wish to participate in the study), this issue led to reduction in the sample size. Another limitation of the experiment was that literacy, while not formally measured, affected the entire design of the intervention. Most individuals could not read their own language, much less English. To accommodate this issue, a picture-based, table-top/counter-top training guide, with oral teaching support, was designed and delivered. Although behavior or attitude results demonstrated no significant change, there were several promising aspects of the intervention. While many participants were illiterate and only spoke Spanish, the training program did successfully increase knowledge and teach proper food safety skills, indicating an intervention can be created for nearly any audience. The increased knowledge and improved food safety skill should benefit directly the citizens who use the carnicerías on a daily basis, in part because of the decreased risk of foodborne illness that results from the increased knowledge (declarative knowledge; there was not any significant change in procedural knowledge), and more importantly, following proper procedures within the delicatessen atmosphere. While there is no current food safety training in Reading, PA, there is the possibility of
having it in the future; the current intervention could provide a foundation for future success. At the very least, the intervention created awareness in nearly 30% of Reading’s carnicerías, and using the guidelines of the TM, this approach allowed the participants to enter the contemplation stage.
6 Recommendations

There are a number of recommendations for future research in the area of food safety training for Spanish-speaking employees working in retail deli stores. It would have been beneficial to complete the “stage of change” survey on all employees used in the study and not just the managers. This approach would allow for all participants to be engaged in learning and improve their food safety knowledge and skills. This approach also may increase retention.

It is difficult to observe differences in attitudes and behavior pre and post-test, primarily due to socially acceptable answers on attitude and behavioral questions. However, it is easier to observe differences in knowledge via pre-test and post-test assessments. Also, since behavior and attitude do not always correlate with knowledge, it would be useful to measure more skills or complete direct observations as part of a post-assessment intervention. An alternative method would be completing retrospective interviews to determine what changes the carnicería managers or employees have made in order to improve food safety practices in the establishments. This approach could determine if the employees are putting their increased knowledge and skills into action. It also would be a better evaluation method of behaviors.

To reduce the likelihood of a threat, due to a ceiling effect from pre-test to post-test to delayed post-test, the difficulty of the questions/material could be increased throughout the testing. It would be ideal to complete the pilot test on a larger sample size (~20 employees) to ensure that questions are well worded and that the training pertains to the work/concerns of employees working at the carnicerías. It would be
best if employees would complete all evaluation tools. The scores on the tools could be used to better calculate the reliability of the test items and determine which items, if any, need to be eliminated or modified.

Additionally, a larger sample size would be ideal. The current study was limited in this regard. This approach could be done by working in a city where the local health inspector is willing to adopt food safety training for the local stores under his/her supervision. This approach would help with buy-in within the community and prevent issues with turnover or mortality throughout the intervention. Another option to increase sample size. To accomplish this task, it may be beneficial to use a different model (to base the training program on) that does not limit the sample size during the recruitment process. Using an incentive from the beginning of the study might be beneficial so more individuals would participate and not decline during recruitment. Additionally, photographs could be taken at actual carnicerías so that they do not appear to be staged.

There are several recommendations for future research, including using a pilot test on a larger sample, using a different model (as to not limit sample size), and to include more questions on the testing aspect of the intervention. The study, as conducted, did result in a significant increase in food safety knowledge, along with improved food safety skills, with some longer term improvements noted by the second round of observations. One way to ensure that bias was avoided during the study would have been to tape record the translation of the surveys, pre-, post-test, and delayed post-test, and the training, respectively, so every individual would have received the exact same intonation or inflection of the translator’s voice. The tape
could then be reviewed by an independent source to ascertain that data were not skewed by intonations of the voice. As such, the recording could be used by both control and FTF-training groups.

As a measure to improve food safety guidelines within the city of Reading, the following letter has been drafted and will be delivered to the city health inspector:

To Whom It May Concern,

There are approximately eighty carnicerías within the city limits of Reading, Pennsylvania. While not required, these stores are in need of food safety training. As such, these locally-owned stores are at high risk for foodborne illness outbreaks. Additionally, the majority of employees working at these stores are considered low literacy with very little educational background. The limitations with this audience make food safety training difficult to implement.

In 2010, Penn State University conducted a needs assessment and used the information to develop a “counter-top” food safety training program, designed specifically for the employees working at these carnicerías. This training was disseminated to twenty carnicerías in the city. The results demonstrated a significant improvement in food safety knowledge, when compared to the carnicerías that were not trained. The “counter-top” training program is easy-to-use, and can be conducted in the carnicerías with a Spanish-speaking instructor, complete with hands-on training and visual aids.

After completion of the training program, the majority of storeowners requested that we share this training with the city health inspector and these same
individuals also requested copies of the educational materials to train future employees of their establishments.

As the city of Reading considers future food safety training options for Spanish-speaking, food handlers in these establishments, please consider a similar food safety training program as a way to provide employees of these stores with the basic tenets of food safety.

If we can be of additional assistance with regard to the training program and/or research project, please contact Dr. Catherine Cutter via email (cnc3@psu.edu) or phone (814-865-8862).
References


The American Society for Microbiology (ASM). 2010. A survey of handwashing behavior. From:


http://etda.libraries.psu.edu/theses/approved/WorldWideIndex/ETD-1215/index.html


APPENDICES

APPENDIX A. Concealed-Direct Observation Evaluation Sheet

Store Code:______

Date: ________

Exact time: ___________ Time of Day: ________

1. Number of customers in the store?:________

2. Number of workers at site?:________

3. Are employees wearing a hairnet/hat? Yes or No

4. Are employees wearing jewelry? Yes or No

5. Are gloves available? Yes or No
   If yes are employees wearing gloves? Yes or No
   If yes are they reusing them? Yes or No

6. Are employees chewing gum? Yes or No

7. How necessary is cleaning for the slicer?
   1 2 3 4 5

8. How necessary is cleaning of the case/s?
   1 2 3 4 5

9. Are there separate RTE & Raw slicers? Yes or No

10. Is there more than one case in the store? Yes or No

11. Is raw meat stored next to RTE products? Yes or No

12. When waiting on us for RTE product do they hand wash? Yes or No

13. Is there a hand-washing station? Yes or No
   If yes is it in operation? Yes or No
   If yes, are disposable paper towels present at the hand-washing station? Yes or No
If yes, is soap present at the hand-washing station? Yes or No

14. Is there a restroom in the store? Yes or No

15. Is there a computer in the store? Yes or No

16. Are cleaning products present? Yes or No

17. What is the general cleanliness of the store?
   1  2  3  4  5

Key
1 = Very clean, no cleaning necessary
2 = Clean, very little cleaning necessary
3 = Neural, has a normal mess from today’s work
4 = Dirty, should be cleaned
5 = Extremely dirty, cleaning is way over due
APPENDIX B. English Survey Consent Form

Title of Project: Food Safety Training and Certification for Industry and Retail.

Principal Investigator: Dr. Catherine Cutter, 433 Food Science Building, University Park, Pa 16802       (814) 865-8862  cnc3@psu.edu

Other Investigator(s): Angela Richard, 434 Food Science Building, University Park, Pa 16802              (814) 865-7041, aer178@psu.edu

Dr. Sergio Nieto-Monetengro, Hispanic Workforce Management (864)-633-6325, sergio@hispanicworkforvemanagement.com

1. Purpose of the Study:
The purpose of this research is to collect managerial preferences and assess the interest in food safety training for Spanish-speaking employees of retail establishments. There is a statistical need for at least 20 people, with as many as 40 managers participating, in order to account for dropouts.

