

INVESTIGATION OF FOOD ALLERGY TRAINING AND CHILD NUTRITION
PROFESSIONALS' KNOWLEDGE AND ATTITUDES ABOUT FOOD ALLERGIES

by

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B. S., (Honors) Universiti Sains Malaysia, 2004
M.S., Texas Woman's University, 2008

AN ABSTRACT OF A DISSERTATION

submitted in partial fulfillment of the requirements for the degree

DOCTOR OF PHILOSOPHY

Department of Hospitality Management and Dietetics
College of Human Ecology

KANSAS STATE UNIVERSITY
Manhattan, Kansas

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Abstract

Food allergies affect 1 in 25 school-aged children in the U.S., and Child Nutrition Professionals (CNPs) need more vigilance serving them. To assess CNPs' knowledge, attitudes about food allergies including barriers to providing food allergy training, as well as current training practices; an online survey was conducted with randomly selected 1,500 CNPs nationwide. The survey instrument was developed based on focus groups, pilot-tested, and sent to the sample via email. About 24% or 340 CNPs completed the survey. Descriptive and inferential statistics including hierarchical and logistic regressions were calculated using SPSS. A majority of respondents currently provide allergen free meals in their districts (n=256). The mean food allergy knowledge score of CNPs was 31.9 (Standard Deviation=3.3) of 39. Respondents scored lowest on recognizing symptoms of food allergic reactions and understanding food allergen-related terminology. Years of managerial experience and previous food allergy training were positively associated with the knowledge scores. Most participants viewed food allergy as an important issue, but they faced challenges fulfilling last-minute allergen-free meal requests and purchasing allergen-free products. Sixty percent (n=200) did not provide any food allergy training. Of those who provided some sorts of training (n=140), the training was provided in groups (n=96), "one-on-one" basis (n=30), or combination of both methods (n=14). The employees were trained annually (n=76), once a year if they worked directly with the students with food allergies (n=52), and/or when they were newly hired (n=33). Lack of time and funding were barriers to providing food allergy training. Previous food allergic reactions and regulatory requirements served as cues to providing food allergy training. Previous food allergy training, knowledge, and self-efficacy were factors differentiating if food allergy

training had or had not been provided in past 12 months. Systematic and regular food allergy training may be needed to ensure allergen-free meals are properly prepared. Food allergy training for CNPs to improve knowledge and self-efficacy may increase food allergy training at school food service establishments.

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Dedication

To my beloved parents: For their unconditional love and lifetime sacrifices for my education.

To my twin sister, Yee Ling Lee: For her great companionship and support for the past 32 years.

To all the individuals who are concerned about food allergies: For their inspiration.

CHAPTER 1 - INTRODUCTION

Introduction

Through the National School Breakfast Program (SBP) and National School Lunch Program (NSLP), millions of students receive nutritious meals at an affordable price. During 2009–2010, over 31 million students participated daily in the NSLP (U.S. Department of Agriculture [USDA], 2011). Providing allergen-free food to children with food allergies is challenging, as the latest statistics indicate that there are approximately 6 million children under the age of 18 years with food allergies in the U.S. (Gupta et al., 2011) rather than 3 million as previously estimated (Food Allergy and Anaphylaxis Network [FAAN], 2011). Eight percent of children under 18 years have a food allergy, which is a significant increase from the 3.9% reported in 2007 (Branum & Lukacs, 2009). In addition, emergency cares as well as hospitalizations due to food allergic reactions have increased in recent years (Branum & Lukacs, 2008).

The eight major food allergens that account for 90% of food allergic reactions are eggs, fish, milk, peanuts, soy, shellfish, tree nuts, and wheat (FAAN, 2011). Most children with food allergies under the age of 18 are allergic to peanuts (25.2%), milk (21.1%) and shellfish (17.2%) (Gupta et al., 2011). Skin contact, inhalation, or ingestion of food allergens in small amounts could lead to various allergic reactions. In the most severe cases, anaphylactic shock may occur, leading to death. As there is no cure for food allergies, stringent avoidance of the food allergen is the only preventative measure (FAAN). In addition to its life-threatening nature, a food allergy also has both psychological and societal consequences on the affected children. Children with food allergies were reported to have been bullied, mocked or harassed by their peers more frequently than children without food allergies (Leo & Clark, 2007).

School-aged children spend approximately 30 hours per week at school (National Institute of Health [NIH], 2000) and thus receive less direct supervision from their parents. Therefore, the role of schools in providing safe environment to the children with food allergies becomes very important. A study showed that more than 60% of 4,586 children registered with the Peanut and Tree Nut Allergy Registry experienced allergic reactions either at schools or in childcare centers. In addition, 10 out of every 63 fatalities in educational institutions occurred due to food allergic reactions (Munoz-Furlong & Weiss, 2009).

School cafeterias are known as a high-risk zone for children with food allergies because the major allergens such as milk, eggs, and peanut butter are commonly served to the students (Munoz-Furlong, 1996; Pulcini, Marshell, & Naveed, 2011). The main causes of food allergic reactions were food allergens hidden in processed foods and cross contact between the allergen-containing food and non-allergen food (Sicherer, Furlong, DeSimone, & Sampson, 2001). Lack of awareness about food allergies among cafeteria and general staff at schools, and inability to respond promptly when there is an allergic reaction, have led to deadly food allergic reactions at schools (Yunginger, Squillace, Richard, Jones, & Helm, 1989). There are other factors that limit the capability of school food services to provide allergen-free food. For example, schools may not have adequate infrastructures and facilities (i.e. separate dining area) to accommodate the individual needs of students with food allergies. In addition, vendors may not adhere to the food allergen restrictions on food procured from them for the school. The school food service management may not provide adequate food allergy training to the employees (Houle, Leo, & Clerk, 2010).

Schools nationwide have implemented different strategies to prevent food allergic reactions from occurring. Among these strategies are declaring “peanut-free zones”, restricting

students from bringing allergen-containing foods to school, designating particular sites in the school as “allergen awareness areas”, and completely avoiding the sale of food that contains common food allergens (Butler, 2005). Other preventative measures include accommodating special meal requests, providing alternative meals, and establishing and enforcing a “no food sharing” policy (Nowak-Wegrzyn, Conover-Walker, & Wood, 2001; Rhim & McMorris, 2001). Even so, the effectiveness of these measures was found to be inconsistent among schools (Butler, 2005).

The federal government has outlined a special provision for individuals with food allergies. The Americans with Disabilities Act 1992 (ADA), the Rehabilitation Act of 1973 (Section 504), and provisions under Individuals with Disabilities Education Act (IDEA) mandate public schools to accommodate children with severe food allergies, if such allergies could lead to anaphylactic shock (USDA, 2001). The SBP and NSLP require schools to provide meal substitutions for children with food allergies if their conditions are certified by a physician (USDA, 2001).

A task force of the National Food Service Management Institute (NFSMI) has identified dealing with food allergies as a future challenge school food services (Cross & Meyer, 2000). One of the possible ways to better prepare food service employees to safely serve children with food allergies, is employee training. Lemons (2004) concluded that food allergy training was a feasible way to increase school food service employees’ knowledge and empower them to serve children with food allergies. The need for food allergy training is also addressed in another study, which revealed that 50% of school food service directors did not realize that allergen-containing food should be prepared at a separate counter when catering to children with food allergies (Mutta & Bednar, 2009).

Lessons learned from food safety programs implemented at schools indicated that managerial commitment was important to ensure the success of such programs (King, 1992). Barriers to implementing training programs mentioned in the literature were time constraints, labor costs, and limited funds (King, 1992; Speer & Kane, 1990). Although such barriers are to be somewhat expected, the consequences of food allergic reactions at schools are too serious to ignore food allergy training.

There is a need for food allergy training among school food service employees, but the factors that affect managerial decisions for such training remain unknown. By discovering these underlying factors, appropriate strategies can be targeted at overcoming managerial barriers and encouraging the implementation of food allergy training for school food service employees.

This study used several constructs of the Health Belief Model (HBM) (i.e., attitudes, perceived barriers, and self-efficacy) as a framework to investigate food-allergy training in the school food service environment, as many of these constructs support the objectives of the study. The Health Belief Model (HBM) was developed in the 1950s to investigate factors that led to the adoption of a health-related behavior (Rosenstock, 1974). This health-related action was influenced by health concerns, beliefs of how severe or susceptible one is to a disease condition or perceived threat, and benefits and costs of taking an action (Rosenstock, Strecher, & Becker, 1988). To complete this model, cues to action, which could trigger and add extra force to an action (Janz & Becker, 1984) and self-efficacy, which is the confidence level in taking an action, were added (Rosenstock et al., 1988). In addition, other modifying variables, such as demographic characteristics, socio-psychological variables and structural variables have been found to consistently affect the readiness to take an action (Rosenstock, 1974).

Statements of Problems

It was estimated that the federal government spent \$13.7 billion in 2010 to subsidize the NSLP (New American Foundation, 2011). Accommodating students with special needs is an important provision in School Nutrition Programs (SNPs) (Molaison & Nettles, 2010) as number of school-aged children with food allergies seemed to increase in the past (Gupta et al., 2011). Even so, previous literature found that the school food service employees lacked of skills and knowledge to provided modified meals to their clients with food allergies (Conklin & Nettles, 1994) and study that comprehensively investigates food allergy training in school food service operation is limited.

Based on these findings, this study was conducted in order to answer a series of research questions. The first of these relates to the food allergy training that is provided to food service employees. The study seeks to understand how this training is conducted, identify the percentage of school food service operations that have actually provided food allergy training to their employees. Another question that this study aims to address is the issue of how knowledgeable Child Nutrition Professionals (CNPs) are about food allergies, as well as the factors that predict the food allergy knowledge scores of CNPs. This study seeks to identify the attitudes of CNPs about food allergies in the context of school food service operation, and explore the issues faced by CNPs while serving students with food allergies. On the issue of training, this study evaluates how confident CNPs are in providing employee food allergy training, looking at the barriers that CNPs' face in providing such training to employees and the circumstances or events that might influence CNPs' decisions to provide it as part of their employee training. In addition, this study investigates how knowledge level, food allergy training provision, and the issues faced when dealing with food allergies differ based on the demographic characteristics of the participants

and facilities. Finally, this study also investigates factors associated with the implementation of food allergy training in the past 12 months.

Justification

The NSLP was introduced in 1946 to provide balanced and nutritious meals to schoolchildren free, or at a low cost (Gundersoon, 2009). The rising number of children with food allergies in the U.S. has presented increasing challenges to school food service operations over the past decades (Gupta et al., 2011). Studies have found that many of the food allergic reactions occurred in classrooms or school cafeterias, and some of them resulted in hospitalizations and/or deaths (Branum & Lukacs, 2008, 2009; Munoz-Furlong & Weiss, 2009). It is crucial that school food services are well prepared to cater to children with food allergies, but studies have been limited in investigating how the CNPs feel about food allergies and the issues faced by school food service operators when dealing with food allergies. In addition, previous studies often investigated food allergy as one issue related to serving students with special needs. Detailed investigation of food allergies is needed in light of the increased prevalence of food allergy and its significant impact, not only on individuals with food allergies, but on other parties as well (Munoz-Furlong, 2004).