2. Procedures to be followed:
You will be asked to complete a survey on food safety training preferences of topics and methods of training. This could lead to food safety training for your business at a later date and that would require a new consent form.

3. Benefits:
The benefits to you include customizing a food safety training program to fit your store needs, and hopefully giving a competitive advantage to their business after completing the food safety training program at a later date.

The benefits to society include an overall safer food supply.

4. Duration/Time:
The survey will take no longer than 30 minutes and is six questions. If in the future you plan to participate in the food safety training that will require a new consent form.

5. Statement of Confidentiality:
Your participation in this research is confidential. The data will be aggregated stored and secured at The Pennsylvania State University in a locked or password protected file. Only Dr. Catherine Cutter, Dr. Sergio Nieto-Montenegro, and Angela Richard will have access to the information for the duration of the materials being kept, which is a period of not less than three years, but within five years. In the event of a publication or presentation resulting from the research, no personally identifiable information will be shared. “The Pennsylvania State University’s Office for Research Protections and Institutional Review Board, and the Office for Human Research Protections in the Department of Health and Human Services may review records related to this project.”

6. **Right to Ask Questions:**
   Please contact Dr Catherine Cutter at (814) 865-8862 with questions, complaints or concerns about this research. You can also call this number if you feel this study has harmed you. If you have any questions, concerns, problems about your rights as a research participant or would like to offer input, please contact The Pennsylvania State University’s Office for Research Protections (ORP) at (814) 865-1775. The ORP cannot answer questions about research procedures. Questions about research procedures can be answered by the research team.

7. **Voluntary Participation:**
   Your decision to be in this research is voluntary. You can stop at any time. You do not have to answer any questions you do not want to answer. Refusal to participate or withdrawal from the research will involve no penalty or loss of benefits to participants or affect their employability in anyway.

8. **Incentive:**
   You will be compensated with a $15 Wal-Mart gift card for you participation in this survey.

You must be 18 years of age or older to consent to take part in this research study. Completion of the survey implies your consent to participate in this research. You will be given a copy of this consent form for your records.
APPENDIX C: Spanish Survey Consent Form
Formulario de Consentimiento para Investigación en Ciencias Sociales

The Pennsylvania State University

Título del proyecto: Entrenamiento y certificación en seguridad de los alimentos para la industria alimentaria y los establecimientos de venta al detalle.

Investigador principal: Dr. Catherine Cutter, 433 Food Science Building, University Park, PA 16802
(814)- 865-8862, cnc3@psu.edu

Otros investigadores: Angela Richard, 434 Food Science Building, University Park, PA 16802
(814)-865-7041, aer178@psu.edu

Dr. Sergio Nieto-Montenegro, Hispanic Workforce Management, LLC (864)-633-6325,
sergio@hispanicworkforvemanagement.com

1. **Objetivo del estudio:**
   El objetivo de esta investigación es recopilar información sobre la preferencia de los encargados y evaluar su interés en un entrenamiento sobre la seguridad de los alimentos para los empleados que hablan español en establecimientos de venta al detalle. Existe una necesidad estadística de tener por lo menos 20 personas, y hasta 40 encargados participando, para tomar en cuenta los participantes que no terminen el programa.

2. **Procedimientos a seguirse:**
Se le pedirá que complete una encuesta en cuanto a su preferencia en temas y métodos de entrenamiento en seguridad de los alimentos. Ésto podría llevar a un entrenamiento en seguridad de alimentos para su negocio en una fecha posterior, lo que requerirá de un nuevo formulario de consentimiento.

3. **Beneficios:**
Los beneficios para usted incluyen personalizar su propio entrenamiento en seguridad de los alimentos que se ajuste a las necesidades de su negocio, y seguramente puede ser una ventaja competitiva para su negocio después de completar el entrenamiento en seguridad de alimentos a realizarse en una fecha posterior.

Los beneficios para la sociedad incluyen el suministro de alimentos más seguros.

4. **Duración:**
La encuesta no tomará más de 30 minutos y consiste en seis preguntas. Si en el futuro usted planea participar en el entrenamiento en seguridad de los alimentos, se requerirá de un nuevo formulario de consentimiento.

5. **Declaración de confidencialidad:**
Su participación en este proyecto de investigación es confidencial. Los datos serán almacenados en un lugar seguro en la Universidad Penn State, en un lugar cerrado, o en un archivo protegido que requerirá de una contraseña. Sólo la Doctora Catherine Cutter, el Dr. Sergio Nieto-Montenegro, y Angela Richard tendrán acceso a la información durante el período de tiempo que los materiales se conserven, el cual no será menor a tres años y no mayor a cinco años. En caso de que se escriba una publicación o se haga alguna presentación como resultado de esta investigación, no se compartirá ninguna información personal que pueda identificarlo. “La Oficina para la Protección de la Investigación y el Comité de Revisión Institucional de la Universidad Estatal de Pennsylvania y la Oficina para la Protección de Investigación con Humanos del Departamento de Salud y Servicios Humanos de la universidad podrían revisar los registros relacionados con este proyecto.”
6. **Derecho a hacer preguntas:**
Por favor, póngase en contacto con la Dra. Catherine Cutter al (814) 865-8862 o vía email cnc@psu.edu si tiene preguntas, quejas o preocupaciones relacionadas con esta investigación. También puede llamar a este número si siente que este estudio lo ha perjudicado. Si tiene alguna pregunta, preocupación o problema con respecto a sus derechos como participante en este proyecto de investigación, o si quiere proporcionar comentarios por favor contacte a la Oficina de Protección de Investigación (OPR, por sus siglas en in inglés) de la Universidad Estatal de Pennsylvania al (814) 865-1775. La ORP no puede contestar preguntas sobre los procedimientos de investigación. Las preguntas sobre los procedimientos de investigación pueden ser contestadas por el equipo de investigación.

7. **Participación voluntaria:**
Su decisión de participar en esta investigación es voluntaria. Usted puede detener su participación en cualquier momento y no tiene que responder ninguna pregunta que no quiera responder. Reusarse a participar o retirarse del estudio no involucrará ninguna penalización o pérdida de beneficios que de otra forma recibiría.

8. **Incentivos:**
Si usted elige llenar la encuesta de seis preguntas, usted recibirá una tarjeta de Wal-Mart por un valor de 15 dólares.

Usted debe tener 18 años de edad o más para dar consentimiento de participación en este estudio de investigación. El llenado completo de la encuesta implica su consentimiento para tomar parte en esta investigación.

Se le entregará una copia de este formulario de consentimiento para que la mantenga en sus registros.
APPENDIX D. English Manager Survey Determining Stage of Contemplation

1) Do you think food safety training on the following topics is necessary for your business?
   a) sanitize the meat slicer?
   b) hand washing?
   c) cleaning and sanitizing for meat display case/s?
   d) proper use gloves?

2) What other topics would be useful?

3) What is your preferred method of training?

4) What is your preferred length of Training?

5) What is you preferred language?

6) Once the training is developed do you want to see it so you or your employee’s can be trained?
APPENDIX E. Spanish Manager Survey Determining Stage of Contemplation

1) ¿Usted cree que es necesario para su negocio un entrenamiento de seguridad para alimentos, basado en los siguientes temas?

   a) desinfección de la moledora de carne?

   b) lavado de manos?

   c) limpieza y desinfección del mostrador de carnes?

   d) uso apropiado de los guantes?