Although limited, research conducted on food allergies in school food service suggests training might be a feasible way to improve food allergy knowledge among employees (Lemons, 2004), and it should therefore be encouraged. The implementation of food allergy training is not mandated by federal regulations at the present time, so training is voluntary and varies from state to state. Although previous literature suggested that mandated regulations would bring positive changes to school nutrition (Lambert, Raidl, Carr, Safaii & Tidwell, 2007), it is important to understand the current status of food allergy training practices in school food service. It is also

crucial to gain more insight into the barriers that interfere with the implementation of training before practical strategies can be suggested to overcome these barriers. Furthermore, additional information, including factors that influence training decisions, may be useful when identifying successful implementation strategies.

Since CNPs, especially those in managerial positions such as school food service directors play a significant role in school food service as decision makers, leaders, managers and nutritionists (Carr, 2003), this study also endeavors to understand how confident they are regarding employee food allergy training. Previous literature indicated that high confidence and self-efficacy were beneficial in encouraging and cultivating professional practices (Bandura, 1997). Consequently, suggestions could be provided to improve the self-efficacy of the management of staff, and to enhance the successful execution of training programs.

Purpose

The purpose of this study was to assess Child Nutrition Professionals' knowledge, attitudes about food allergies, and food allergy training practices in school food service operation in the U.S. The study was conducted in two phases and included both qualitative and quantitative methods.

Objectives and Null Hypotheses

Qualitative study: Focus groups

The objectives of the qualitative portion of this study were to explore CNP's attitudes toward food allergies; to identify issues surrounding dealing with food allergies; to explore current food allergy training practices in school food services; and to investigate perceived

barriers to providing food allergy training, and the events or circumstances that might affect this decision. In addition, the study aimed to identify themes for the development of an online survey.

Quantitative study: Online survey

The objectives of the quantitative portion of this study were manifold. First, the study aimed to examine current practices related to food allergy training in school food service establishments. Second, the study sought to evaluate CNPs' knowledge about food allergy, to identify the factors that predict CNPs' food allergy knowledge, to assess CNPs' attitudes toward food allergies in the context of school food service, and to investigate issues involved in dealing with food allergies. Third, in relation to training, the study aimed to identify barriers to providing employee allergy training in school food service contexts, to recognize events or circumstances that might affect the decision to provide food allergy training, and to examine CNPs' self-efficacy to provide food allergy training. This study also evaluated the differences in knowledge, issues dealing with food allergies, and perceived barriers to providing employee food allergy based on the demographic characteristics of respondents and facilities. Finally, the study aimed to identify factors related to food allergy training implementation in the past 12 months.

The study hypothesized that:

- There is no relation between respondents' age, education level, history of personal or family food allergies, years of school food service experience, previous food allergy training and their knowledge scores.
- There is no difference in knowledge level, issues faced when dealing with food allergies, or perceived barriers to providing employee food allergy training based on demographic characteristics of the respondents and facilities.

- There is no relationship between independent variables (years of school food service experience, previous food allergy training, previous food allergic reaction, food allergy knowledge, self-efficacy, cues to action, and attitudes about food allergies) and the practice of food allergy training in the past 12 months.

Significance of the Study

Food allergy has been regarded as one of the most noteworthy chronic illnesses among children in the U.S. (Rappaport, 1966). Recent statistics indicate that food allergies affect more children now than in past decades, and this number is very likely to increase in the future (Gupta et al., 2011). The etiology behind this increase is still under investigation. Since children with food allergies often consume foods at schools, it is imperative that they are served allergen-free food and that their safety is ensured.

Despite the fact that food allergic reactions may occur in school cafeterias, empirical research about food allergy prevention practices in school food service operation is lacking. This study contributes to the body of knowledge about food allergy research in school food service operations by identifying issues related to accommodating these students with special needs. Pragmatic suggestions and solutions could be provided to school food service operators once these issues are identified. The SNPs would also benefit from this study, as federal laws require quality nutrition services to be provided to students with special needs. Vigilance is imperative in order to continue serving this group of students (Molaison & Nettles, 2010). In addition, understanding the attitudes of CNPs toward food allergies in the school food service environment is critical in determining the atmosphere, direction and long-term planning of school food service operations.

This study examined food allergy training practices in school food service, since previous literature indicated that training might be a plausible strategy to help reduce adverse reactions to food (Lemons, 2004). Even so, little is known about school food service directors' attitudes to food allergy training, and whether food allergy training has been provided in school food service operations. Furthermore, the factors that encourage or discourage school food service directors to provide food allergy training also have not been explored. By identifying these underlying factors, strategies can be aimed at overcoming managerial barriers and encouraging the implementation of food allergy training for school food service employees. Consequently, school food service personnel would be better trained and acquire the proper skills needed to serve students with food allergies.

This study also examined how confident the managerial staff in school food service operations is in providing food allergy training to their employees. Coaching and assistance could be provided to build their self-efficacy. They would be able to conduct "in-house" food allergy training periodically to all the employees. Potentially this may save both time and money, as it allows flexibility (i.e., training at convenient times, and less time needed for an outside facilitator to travel to the training location). Training that is customized to the school food service operation could be planned and implemented through the findings of this study. In general, CNPs were interested to know what other school districts were doing to adopt these practices to fit their own environment (Verduin & Corbett, 2009).

This study also sought to compare the current practices related to employee food allergy training based on demographic characteristics of the respondents, such as years of employment in school food service and school district size. By doing so, the discrepancies in food allergy training practices among schools may be revealed, and based on this, different strategies may be

planned to close the gap. The practices of food allergy training could potentially be more uniform and consistent across the nation. This study also provided new insights into the local, state and federal agencies, and encourages them to work with school districts in preventing food allergic reactions.

Assumptions

This study assumes that the respondents answered all the questions truthfully and to the best of their knowledge. It also assumes that each construct is measurable and the instrument developed based on an elicitation study is adequate to assess each construct.

Limitations

This study has some limitations. The CNPs who participated in this survey might already have greater concerns about and interest in food allergies, and might therefore demonstrate higher food allergy knowledge scores. The low response rate might be due to the administration of the survey over the period when CNPs were busy getting acquainted with the new national nutrition requirements for SNPs had just been released. In addition, the online survey method has some advantages over the mail-in survey, but it is possible that some participants have no regular access to internet (Sullivan, Harper, & Charles, 2002). The study was conducted in the school food service environment in the U.S. alone. Therefore, the results cannot be generalized beyond the school food service setting, or beyond the territory of the U.S.

Definition of Terms

Anaphylaxis: A serious allergic reaction involving life-threatening symptoms – such as loss of consciousness, difficulty in breathing and coma – and which may result in death (FAAN, 2011; Mayo Clinic, 2011).

Attitudes: An attitude is defined as a positive or negative evaluation of people, objects, event, activities, ideas, or just about anything in your environment (Zimbardo, Ebbesen, & Maslach, 1999, p. 745).

Beliefs: Any proposition or hypothesis held by a person, and related to two or more psychological elements or objects (Kirscht, 1974).

Cues to action: The internal or external events, circumstances, or people that affect the perceived threat and increase the likelihood to implement an action (Janz & Becker, 1984).

Food allergy: A condition that occurs when the body's immune system mistakenly attacks a food protein and triggers the release of chemicals, i.e., histamine, which results in an allergic reaction (FAAN, 2011).

Food intolerance: A condition that occurs when a food irritates an individual's digestive system. It could also happen when a person is unable to properly digest or breakdown the food. One of the examples of food intolerance is lactose intolerance (WebMD, 2012).

Food Sensitivity: An alternative name for a delayed food allergy (USDA, 2011).

Health Belief Model (HBM): This theory proposed that a health-related action was influenced by the motivation, the belief of how severe or susceptible one is to a disease condition (the perceived threat), the benefits and costs of taking an action, cues to actions and self-efficacy (Janz & Becker, 1984; Rosenstock, Strecher, & Becker, 1988).

National School Breakfast program (NBP): This federal-assisted meal program was officially implemented in 1975 at public, nonprofit private, and residential childcare institutions, aiming to provide reduced-price or free breakfasts to children in schools (USDA, 2011).

National School Lunch Program (NSLP): This federal-assisted meal program was initiated in 1946 at public, nonprofit private, and residential childcare institutions, aiming to provide nutritious lunches to children at schools nationwide, either for free, or at a reduced price (USDA, 2011).

Perceived barriers: The apparent obstacles that made the action or decision difficult (Rosenstock, 1974).

Perceived benefit: An individual's assessment of the positive consequences of adopting a behavior (Rosenstock, 1974).

Perceived severity: An individual's self-assessment of the seriousness of a condition and its potential consequences (Rosenstock, 1974).

Perceived susceptibility: An individual's self-assessment of the risk of acquiring a certain condition as a result of his/own own behavior (Rosenstock, 1974).

School Nutrition Program (SNP): Comprised of the National School Lunch Program, the National School Breakfast program, Afterschool Snacks, the Summer Food service Program, the Fresh Food and Vegetable Program, and the Special Milk Program (USDA, 2012).

Self-efficacy: An individual's belief and confidence in his/her capability to accomplish a given responsibility (Bandura, 1997).

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CHAPTER 2 - LITERATURE REVIEW

This chapter provides an overview of food allergies and discusses its impacts on individuals with food allergies and other parties. This chapter also discusses food allergic reactions that occur in schools and how schools, including school food services, are dealing with this emerging health concern. Food allergy-related legislation and training are also included in this chapter.

Overview of Food Allergies

Food is vital to life, as it provides the essential nutrients the body needs to function normally. However, food containing allergens can be life threatening for individuals with food allergies. A food allergy is a chronic, complicated immunological disease in which the immune system attacks a food protein that is not harmful to the body (Food Allergy and Anaphylaxis Network [FAAN], n.d; Rappaport, 1966). First-time exposure to food allergens does not result in an allergic reaction but stimulates the production and circulation of Immunoglobulin E (IgE) that attaches to white blood cells (i.e., basophils and mast cells). Further exposures to the same food allergens trigger the release of chemicals such as histamine from the body through the binding of IgE to the basophils and mast cells, which results in a food allergic reaction (U.S. Department of Agriculture [USDA], 2010).

Adverse reactions to foods are manifested through cutaneous (itchiness of skin, throat, and tongue; rashes), cardiovascular (tingling hands, difficulty breathing, increased heart rate), and/or gastrointestinal (vomiting, diarrhea) systems. Allergic symptoms range from mild (i.e., skin irritation) to severe. In severe cases, anaphylactic shock can occur and lead to life-threatening symptoms, such as loss of consciousness, difficulty breathing, coma, and even death

(Mayo Clinic, 2009). An individual could have a food allergic reaction almost immediately, several minutes, or a few hours after being exposed to a food allergen (National Institute of Allergy and Infectious Disease [NIAID], 2010).

It is estimated that 100-200 deaths occur yearly due to severe allergic reactions to food. Moreover, food allergies cause 34–52% of reported emergency room visits annually (Clark et al., 2004; NIAID, 2008). Between 2004 and 2006, there were a total of 9,537 hospitalizations due to diagnosed food allergies among children 0–17 years compared to 4,135 in 2001–2003 (Centers for Disease Control and Prevention [CDC], 2008).