2) ¿Qué otros temas serían útiles?

3) ¿Qué método de entrenamiento prefieres?

4) ¿Cuál es la duración de entrenamiento que prefieres?

5) ¿Cuál es tu lenguaje de preferencia?

6) Después de que el entrenamiento esté desarrollado, ¿Le gustaría verlo para que usted o su empleado puedan ser entrenados?
APPENDIX F. English Debriefing Statement for Observations

Hello. We (Angela and Sergio) are from The Pennsylvania State University and are working with small Hispanic carniceria’s in PA to conduct a research project. We have been visiting and shopping at PA stores (carnicería’s) over the last few months and was pretending to be regular customs when we actually were collecting research. We visited each store an average of three times and collected data on common food safety practices such as use of hair nets, rubber gloves, hand-washing and general store cleanliness. By collecting this important research data it will allow the researchers to develop a customized training program for Hispanic stores such as this one. All of the data that was collected is kept safe and for the purpose of giving the option to destroy the research data at anytime. The information will only be used to develop the training program and will not bring any unnecessary risks to you or your business.

We would like to ask you at this time whether you give Penn State permission to use the research data collected or whether you prefer for the research data to be destroyed?

If you allow the researchers to develop the training program with your data we would like to invite you to participate in the customized training program. This food safety training program is developed for Hispanic carniceria’s in PA. The goal of the program is to bring about awareness of food safety and hopefully increase knowledge on good food safety practices. This Penn State research project is funded by USDA. The only inclusion criteria is employee’s over the age of 18 who
communicate in Spanish and work at a carnicería that has a slicer and deli display case. If you have any questions regarding the study please feel free to contact Dr. Catherine Cutter at 814-865-7041.

If they say they are interested in the training program then we will ask them to participate in a six question survey on training topics and preferred format of training. There are no wrong or right answers this is just a matter of personal preference. This information will not be shared with anyone but the researchers and is simply to help develop a training program that fits your business objectives. No identifying information is needed to complete the survey. If you chose to fill out this six question survey you will receive an incentive of $15 Wal-Mart gift card. If you have any questions regarding the study please feel free to contact Dr. Catherine Cutter at 814-865-7041.
APPENDIX G. Spanish Debriefing Statement for Observations

Hola. Nosotras (Ángela y Sergio) somos de la Universidad de Penn State y estamos trabajando con carnicerías pequeñas de Hispanos en PA haciendo un proyecto de investigación. En los últimos meses hemos estado visitando y comprando en tiendas de PA (carnicerías) aparentando ser clientes regulares cuando realmente estábamos recolectando información. Visitamos cada tienda tres veces en promedio y recolectamos datos de las prácticas comunes de seguridad de los alimentos, como el uso de rededillas para el cabello, guantes de látex, lavado de manos y limpieza general de la tienda. La recolección de estos importantes datos permitirá a los investigadores desarrollar un programa de entrenamiento personalizado para tiendas de hispanos como esta. Toda la información recolectada se mantiene segura con el propósito de darle la opción de borrar los datos en cualquier momento. La información será usada solo para desarrollar el programa de entrenamiento y no traerá ningún riesgo innecesario para usted o su negocio.

Nos gustaría preguntarle en este momento si ¿da permiso a Penn State para usar la información recolectada o si prefiere que estos datos sean destruidos?

Si permite a los investigadores desarrollar el programa de entrenamiento con su información, nos gustaría invitarlo a participar en el programa de entrenamiento personalizado. Este programa de entrenamiento de seguridad de los alimentos es desarrollado para carnicerías y tiendas deli de hispanos en PA. El objetivo del programa es generar conciencia sobre la seguridad de los alimentos y esperamos aumentar el conocimiento en buenas prácticas en seguridad de los alimentos. Este
proyecto de investigación de Penn State es financiado por la USDA. Los únicos criterios de inclusión es que el empleado sea mayor de 18 años, se comunique en español y que trabaje en una carnicería que tenga una máquina rebanadora y vitrinas de productos de delicatessen. Si usted tiene alguna pregunta respecto al estudio por favor siéntase en la libertad de contactar a la Dr. Catherine Cutter al número 814-865-7041.

Si ellos están interesados en el entrenamiento, entonces vamos a pedirles que participen en una encuesta de seis preguntas acerca de temas de entrenamiento y el formato que prefieran. No hay respuestas correctas o incorrectas, es asunto de preferencia personal. Esta información no será compartida con nadie excepto los investigadores, y es simplemente para ayudar a desarrollar el programa de entrenamiento que mejor encaje con los objetivos de su negocio. No se necesita información personal para completar la encuesta. Si usted elige llenar la encuesta de seis preguntas, usted recibirá una tarjeta de Wal-Mart por un valor de 15 dólares. Si usted tiene alguna pregunta respecto al estudio por favor siéntase en la libertad de contactar a la Dr. Catherine Cutter al número 814-865-7041.
Free Food Safety Training

The Penn State Food Science Department is excited to offer free food safety training for a food safety research project. This training is offered to small delis/carnicerías for employees that speak Spanish. You must be 18 year of age or older. The deli must have a case and a slicer to qualify. You may have participated in a survey previously. However, this training will also include a pre-test, post-test and delayed post-test assessing knowledge, behavior and attitude, as well as testing a skill. Each set of tests will last approximately 30 minutes and will be given in four separate visits over a nine week period of time. At some point you will receive free food safety training which will last 45 minutes to one hour. There will not be any cost to your business or to your employees. It will be offered in person and the timing is very flexible and it can be completed at your convenience. If you choose to receive the training, it will allow your business to receive a Pennsylvania State University certificate demonstrating that you have completed a food safety program.

This is where we need your help! We are looking for delis/carnicerías that would be willing to participate in this free training. In order to qualify, your business must have Spanish-speaking employees over 18. As well as sell meat products and use a case and meat slicer.

This is a great opportunity for your employees to receive free training for food handlers while also helping us with this important research project. Your participation will help us develop additional programs that will be used in the future.
If you choose to participate you will be compensated $50 for your time at the end of the study.

If you are interested in helping the research team affiliated with The Pennsylvania State University complete this study conducted for research purposes, and want to receive Free training, or have any questions please contact Dr. Catherine Cutter at 814-865-7041 or cnc3@psu.edu. Thank you for your consideration.
APPENDIX I. Spanish Training Recruitment Flyer
Entrenamiento gratuito en seguridad y manejo de alimentos.

El Departamento de Ciencia de los Alimentos de la Universidad Estatal de Pennsylvania (The Pennsylvania State University) se complace en ofrecer un entrenamiento gratuito en seguridad y manejo de los alimentos a carnicerías/delis pequeñas para sus empleados que hablen español. Los participantes deben tener 18 años de edad o ser mayores de 18 años. Para poder calificar, la carnicería/deli debe tener una vitrina de exhibición y una rebanadora. Usted pudo haber participado en una visita donde se llevó a cabo una evaluación de necesidades. Este entrenamiento también incluirá pruebas antes y después del curso para evaluar los conocimientos, comportamientos y actitudes, además de evaluar una habilidad. Cada serie de evaluaciones durará aproximadamente 30 minutos y serán administradas en cuatro visitas separadas dentro de un periodo de tiempo de nueve semanas. En algún momento, usted recibirá entrenamiento gratuito en seguridad de los alimentos, el cual durará entre 45 minutos a una hora. Este curso no tendrá costo alguno para su empresa o empleados. El curso de entrenamiento será ofrecido de forma personal, el horario es muy flexible y puede ser llevado a cabo de acuerdo a su conveniencia. Si usted elige recibir el entrenamiento, su empresa recibirá un certificado de participación otorgado por la Universidad Estatal de Pennsylvania (The Pennsylvania State University) para demostrar que completaron el programa de seguridad de los alimentos.