Previous studies have attempted to estimate the prevalence of food allergies in the U.S. Statistics published in 2007 indicated that as many as 15 million Americans suffer from food allergies (FAAN, n.d.). This condition is unequally distributed among populations of different age groups (Rous & Hunt, 2004). Overall, it is more prevalent among children than adults (Crespo, James, Fernandez-Rodriguez, & Rodriguez, 2006) as 1 in 17 children under three and 1 in 25 school-aged children, and 1 in 12 children under 18 have food allergies compared to 1 in 25 adults (FAAN, n.d.; Young, Munoz-Furlong, & Sicherer, 2009). In addition, Sampson (2004) estimated that the prevalence of peanut allergies doubled among children under the age of five in a 5-year period (1999-2004) in the U.S. In addition, Christie, Hine, Porter, and Burks (2002) estimated that 6–8% of children will develop food allergies in the first three years of their lives.

Evidently, food allergies among children seem to have increased over the years. The most recent survey conducted by Gupta et al. (2011) indicated that food allergies affect as many as 6 million children under the age of 18 years in the U.S., reflecting an increase in the prevalence of food allergies from 3.9% to 8.0% (Branum & Lukacs, 2008). Even so, the researchers believed that the prevalence of food allergies is still underestimated (Gupta et al.) because there are two or

three unreported cases for every one reported case. It is also difficult to estimate the prevalence of food allergies, because the terms food allergy, food intolerance, and food sensitivity are often misused or used interchangeably. In addition, the public may misunderstand symptoms such as nasal congestion, stomach pain, and headache as allergic reactions to food. Although the prevalence of food allergy is similar across the world, the true figure may be distorted due to these problems and limitations of studies and surveys in terms of size (Munoz-Furlong, 2004).

Eight allergens account for 90% of food-allergy cases in the U.S.: Milk, eggs, peanuts, tree nuts, wheat, soy, fish, and shellfish (FAAN, 2012). Oral ingestion, skin contact, or inhalation of these allergens in minute amounts could cause allergic reactions (Eigenmann & Zamora, 2002; Furlong, Maloney, & Sicherer, 2006). Statistics published by NIAID in 2008 stated that milk and eggs are two of the most common allergens among children (NIAID, 2008).

Approximately 1.5% of young children are estimated to be allergic to eggs, and approximately 2.5% of children under three are allergic to milk. However, this distribution has changed over the years, and currently, the highest numbers of children are allergic to peanuts, milk, and shellfish (Gupta et al., 2011). Peanuts are one of the major allergens, especially among school-aged children (Christakis, 2008), and peanuts and tree nuts have been identified as the main cause of anaphylactic shock (Crespo et al., 2006).

In addition to the eight major allergens, other food allergens such as fruits, chocolate, red dye, tomatoes, fish, orange juice, spices, and cheese are also common among children (Rhim & McMorris, 2001). A study of Australian pre-school children and schoolchildren found that the most common food allergens among 4,713 participants were peanuts, fruits and vegetables, eggs, and cows' milk (Boros, Kay, & Gold, 2000). Previous studies showed that most children outgrow milk and egg allergies and even tree nut and peanut allergies when they get older (Clark

& Ewan, 2003). However, recent research found egg and milk allergies tend to persist into late childhood and adolescence (Savage, Limb, Brereton, & Wood, 2011). The Asthma and Allergy Foundation of America (AAFA, 2005b) also reported that these children might never outgrow their peanut, tree nut, and shellfish allergies.

It is more common to be allergic to multiple foods than to a single food allergy. Allergists state that more children today suffer from multiple allergies compared to decades ago (Laundau, 2011). A telephone survey in Maryland with individuals with food allergies found that almost half of the respondents were allergic to four or more food items and that 29% of them were allergic to three allergens. Only 14% of them were allergic to a single food item (Nowak-Wegrzyn, Isenberg, & Wood, 2000; Park, Ahn, & Sicherer, 2010).

Causes, Diagnostic Tests, and Treatment of Food Allergies

It is difficult to determine the causes of food allergies, because some of these food allergies remain undetected until they are triggered. Genetic susceptibility and environmental factors might contribute to the development of food allergies (Björkstén, 2005). The hygiene hypothesis may also explain why the number of allergy types is increasing. According to the hygiene hypothesis, the immune system, which is used to defend our body against foreign particles, starts to attack the “innocuous allergens” when the living environment becomes cleaner (Kalb, Springen, Raymond, & Carmichael, 2007). The hypothesis also states that infrequent exposure to allergens in early life increases the possibility of having a food allergy later in life (Skypala, 2011). In addition, some researchers also attribute the increased number of food allergies to the increased consumption of processed foods containing various additives, colorings, and artificial flavors (Mercola, 2011).

Due to the similarities in manifested symptoms, food allergies are often confused with food intolerance and/or food sensitivity, making the diagnosis of actual food allergies challenging. Food allergies involve the body's immune system, and they can result in life-threatening reactions, compared to food intolerance, which does not lead to an immune-system reaction and is usually less severe. On the other hand, food sensitivity is also known as delayed food allergy, and its symptoms can appear from 45 minutes to a few days after consumption. Food sensitivity involves either immunologic or non-immunologic mechanisms (Rose, 2010). A detailed comparison of food allergy, food intolerance, and food sensitivity is presented in Table 2.1.

Table 2.1 Comparison of Food Allergy, Food Intolerance, and Food Sensitivity

	<i>Food Allergy</i>	<i>Food Intolerance</i>	<i>Food Sensitivity (Delayed Food Allergy)</i>
Body system	<ul style="list-style-type: none"> ▪ Skin ▪ Cardiovascular ▪ Gastrointestinal 	<ul style="list-style-type: none"> ▪ Gastrointestinal 	<ul style="list-style-type: none"> ▪ Any bodily system
Onset of symptoms	<ul style="list-style-type: none"> ▪ A few seconds to hours after ingestion 	<ul style="list-style-type: none"> ▪ Slow onset 	<ul style="list-style-type: none"> ▪ 45 minutes–72 hours
Immunological mechanism	<ul style="list-style-type: none"> ▪ Antibody: IgE 	<ul style="list-style-type: none"> ▪ None 	<ul style="list-style-type: none"> ▪ Antibodies: IgA, IgC, IgM, C3, C4 ▪ White blood cells
Non-immunological mechanism	<ul style="list-style-type: none"> ▪ None 	<ul style="list-style-type: none"> ▪ Lack of enzymes (e.g., lactase) 	<ul style="list-style-type: none"> ▪ Toxic response ▪ Alcohol ▪ Pharmacologic (e.g., non-steroidal anti-inflammatory drugs)
Amount of food to trigger an reaction	<ul style="list-style-type: none"> ▪ One molecule of food allergen 	<ul style="list-style-type: none"> ▪ Dose-dependent ▪ Small–large quantity 	<ul style="list-style-type: none"> ▪ Dose-dependent ▪ Small–large quantity

The initial diagnostic test for food allergies uses the patient's medical record to identify symptoms and suspected food allergens (Sampson, 1999). A supplementary food diary may also be used to reveal the types of foods ingested as well as the times and quantities. Physical examination is the second step to identify adverse reactions to foods manifested through the cutaneous, gastrointestinal, and/or respiratory systems, followed by laboratory tests such as the Prick/Puncture Skin Test (PST), the Radioallergosorbent Test (RAST), and blood tests (Beck, 2010; Sampson, 1999). An allergen-elimination diet is carried out to support the diagnosis if a suspected food allergen is identified. Single-blind or double-blind placebo controlled (DBPCFC) studies are the gold standard for food allergy diagnostic tests (Sampson, 1988). NIAID food allergy clinical guidelines recommend physicians perform a combination of tests including skin-prick, blood tests, and oral challenges to make an accurate diagnosis (Beck, 2010).

Modern medicine does not provide a cure for food allergies. Stringent avoidance of the allergens is the only way to prevent the allergic reactions (FAAN, 2012). Even so, each individual affected by a food allergy has a different threshold of clinical reactivity (Hourihane, 2001), and this makes the prevention of allergic reactions difficult. In addition, pediatricians and family physicians are not always competent to treat their young patients with food allergies (Gupta et al., 2011). In the event of a food allergic reaction, injecting epinephrine is the only way to reduce the risk of life-threatening symptoms (Sampson et al., 1996).

Impacts of Food Allergies

Children with Food Allergies

Previous literature showed that children with food allergies tend to be cautious and timid (Rous & Hunt, 2004). Because of their food allergies, some such children are bullied and teased

by their peers (Leo & Clark, 2007). Bullying is more rampant among middle school children due to peer pressure (Trim, 2009). A survey conducted among 353 attendees of the FAAN conference found that 24% of them had been bullied, mocked, or harassed by someone. This figure increased to 35% if the respondents under the age of five were excluded, and 48% of children over 10 had had such unpleasant experiences. Most of these cases were recurrent, and 82% of them occurred in the school environment. The perpetrators were reported as purposefully throwing or waving allergen-containing food items at their peers with food allergies (Lieberman, Weiss, Furlong, & Sicherer, 2010). Further, some students with food allergies were also forced to eat food items that contained allergens by their classmates (Munoz-Furlong, 2004). Because bullying could jeopardize the psychological development of children with food allergies, anti-bullying policy should be implemented correspondingly to curb this action. School Food Allergy State Guidelines in Connecticut require educators to teach all their students about food allergies to avoid the discrimination of pupils with such conditions (Kalb et al., 2007).

In addition to the issue of bullying, a telephone survey investigating food allergic reactions in schools located in Maryland discovered that some students were homeschooled due to their food allergies (Nowak-Wegrzyn et al., 2000). Such decisions were made because the food allergic reactions continued to occur at schools despite special instructions given to school administrators (Graceffo, 2008). The parents felt the school staff failed to pay full attention to their children's special needs (Vickers, Maynard, & Ewan, 1997). Parents were also unsure of teachers' capability to ensure their children's safety (Rous & Hunt, 2004). Among students who attended regular schools despite their condition, food allergies were found to affect school attendance negatively (Meerschaet, 2007).

The transition period from childhood to adolescence imposes an additional risk for food allergic reactions. Previous literature indicated that food allergic-induced fatalities most frequently occurred among teenagers and young adults, because they would act as “risk-takers,” intentionally ingesting food items that contained known allergens (Sampson, Munoz-Furlong, & Sicherer, 2006).

In addition to psychological development, delayed growth and nutrition deficiencies among children with food allergies have also been observed, as some of them are given unwarranted restricted diets by their parents or guardians (Eggesbø, Botten, & Stigum, 2001). A study by Christie et al. (2002) showed that children with two or more food allergies were more likely to fall below the 25th percentile in the height-for-age curve. Other evidence showed that 73 out of 206 parents imposed restricted diets on children believed to have allergies to eggs or milk (Eggesbø et al.). Some children restricted from eating eggs or milk were also restricted from eating fish (Eggesbø et al.).