¡Necesitamos su ayuda! Estamos buscando carnicerías/delis que estén dispuestas a participar en este programa de entrenamiento gratuito. Para poder participar, su establecimiento deberá tener empleados que hablen español y sean mayores de 18
años. Además de vender productos cárnicos y contar con una vitrina de exhibición y una máquina rebanadora.

Esta es una gran oportunidad para que sus empleados reciban entrenamiento gratuito para empleados que manipulan alimentos y a la vez nos ayude en este importante proyecto de investigación. Su participación en esta investigación será usada para desarrollar nuevos programas de entrenamiento en seguridad y manejo de los alimentos. Si decide participar, al final del estudio usted será compensado por su tiempo con $50.

Si está interesado en ayudar a este equipo de investigadores de The Pennsylvania State University a llevar a cabo este proyecto de investigación y desea recibir entrenamiento gratuito, o si tiene alguna pregunta por favor contacte a la Dr. Catherine Cutter al 814-865-7041 o cnc3@psu.edu.

Gracias por su atención.
APPENDIX J: English Demographic Questionnaire

Demographic Questions:

1) Age
   18-25  26-35  36-45  46-55  56-65  66+

2) Education level
   8th grade or less  Some high school  high school  some college  bachelors degree+

3) Country of origin
   USA  Dominica  Puerto Rico  Mexico  Other:______________

4) How many people does this store serve per week?
   0-25  26-50  51-75  76-100  101+

5) How long have you worked with food in a retail setting?
   0-1  2-5  6-10  10-19  20+

6) If store owner: how long have you owned this store?
   0-1  2-5  6-10  10-19  20+

7) Gender  Male or Female

8) How many people work in the deli in this store?
   1  2-5  6-10  10-19  20+
APPENDIX K: Spanish Demographic Questionnaire

Preguntas de información socioeconómica:

9) Edad
   18-25  26-35  36-45  46-55  56-65  66+

10) Escolaridad
   8º grado o menor  preparatoria incompleta  preparatoria universidad incompleta
   licenciatura+

11) País de origen
   EU  Rep. Dominicana  Puerto Rico  México  Otro:______________

12) ¿Aproximadamente a cuántas personas atiende este local semanalmente?
   0-25  26-50  51-75  76-100  101+

13) ¿Cuánto tiempo lleva trabajando con alimentos en un ambiente de venta directa al consumidor?
   0-1  2-5  6-10  10-19  20+

14) Si es el dueño de la tienda: ¿Cuánto tiempo ha sido dueño de este establecimiento?
   0-1  2-5  6-10  10-19  20+

15) Genero:  Masculino  o  femenino

16) ¿Cuántas personas trabajan en el área de carnes frías de esta tienda?
   1  2-5  6-10  10-19  20+
Title of Project: Food Safety Training and Certification for Industry and Retail.

Principal Investigator: Dr. Catherine Cutter, 433 Food Science Building, University Park, Pa 16802 (814)–865-8862 cnc3@psu.edu

Other Investigator(s): Angela Richard, 434 Food Science Building, University Park, Pa 16802 (814)–865-7041, aer178@psu.edu

Dr. Sergio Nieto-Monetengro, Hispanic Workforce Management (864)-633-6325, sergio@hispanicworkforcemangement.com

1. **Purpose of the Study:**
The purpose of this research is to collect demographic data of the employees in this study

2. **Procedures to be followed:**
You will be asked to complete a verbal survey on demographics.

3. **Duration/Time:**
The survey will take no longer than 10 minutes and is eight questions
4. **Statement of Confidentiality:**

   Your participation in this research is confidential. The data will be aggregated stored and secured at *The Pennsylvania State University* in a **locked or password protected** file. Only Dr. Catherine Cutter, Dr. Sergio Nieto-Montenegro, and Angela Richard will have access to the information for the duration of the materials being kept, which is a period of not less than three years, but within five years. In the event of a publication or presentation resulting from the research, no personally identifiable information will be shared. “The Pennsylvania State University’s Office for Research Protections and Institutional Review Board, and the Office for Human Research Protections in the Department of Health and Human Services may review records related to this project.”

5. **Right to Ask Questions:**

   Please contact Dr Catherine Cutter at (814) 865-8862 with questions, complaints or concerns about this research. You can also call this number if you feel this study has harmed you. If you have any questions, concerns, problems about your rights as a research participant or would like to offer input, please contact The Pennsylvania State University’s Office for Research Protections (ORP) at (814) 865-1775. The ORP cannot answer questions about research procedures. Questions about research procedures can be answered by the research team.

6. **Voluntary Participation:**

   Your decision to be in this research is voluntary. You can stop at any time. You do not have to answer any questions you do not want to answer. Refusal to participate or withdrawal from the research will involve no penalty or loss of benefits to participants or affect their employability in anyway.

   You must be 18 years of age or older to consent to take part in this research study. Completion of the survey implies your consent to participate in this research. You will be given a copy of this consent form for your records.
APPENDIX M: Spanish Consent Demographic Questionnaire
Formulario de Consentimiento para Investigación en Ciencias Sociales
La Universidad del Estado de Pennsylvania

Título del proyecto: Entrenamiento y certificación en seguridad de los alimentos para la industria alimentaria y los establecimientos de venta al detalle.

Investigador principal: Dr. Catherine Cutter, 433 Food Science Building, University Park, PA 16802
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Otros investigadores: Angela Richard, 434 Food Science Building, University Park, PA 16802
(814)-865-7041, aer178@psu.edu

Dr. Sergio Nieto-Montenegro, Hispanic Workforce Management, LLC (864)-633-6325,
sergio@hispanicworkforvemanagement.com

1. Objetivo del estudio: El objetivo de esta investigación es recopilar información demográfica acerca de los empleados en este estudio.

2. Procedimientos a seguirse: Se les pedirá que complete una encuesta verbal en base a lo demográfico.

3. Duración: La encuesta no tomará más de 10 minutos y consiste en 8 preguntas.

4. Declaración de confidencialidad:
Su participación en este proyecto de investigación es confidencial. Los datos serán almacenados en un lugar seguro en la Universidad Penn State, en un lugar cerrado, o en un archivo protegido que requerirá de una contraseña. Sólo la Doctora Catherine Cutter, el Dr. Sergio Nieto-Montenegro, y Angela Richard tendrán acceso a la información durante el período de tiempo que los materiales se conserven, el cual no será menor a tres años y no mayor a cinco años. En caso de que se escriba una publicación o se haga alguna presentación como resultado de esta investigación, no se compartirá ninguna información personal que pueda identificarlo. “La Oficina para la Protección de la Investigación y el Comité de Revisión Institucional de la Universidad Estatal de Pennsylvania y la Oficina para la Protección de Investigación con Humanos del Departamento de Salud y Servicios Humanos de la universidad podrían revisar los registros relacionados con este proyecto.”

5. **Derecho a hacer preguntas:**
Por favor, póngase en contacto con la Dra. Catherine Cutter al (814) 865-8862 o vía email cnc@psu.edu si tiene preguntas, quejas o preocupaciones relacionadas con esta investigación. También puede llamar a este número si siente que este estudio lo ha perjudicado. Si tiene alguna pregunta, preocupación o problema con respecto a sus derechos como participante en este proyecto de investigación, o si quiere proporcionar comentarios por favor contacte a la Oficina de Protección de Investigación (OPR, por sus siglas en inglés) de la Universidad Estatal de Pennsylvania al (814) 865-1775. La ORP no puede contestar preguntas sobre los procedimientos de investigación. Las preguntas sobre los procedimientos de investigación pueden ser contestadas por el equipo de investigación.

6. **Participación voluntaria:**
Su decisión de participar en esta investigación es voluntaria. Usted puede detener su participación en cualquier momento y no tiene que responder ninguna pregunta que no quiera responder. Reusarse a participar o retirarse del estudio no involucrará ninguna penalización o pérdida de beneficios que de otra forma recibiría.

Usted debe tener 18 años de edad o más para dar consentimiento de participación en este estudio de investigación. El llenado completo de la encuesta implica su consentimiento para tomar parte en esta investigación.

Se le entregará una copia de este formulario de consentimiento para que la mantenga en sus registros.
APPENDIX N: English Training Consent
Informed Consent Form for Social Science Research
The Pennsylvania State University

Title of Project: Food Safety Training and Certification for Industry and Retail.

Principal Investigator: Dr. Catherine Cutter, 433 Food Science Building, University Park, Pa 16802 (814)- 865-8862 cnc3@psu.edu

Other Investigator(s): Angela Richard, 434 Food Science Building, University Park, Pa 16802 (814)- 865-7041, aer178@psu.edu

Dr. Sergio Nieto-Monetengro, Hispanic Workforce Management 864-633-6325, sergio@hispanicworkforvemanagement.com

1. **Purpose of the Study:**
   The purpose of this research is to implement a food safety training program and assess food safety knowledge attitudes and behaviors of Spanish-speaking employees of retail establishments. There is a statistical need for at least 40 people, with as many as 50 people participating, in order to account for dropouts.

2. **Procedures to be followed:**
   This training program is nine weeks in length and requires four visits. During this time you will be asked to complete one set of pre-tests, post-tests and delayed post-tests. Each test will be made up of behavior, attitude and knowledge questions, equaling a total of 20 questions or less per visit. Also at each visit you will be asked to perform a basic food safety skill. Lastly, you may or may not get a food safety training in-between the tests. However, you will be trained in food safety sometime during the nine week period.

   **Discomforts and Risks:** There are no risks in participating in this research beyond those experienced in everyday life. However, some of the questions are personal and might cause discomfort.

3. **Benefits:** The benefits to you include training in food safety customized to your current job and daily tasks, which will give your company a competitive advantage.
The benefits to society include an overall safer food supply.

4. **Duration/Time:**
The pre-test, post-test and delayed post-test including testing a skill will not exceed 30 minutes for each and will be given on different three different visits. The training will be given on a separate visit and will take 45 minutes to 1 hour depending on the amount of employee’s trained and interruptions due to sales. There will be a total of four visits equaling a total of two hours and thirty minutes of the employee’s time over a nine weeks.

**Statement of Confidentiality:** Your participation in this research is confidential. The data will be aggregated stored and secured at The Pennsylvania State University in a locked or password protected file. Only Dr. Catherine Cutter, Dr. Sergio Nieto-Montenegro, and Angela Richard will have access to the information for the duration of the materials being kept, which is a period of not less than three years, but within five years. In the event of a publication or presentation resulting from the research, no personally identifiable information will be shared. “The Pennsylvania State University’s Office for Research Protections and Institutional Review Board, and the Office for Human Research Protections in the Department of Health and Human Services may review records related to this project.”

**Right to Ask Questions:** Please contact Dr Catherine Cutter at (814) 865-8862 with questions, complaints or concerns about this research. You can also call this number if you feel this study has harmed you. If you have any questions, concerns, problems about your rights as a research participant or would like to offer input, please contact The Pennsylvania State University’s Office for Research Protections (ORP) at (814) 865-1775. The ORP cannot answer questions about research procedures. Questions about research procedures can be answered by the research team.

5. **Voluntary Participation:** Your decision to be in this research is voluntary. You can stop at any time. You do not have to answer any questions you do not want to answer. Refusal to take part in or withdrawing from this study will involve no penalty or loss of benefits you would receive otherwise.

6. **Incentive:**
You will be compensated with a $70 Wal-Mart gift card for you participation in this intervention at the end of the study.

You must be 18 years of age or older to consent to take part in this research study. If you agree to take part in this research study and the information outlined above, please sign your name and indicate the date below.

You will be given a copy of this consent form for your records.
APPENDIX O: Spanish Training Consent Form

Formulario de consentimiento para la investigación en ciencias sociales

The Pennsylvania State University

Título del proyecto: Entrenamiento y certificación en seguridad de los alimentos para la industria y venta de alimentos al detalle

Investigador principal: Dr. Catherine Cutter, 433 Food Science Building, University Park, PA 16802 (814)- 865-8862 cnc3@psu.edu

Otros investigadores: Angela Richard, 434 Food Science Building, University Park, PA 16802 (814)- 865-7041, aer178@psu.edu

Dr. Sergio Nieto-Monetengro, Hispanic Workforce Management, LLC 864-633-6325, sergio@hispanicworkforvemanagement.com

1. **Objetivo del estudio:**
   El objetivo de esta investigación es implementar un programa de entrenamiento en seguridad de los alimentos y evaluar el conocimiento, actitudes y comportamientos relacionados con seguridad de los alimentos de los empleados que hablan español en los establecimientos de venta de alimentos al detalle. Existe una necesidad estadística de tener por lo menos 40 personas y hasta 50 personas participando, ésto para tomar en cuenta los participantes que no terminen el programa.

2. **Procedimiento a seguir:**
   Este programa tiene una duración de 9 semanas y requiere 4 visitas. Durante este tiempo se le pedirá que complete una serie de evaluaciones antes y después del entrenamiento. Cada evaluación en cada una de las visitas consistirá de un total de 20 preguntas o menos, las preguntas serán sobre comportamiento, actitud y conocimientos. Además en cada visita se le pedirá que demuestre alguna habilidad de seguridad de los alimentos. Por último es posible que participe o no en un entrenamiento de seguridad de los alimentos entre cada una de las evaluaciones. Sin embargo, usted sí será entrenado en seguridad de los alimentos en algún momento durante el periodo de nueve semanas.
**Incomodidades y riesgos:** No existen riesgos al participar en este proyecto de investigación más allá de los que existen en la vida cotidiana. Sin embargo, algunas de las preguntas son personales y podrían causarle incomodidad.

3. **Beneficios:** Los beneficios para usted incluyen un entrenamiento en seguridad de los alimentos personalizado para las actividades de su trabajo actual y las tareas diarias que desempeña, lo cual le dará a su compañía una ventaja competitiva. Los beneficios para la sociedad incluyen una fuente de alimentos más segura.

4. **Duración/Tiempo:**
Las evaluaciones antes y después del entrenamiento, incluyendo la prueba de habilidad no durarán más de 30 minutos cada una y se llevarán a cabo en tres visitas diferentes. El entrenamiento se llevará acabo en una visita separada y tomará de 45 minutos a 1 hora dependiendo de la cantidad de empleados que son entrenados e interrupciones debido a las ventas. Habrá un total de cuatro visitas, lo que equivale a un total de dos horas y treinta minutos de tiempo del empleado durante un periodo de nueve semanas.