Parents of Children with Food Allergies

The impact of food allergies among children is not limited to the children themselves; rather, it expands to the people around them, including their families, their caregivers, and the staff and other students at their schools or daycare centers (Munoz-Furlong, 2004). Previous studies have captured a wide range of emotions expressed by the families of children with food allergies.

The immediate families of children with food allergies experienced stress due to a lack of control over food allergies. The parents also reported a lack of support and understanding concerning food allergies among the general public. The fact that there were insufficient resources to assuage their worries was also problematic for them (Butler, 2005; Gowland, 2001;

Mandell, Curtis, Gold, & Hardie, 2002). In addition, parents felt that shopping for and preparing food is stressful (Gowland; Mandell et al.). The families needed to change their lifestyles to accommodate the needs of these children, and this means additional time spent on shopping for food (Sicherer, Noone, & Munoz-Furlong, 2001). Of 87 families with food-allergic children, 60% claimed that the food allergy affected their family activities (Gowland).

Because anaphylaxis could be life threatening, parents of children with food allergies also reported living in constant fear regarding the survival of their children (Sampson, Mendelson, & Rosen, 1992). Interviews with six mothers of children with food allergies further confirmed these findings (Gillespie & Chalmers, 2002; Graceffo, 2008). Parents also worried that their children would not be able to live a healthy and normal life. They became more anxious if their children have had an allergic reaction before (Clover & Hourihane, 2006), and their anxiety level peaked when their children gained more independence, approaching age six (Mandell et al., 2002). Some parents felt guilty about their children's food allergies and hold themselves personally accountable for what happens to their children (Graceffo, 2008; Valovitra, 2009).

Other studies indicated that reactions to feeding children with food allergies varied among parents. Most parents (60%) prepared and provided every meal for their children, while some (31%) allowed their children to select or choose the food items they wanted to eat (Nowak-Wegrzyn et al., 2000). Gowland (2001) and Mandell et al. (2002) found that some parents were over-protective of their children, since they were unable to trust third parties taking care of their children. Moreover, Nowak-Wegrzyn, Conover-Walker, and Wood (2001) revealed that 59% of schoolchildren with food allergies were only allowed to eat food prepared by their parents. Dining out is also a concern of families with food allergic children, with some families avoiding dining out entirely due to food allergies (Sicherer et al., 2001).

Voordouw et al. (2010) investigated the intangible household costs associated with food allergies. Their study indicated that self-reported health status and well-being scores of parents of children with food allergies were significantly lower than those of their counterparts.

School Personnel

Food allergies also affect personnel at schools. Some school principals found it stressful to satisfy both children with and without food allergies at the same time (Butler, 2005). They also faced uncertainties in terms of how to handle food allergies and reported increased workloads due to this issue (Butler). School teachers were not confident in handling food allergies in their classrooms either. They were overwhelmed by the burden of dealing with the medical conditions of students, especially food allergic reactions (Magliaro & Luby, 2005). Magliaro and Luby also found that teachers frequently used eggs, wheat, and dairy products for classroom celebrations and lesson planning. However, they neither had consistent classroom practices for hand/work-area cleaning nor food-sharing policies in their classrooms.

School nurses share the responsibility of taking care of children with food allergies. Only 37% out of 150 school nurses surveyed in one study had been trained in food-allergy management, whereas the other 63% claimed that they had learned about food allergy-related topics through self-study (Carlisle et al., 2010).

Financial Costs of Food Allergies

The financial costs associated with food allergic reactions and anaphylaxis are significant. The most recent study published by Patel, Holdford, Edwards, and Carroll (2011) estimated that the direct medical cost associated with food allergy anaphylaxis was \$225 million in 2006–2007. Of this amount, clinic visits accounted for more than 50%, followed by

emergency room visits (20%), and hospitalizations (11.8%). In addition, the indirect cost associated with morbidity and mortality was estimated at \$115 million.

Household costs related to food allergies in Europe have also been investigated. Voordouw et al. (2010) investigated the household spending of families with and without members with food allergies in the Netherlands and the U.K. and concluded that the total direct costs (i.e., financial costs resulting from a particular disease) and indirect costs (i.e., productivity and time lost) were significantly higher for families with food-allergic members.

An earlier study conducted in 1994 estimated the direct (labor and food) and indirect (labor related to the administration of special meal programs) costs of accommodating students with special needs, including students with food allergies at a school food service. The study concluded that the service did not incur any additional costs by preparing special meals for students (Conklin & Nettles, 1994).

Food Allergic Reactions at School and School Interventions

Incidence of Food Allergic Reactions at Schools

When children approach school age, they are no longer under the direct supervision of their parents. Most children spend over 30 hours a week at school (National Institute of Health [NIH], 2000), studying, socializing, and learning how to interact with others (Munoz-Furlong, 1996). Therefore, the importance of the role of schools in providing allergen-free food to children with food allergies cannot be overemphasized.

There are plenty of evidences indicate that food allergic reactions occur at educational institutions. Peanuts and tree nuts lead to more than 80% of the 30,000 food-induced anaphylactic reactions in emergency departments every year (Putman School District, n.d.).

Sicherer, Furlong, DeSimone, and Sampson (2001) reported that more than 60% of the 4,586 children who registered with the Peanut and Tree Nut Allergy Registry experienced allergic reactions at either schools or childcare centers. Greenhawt, McMorris, and Furlong (2008) also noted that many children have multiple food allergic reactions in schools or childcare centers. More seriously, 10 out of every 63 fatal food allergy cases occur in schools, childcare centers, or universities (Munoz-Furlong & Weiss, 2009). Further, researchers found that more children died from anaphylactic shock at school than any other place, including the home (Bock, Munoz-Furlong, & Sampson, 2001; Sampson et al., 1992).