**Confidencialidad:** Su participación en este estudio es confidencial. La información será recolectada, almacenada y asegurada en la *Universidad Estatal de Pennsylvania* (*The Pennsylvania State University*) en un archivo cerrado o protegido mediante clave. Únicamente la Dr. Catherine Cutter, el Dr. Sergio Nieto-Montenegro, y Angela Richard tendrán acceso a la información durante el tiempo que el material sea guardado, el cual será un periodo no menor a tres años pero no mayor a cinco años. En el caso que alguna publicación o presentación resulte de esta investigación, no se compartirá ninguna información personal que pueda identificarlo. “La Oficina para la Protección de la Investigación y el Comité de Revisión Institucional de la Universidad Estatal de Pennsylvania y la Oficina para la Protección de Investigación con Humanos del Departamento de Salud y Servicios Humanos de la universidad podrían revisar los registros relacionados con este proyecto.”

**Derecho a hacer preguntas:** Por favor contacte a la Dr Catherine Cutter al (814) 865-8862 si tiene preguntas, quejas o preocupaciones sobre este proyecto de investigación. También puede llamar a este número si siente que este estudio lo ha perjudicado. Si tiene alguna pregunta, preocupación o problema con respecto a sus derechos como participante de este proyecto de investigación o si quiere proporcionar comentarios por favor contacte a la Oficina de Protección de Investigación (OPR, por sus siglas en in inglés) de la Universidad Estatal de Pennsylvania al (814) 865-1775. La ORP no puede contestar preguntas sobre los procedimientos de investigación. Las preguntas sobre los procedimientos de investigación pueden ser contestadas por el equipo de investigación.

5. **Participación voluntaria:** Su decisión de participar en este proyecto de investigación es voluntaria. Usted puede detener su participación en cualquier momento. Además no tiene que contestar cualquier pregunta que no desee contestar. Reusarse a participar o retirarse...
del estudio no involucrará ninguna penalización o pérdida de beneficios que de otra forma recibiría.

6. **Incentivos:**
   Al final del estudio, usted será compensado con una tarjeta de regalo de Wal-Mart con un valor de $70 por su participación en esta intervención.

Debe de tener 18 años o más para consentir formar parte en este proyecto de investigación. Si está de acuerdo en tomar parte en este proyecto de investigación y con la información mencionada anteriormente por favor firme su nombre e indique la fecha en la sección de abajo.

Usted recibirá una copia de este formulario de consentimiento para que lo mantenga en sus registros.

__________________________________________  ______________________
Firma del participante                      Fecha

__________________________________________  ______________________
Persona que obtiene el consentimiento de participación  Fecha
APPENDIX P: Training Lesson 1 (See hard copy)

APPENDIX Q: Training Lesson 2 (See hard copy)
APPENDIX R: English Certificate

CERTIFICATE OF ATTENDANCE

Penn State University hereby declares that

completed a
Food Safety Training Course for Deli Stores/Carnicerias

on
August 16, 2010

Sergio Nieto-Montenegro, Ph.D.
Instructor

Catherine N. Cutter, Ph.D.
Associate Professor
Department of Food Science
Penn State University
APPENDIX S: English Pre-test

Knowledge Questions

1. How many steps are involved in the proper cleaning and sanitizing of a food contact surface?
   a. 2
   b. 3
   c. 4
   d. 5
   e. I do not know

2. How much time is allowed between cleaning and sanitizing of a slicer when used to slice the same ready-to-eat product?
   a. None you should clean the slicer every time you work with a new ready-to-eat product
   b. Every hour
   c. Every four hours
   d. Once per day
   e. I do not know

3. How long should you vigorously wash your hands with soap and water?
   a. 10 sec
   b. 15 sec
   c. 20 sec
   d. 30 sec
   e. I do not know

4. How long can you use your gloves while working with a ready-to-eat product before you must change gloves?
   a. You must change your gloves every time you work with a new ready-to-eat product
   b. Every hour
   c. Every four hours
   d. Once per day
   e. I do not know

5. What is the proper amount of chlorine to add to a gallon of water based on a 200 ppm concentration?
a. One teaspoon
b. One tablespoon
c. Two tablespoons
d. ½ teaspoon
e. I do not know

Attitude Questions

*To what extent do you agree or disagree with each of the following statements*

<table>
<thead>
<tr>
<th>Statement</th>
<th>Strongly Disagree</th>
<th>Disagree</th>
<th>Neutral</th>
<th>Agree</th>
<th>Strongly Agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>1) I believe sanitizers will reduce contamination regardless of when applied to food contact surfaces.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>2) I believe proper sanitation can prevent illness in local deli’s (or our deli).</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3) I feel it is important for food safety to hand wash thoroughly before putting on gloves.</td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>4) I feel it is important for food safety to make a fresh sanitizing solution every-day.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5) I believe it is critical for food safety to store raw meat separately from cheese.</td>
<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
</tbody>
</table>

Behavioral Questions

When working with food, how often do you wash your hands after completing the following activities? Circle one answer in each row.

1) Handling cash
   - HARDLY EVER
   - SOMETIMES
   - OFTEN
   - ALWAYS

2) After eating a meal
   - HARDLY EVER
   - SOMETIMES
   - OFTEN
   - ALWAYS
3) Going to the bathroom
   ALWAYS
   HARDLY EVER     SOMETIMES     OFTEN

4) Touching your face
   ALWAYS
   HARDLY EVER     SOMETIMES     OFTEN

5) After handling raw meat
   ALWAYS
   HARDLY EVER     SOMETIMES     OFTEN

**Measuring Skill (to be evaluated by the instructor)**

Steps:
- Pre-rinse
- Wash/Clean
- Rinse
- Sanitize

<table>
<thead>
<tr>
<th>STEPS</th>
<th>Pre-test</th>
<th>Post-test</th>
<th>Delayed Post-test</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre-rinse</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wash/Clean</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rinse</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sanitize</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

1=Completed correctly (Score=1)
2= Not in correct order but completed (Score=0)
3= Not completed (Score=0)
APPENDIX T: Spanish Pre-test

**Preguntas de conocimiento**

1. ¿Cuántos pasos están involucrados en la limpieza y desinfección adecuadas de una superficie de contacto con los alimentos?
   - f. 2
   - g. 3
   - h. 4
   - i. 5
   - j. No lo sé

2. ¿Cuánto es el tiempo que se puede dejar entre la limpieza y desinfección de una rebanadora cuando ésta es utilizada para rebanar el mismo producto alimenticio listo para el consumo?
   - f. Nada, la rebanadora se debe limpiar cada vez que se trabaja con un nuevo producto alimenticio listo para el consumo
   - g. Cada hora
   - h. Cada cuatro horas
   - i. Una vez al día
   - j. No lo sé

3. ¿Durante cuánto tiempo debe lavarse las manos vigorosamente con agua y jabón?
   - f. 10 segundos
   - g. 15 segundos
   - h. 20 segundos
   - i. 30 segundos
   - j. No lo sé

4. ¿Cuánto tiempo puede utilizar los guantes mientras trabaja con un producto listo para el consumo antes de que tenga que cambiarlos por otros nuevos?
   - f. Debe cambiarse los guantes cada vez que trabaje con un nuevo producto listo para el consumo
   - g. Cada hora
   - h. Cada cuatro horas
   - i. Una vez al día
   - j. No lo sé

5. ¿Cuál es la cantidad adecuada de cloro que se le debe agregar a un galón de agua para obtener una concentración de 200 ppm?
   - f. Una cucharadita o cucharada cafetera
   - g. Una cucharada sopera
h. Dos cucharadas soperas  
  i. ½ cucharadita o cucharada cafetera  
  j. No lo sé  

**Preguntas de actitudes**

*Hasta que grado está de acuerdo o en desacuerdo con las siguientes expresiones.*

<table>
<thead>
<tr>
<th>Expresión</th>
<th>Muy en desacuerdo</th>
<th>En desacuerdo</th>
<th>Neutral/Indeciso</th>
<th>De acuerdo</th>
<th>Muy acuerdo</th>
</tr>
</thead>
<tbody>
<tr>
<td>1)</td>
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<td></td>
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<tr>
<td>2)</td>
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<td>3)</td>
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<td>5)</td>
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</tbody>
</table>

6) Creo que los desinfectantes reducirán la contaminación sin importar cuándo son aplicados a las superficies en contacto con los alimentos. _______

7) Creo que una desinfección o saneamiento adecuado en este (nuestro) deli/carnicería puede prevenir enfermedades. _______

8) Siento que lavarse bien las manos antes de ponerse los guantes es importante para la seguridad de los alimentos. _______

9) Pienso que preparar una solución desinfectante fresca a diario es importante para la seguridad de los alimentos. _______

10) Creo que guardar la carne cruda separada del queso es crítico para la seguridad de alimentos. _______

**Preguntas de comportamientos**

Cuando trabaja con alimentos ¿qué tan seguido se lava las manos después de completar alguna de las siguientes actividades? Marque con un círculo alrededor de una respuesta en cada fila.

6) Manejar dinero
CASI NUNCA  A VEces  MUY SEGUIDO
SIEMPRE

7) Después de comer
CASI NUNCA  A VEces  MUY SEGUIDO
SIEMPRE

8) Ir al baño
CASI NUNCA  A VEces  MUY SEGUIDO
SIEMPRE
9) Tocarse la cara
    CASI NUNCA    A VECES    MUY
    SEGUIDO      SIEMPRE

10) Manipular carne cruda
    CASI NUNCA    A VECES    MUY
    SEGUIDO      SIEMPRE

Medición de habilidad (Para ser evaluado por el instructor)

Pasos:

Pre-enujagado
Lavado/Limpiado
Enjuagado
Desinfectado

<table>
<thead>
<tr>
<th>PASOS</th>
<th>Ante-prueba (pre-test)</th>
<th>Post-prueba (post-test)</th>
<th>Post-prueba retardada (delayed post-test)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre-enujagado</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lavado/Limpiado</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Enjuagado</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Desinfectado</td>
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<td></td>
<td></td>
</tr>
</tbody>
</table>

1=Completado correctamente (Calificación=1)
2= Completado aunque no en el orden correcto (Calificación=0)
3= No fue completado (Calificación=0)
APPENDIX U: English Post-test and Delayed Post-test

Knowledge Questions

1. How many steps are involved in the proper cleaning and sanitizing of a food contact surface?
   k. 2
   l. 3
   m. 4
   n. 5
   o. I do not know

2. How much time is allowed between cleaning and sanitizing of a slicer when used to slice the same ready-to-eat product?
   k. None you should clean the slicer every time you work with a new ready-to-eat product
   l. Every hour
   m. Every four hours
   n. Once per day
   o. I do not know

3. How long should you vigorously wash your hands with soap and water?
   k. 10 sec
   l. 15 sec
   m. 20 sec
   n. 30 sec
   o. I do not know

4. How long can you use your gloves while working with a ready-to-eat product before you must change gloves?
   k. You must change your gloves every time you work with a new ready-to-eat product
   l. Every hour
   m. Every four hours
   n. Once per day
   o. I do not know

5. What is the proper amount of chlorine to add to a gallon of water based on a 200 ppm concentration?
k. One teaspoon
l. One tablespoon
m. Two tablespoons
n. ½ teaspoon
o. I do not know

Attitude Questions

To what extent do you agree or disagree with each of the following statements

<table>
<thead>
<tr>
<th>Statement</th>
<th>Strongly</th>
<th>Disagree</th>
<th>Neutral</th>
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<tbody>
<tr>
<td>11) I believe sanitizers will reduce contamination regardless of</td>
<td></td>
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<td></td>
<td></td>
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<tr>
<td>when applied to food contact surfaces.</td>
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<td></td>
</tr>
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<td>12) I believe proper sanitation can prevent illness in local deli’s (or our deli).</td>
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<td></td>
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<tr>
<td>13) I feel it is important for food safety to hand wash thoroughly</td>
<td></td>
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<tr>
<td>before putting on gloves.</td>
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<td>14) I feel it is important for food safety to make a fresh</td>
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<td></td>
</tr>
<tr>
<td>sanitizing solution every-day.</td>
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<td>15) I believe it is critical for food safety to store raw meat</td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>separately from cheese.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Behavioral Questions

When working with food, how often do you wash your hands after completing the following activities? Circle one answer in each row.

11) Handling cash
   HARDLY EVER   SOMETIMES   OFTEN
   ALWAYS

12) After eating a meal
   HARDLY EVER   SOMETIMES   OFTEN
   ALWAYS
13) Going to the bathroom
   ALWAYS
   HARDLY EVER  SOMETIMES  OFTEN

14) Touching your face
   ALWAYS
   HARDLY EVER  SOMETIMES  OFTEN

15) After handling raw meat
   ALWAYS
   HARDLY EVER  SOMETIMES  OFTEN

**Measuring Skill (to be evaluated by the instructor)**

Steps:

- Pre-rinse
- Wash/Clean
- Rinse
- Sanitize

<table>
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<tr>
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<tr>
<td>Rinse</td>
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<td></td>
</tr>
<tr>
<td>Sanitize</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

1=Completed correctly (Score=1)

2= Not in correct order but completed (Score=0)

3= Not completed (Score=0)

**Additional Question for Post-test and Delayed Post test**

Personal hygiene is important for handling food products. How important is personal hygiene for each of the following issues? Choose only one answer in each row.

**Helping you avoid having spoiled products**

<table>
<thead>
<tr>
<th></th>
<th>NOT</th>
<th>NOT</th>
<th>SOMEWHAT</th>
<th>IMPORTANT</th>
<th>VERY IMPORTANT</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>IMPORTANT</td>
<td>SURE</td>
<td>IMPORTANT</td>
<td>IMPORTANT</td>
<td></td>
</tr>
</tbody>
</table>

**Helping your customers**
<table>
<thead>
<tr>
<th></th>
<th>NOT</th>
<th>NOT</th>
<th>SOMEWHAT</th>
<th>IMPORTANT</th>
<th>VERY IMPORTANT</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Avoid illness</strong></td>
<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td><strong>IMPORTANT</strong></td>
<td>SURE</td>
<td></td>
<td>IMPORTANT</td>
<td>IMPORTANT</td>
<td></td>
</tr>
<tr>
<td><strong>Avoiding contamination of food products</strong></td>
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</tr>
<tr>
<td></td>
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<td>NOT</td>
<td>SOMEWHAT</td>
<td>IMPORTANT</td>
<td>VERY IMPORTANT</td>
</tr>
<tr>
<td></td>
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</tr>
<tr>
<td><strong>IMPORTANT</strong></td>
<td>SURE</td>
<td></td>
<td>IMPORTANT</td>
<td>IMPORTANT</td>
<td></td>
</tr>
<tr>
<td><strong>Helping other workers in our deli avoid illness</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>NOT</td>
<td>NOT</td>
<td>SOMEWHAT</td>
<td>IMPORTANT</td>
<td>VERY IMPORTANT</td>
</tr>
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<tr>
<td><strong>IMPORTANT</strong></td>
<td>SURE</td>
<td></td>
<td>IMPORTANT</td>
<td>IMPORTANT</td>
<td></td>
</tr>
</tbody>
</table>
APPENDIX V: Spanish Post-test and Delayed Post-test

Preguntas de conocimiento

1. ¿Cuántos pasos están involucrados en la limpieza y desinfección adecuadas de una superficie de contacto con los alimentos?
   p. 2
   q. 3
   r. 4
   s. 5
   t. No lo sé

2. ¿Cuánto es el tiempo que se puede dejar entre la limpieza y desinfección de una rebanadora cuando ésta es utilizada para rebanar el mismo producto alimenticio listo para el consumo?
   p. Nada, la rebanadora se debe limpiar cada vez que se trabaja con un nuevo producto alimenticio listo para el consumo
   q. Cada hora
   r. Cada cuatro horas
   s. Una vez al día
   t. No lo sé

3. ¿Durante cuánto tiempo debe lavarse las manos vigorosamente con agua y jabón?
   p. 10 segundos
   q. 15 segundos
   r. 20 segundos
   s. 30 segundos
   t. No lo sé

4. ¿Cuánto tiempo puede utilizar los guantes mientras trabaja con un producto listo para el consumo antes de que tenga que cambiarlos por otros nuevos?
   p. Debe cambiarse los guantes cada vez que trabaje con un nuevo producto listo para el consumo
   q. Cada hora
   r. Cada cuatro horas
   s. Una vez al día
   t. No lo sé

5. ¿Cuál es la cantidad adecuada de cloro que se le debe agregar a un galón de agua para obtener una concentración de 200 ppm?
   p. Una cucharadita o cucharada cafetera
   q. Una cucharada sopera
r. Dos cucharadas soperas  
s. ½ cucharadita o cucharada cafetera  
t. No lo sé

Preguntas de actitudes

_Hasta que grado está de acuerdo o en desacuerdo con las siguientes expresiones._

<table>
<thead>
<tr>
<th>Expresión</th>
<th>Muy en</th>
<th>En desacuerdo</th>
<th>Neutral/Indeciso</th>
<th>De acuerdo</th>
</tr>
</thead>
<tbody>
<tr>
<td>Muy de acuerdo</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>5</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

16) Creo que los desinfectantes reducirán la contaminación sin importar cuándo son aplicados a las superficies en contacto con los alimentos. _______

17) Creo que una desinfección o saneamiento adecuado en este (nuestro) deli/carnicería puede prevenir enfermedades. _______

18) Siento que lavarse bien las manos antes de ponerse los guantes es importante para la seguridad de los alimentos. _______

19) Pienso que preparar una solución desinfectante fresca a diario es importante para la seguridad de los alimentos. _______

20) Creo que guardar la carne cruda separada del queso es crítico para la seguridad de alimentos. _______

Preguntas de comportamientos

_Cuando trabaja con alimentos ¿qué tan seguido se lava las manos después de completar alguna de las siguientes actividades? Marque con un círculo alrededor de una respuesta en cada fila._

16) Manejar dinero       CASI NUNCA    A VEces    MUY SEGUIDO  
   SIEMPRE

17) Después de comer     CASI NUNCA    A VEces    MUY SEGUIDO  
   SIEMPRE

18) Ir al baño           CASI NUNCA    A VEces    MUY SEGUIDO  
   SIEMPRE
19) Tocarse la cara  
CASI NUNCA      A VECES      MUY
SEGUIDO        SIEMPRE

20) Manipular carne cruda  
CASI NUNCA      A VECES      MUY
SEGUIDO        SIEMPRE

Medición de habilidad (Para ser evaluado por el instructor)

Pasos:

- Pre-enjuagado
- Lavado/Limpiado
- Enjuagado
- Desinfectado

<table>
<thead>
<tr>
<th>PASOS</th>
<th>Ante-prueba (pre-test)</th>
<th>Post-prueba (post-test)</th>
<th>Post-prueba retardada (delayed post-test)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre-enjuagado</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lavado/Limpiado</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Enjuagado</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Desinfectado</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

1=Completado correctamente (Calificación=1)

2= Completado aunque no en el orden correcto (Calificación=0)

3= No fue completado (Calificación=0)

Preguntas adicionales para la post-prueba y post prueba retardada

La higiene personal es importante para manejar productos alimenticios. ¿Qué tan importante es la higiene personal para cada una de los siguientes problemas? Elija una sola respuesta en cada fila.

Para ayudarlo a evitar tener productos malogrados

- NO ESTOY      NO ES      POCO      IMPORTANTE
- MUY IMPORTANTE
- SEGURO      IMPORTANTE      IMPORTANTE

Para ayudar a sus clientes a evitar enfermedades

- NO ESTOY      NO ES      POCO      IMPORTANTE
- MUY IMPORTANTE
- SEGURO      IMPORTANTE      IMPORTANTE
Para evitar la contaminación de los alimentos
NO ESTOY NO ES POCO IMPORTANTE
MUY IMPORTANTE
SEGURO IMPORTANTE IMPORTANTE

Para ayudar a otros empleados en nuestro deli/carnicería a que no se enfermen
NO ESTOY NO ES POCO IMPORTANTE
MUY IMPORTANTE
SEGURO IMPORTANTE IMPORTANTE
APPENDIX W: Letter of Review

Dear Ms. Young,

My name is Ursula Lay Ma and I'm a native Spanish Speaker from Peru. I'm a Ph.D. candidate at the Food Science Department and have been a Penn State student for the last 6 years. I'm fluent in both English and Spanish. I have read all the documents submitted in the IRB application "Food Safety Training and Certification for Industry and Retail". I have no relationship with the project and there is no conflict of interest with any of the researchers involved. The documents reviewed were: De-briefing statement, Survey IRB consent form, Training IRB consent form, recruitment for training, and the managerial survey, Pre-test, Post-test and Delayed Post-test, Demographic Questionnaire, Demographic Consent form and the certificate. I can attest that the documents are accurate and well translated into Spanish.

Please do not hesitate to contact me if you have any questions or need a hard copy of this letter.

Sincerely

Ursula Vanesa Lay Ma
Ph.D. Candidate
Department of Food Science
The Pennsylvania State University
402 Food Science Building
University Park, PA 16802
## APPENDIX X: Reliability Analysis of Evaluation Instruments

<table>
<thead>
<tr>
<th></th>
<th>Number of Items</th>
<th>Number of Stores</th>
<th>Post-test Reliability</th>
<th>Delayed Post-test Reliability</th>
</tr>
</thead>
<tbody>
<tr>
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<td>0.9</td>
</tr>
<tr>
<td>Attitude**</td>
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<td>20</td>
<td>0.7</td>
<td>0.8</td>
</tr>
<tr>
<td>Behavior**</td>
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<td>0.6</td>
</tr>
<tr>
<td>Skill*</td>
<td>5</td>
<td>20</td>
<td>0.65</td>
<td>0.8</td>
</tr>
</tbody>
</table>

*Split-half method

**Conbach’s Alpha