An analysis of areas in which food allergic reactions could occur in the school compound concluded that 16 out of 65 reported cases of accidental ingestion took place in various locations at schools (Nowak-Wegrzyn et al., 2000). Of these 16 cases, six (15%) happened in the school cafeterias (Nowak-Wegrzyn et al.). Parents of children with food allergies expressed concern about their children going on field trips or being on the school buses due to the lack of trained personnel in case of anaphylactic shock (Hernandez-Trujillo & Factor, 2008). Food allergic reactions also commonly occurred on playgrounds and at sport venues (Massachusetts Department of Public Health, n.d.).

Previous studies indicated that children could be exposed to food allergens at schools through snacks served in kindergarten to second-grade classrooms (Munoz-Furlong & Weiss, 2009). Peanut products, as rich sources of protein, are ubiquitous and often consumed as snacks or substitutions for meals at schools (Sampson, 1996). Foods containing peanut butter, milk, and eggs are also commonly served to schoolchildren in school cafeterias, making cafeterias one of the high-risk zones for food allergic reactions (Munoz-Furlong, 1996).

Causes of Food Allergic Reactions and Fatalities

Numerous causes of food allergic reactions in school settings have been identified in previous studies. Hidden allergens are one of the common causes, since nuts can be present in popular children's snacks without their knowledge (e.g., ice cream, cakes, chocolates, and confectionery products) (Sicherer et al., 2001). An investigation of food allergy-induced deaths revealed that a victim had unknowingly eaten cake that contained "hidden" peanuts in the cafeteria and that the epinephrine was not given to the student promptly (Yunginer, Squillace, Richard, Jones, & Helm, 1989).

School administrative personnel and food service employees not being informed of the children's food allergies could also indirectly result in adverse consequences. A study conducted by Watura (2002) showed that only 19 out of 83 schools with a nut-allergic child had distributed information about nut allergies to all teachers, and only 21 schools had told the school cafeteria supervisors and assistants about the special needs. Only cooks and catering staff working in 23 schools were aware of the presence of children with nut allergies.

Cross-contact between food allergens and other food items and food trading can also lead to food allergic reactions, as both practices can lead to the unintentional ingestion of food allergens (Leo & Clark, 2007). Food allergic reactions can also occur when students position themselves too close to food allergens (e.g., a peanut butter fondue, other children eating peanut butter crackers, peanut butter birdfeeders) or handle craft projects that involve nuts (Sicherer et al., 2001).

Furthermore, older children with food allergies also experience peer pressure and are unable to make appropriate decisions regarding their personal health. They are not able to

communicate their needs with authority, which makes them susceptible to food allergic reactions (Sampson, Munoz-Furlong, & Sicherer, 2006).

Most fatalities are due to delays in the administration of an anti-inflammatory drug or epinephrine (Bock et al., 2001; Sampson et al., 1992), as awareness about food allergies is often lacking among cafeteria and other school staff (Yunginer et al., 1989). An inability to respond promptly to allergic reactions has also led to food allergy-induced deaths (Weiss, Munoz-Furlong, Furlong, & Arbit, 2004). Furthermore, if children are too young to verbally communicate the initial signs of their allergic reactions (Houle, Leo, & Clark, 2010), this can also result in delays in epinephrine administration.

Food Allergy Policies at Schools

As the number of children with food allergies is increasing, schools have implemented multiple strategies to prevent the occurrence of allergic reactions. School nurses, school nutrition professionals and school food service personnel, parents, and teachers are usually involved in implementing these policies (Verduin & Corbett, 2009). Some of these strategies used for allergic-reaction prevention involve prohibiting students with food allergies or students in the same classroom from bringing food that contains food allergens to school, providing allergen-awareness areas, and avoiding the sale of food that might contain food allergens (Butler, 2005).

A survey conducted by the School Nutrition Association (SNA) and the International Food Information Council (IFIC) Foundation in 2008 found that 30% of 844 schools had eliminated food allergens from the school lunch program (15% from the entire school) (Burns, 2010). Other preventive measures taken to prevent food allergic reactions include providing substitutions for meals served in cafeterias, accommodating special meal requests, providing peanut-free tables, and establishing “no food sharing” policies (Nowak-Wegrzyn et al., 2001;

Rhim & McMorris, 2001). The SNA and IFIC's study showed that 34.7% of schools surveyed had implemented some kind of food ban for peanuts (95.6%), tree nuts (36.2%), and other foods such as seafood (4.1%).

According to the School Nutrition Operations Reports 2009 and 2011 (SNA, 2009, 2011), food bans had been implemented in about one-third of the schools represented by the participants. Larger school districts have more food bans in place in all or some of the schools located in their districts compared to smaller school districts. Peanuts and tree nuts are the two most frequently banned food items reported.

Schools have also educated their staff about label reading and alerted them about hidden ingredients as preventive measures (Rhim & McMorris, 2001; Verduin & Corbett, 2009). Some schools encourage proper hand washing practices and the washing and separating of kitchen utensils, all food contact surfaces, and toys (Yu et al., 2006) to prevent cross-contact. Some schools also send out reminders and display posters to communicate information about food allergies in the school compounds in order to raise awareness (Hay, Harper, & Moore, 2006).

A number of schools have also implemented restrictions for birthday celebrations. For instance, some school districts require that birthday parties be celebrated in the school cafeterias. Moreover, teachers are encouraged to reward students with pencils and stickers instead of food to avoid potential allergic reactions. Students from five schools in Penn-Trafford, Pennsylvania, were only permitted to order pre-approved snacks from cafeterias for their birthday or other occasions. In addition, school nurses are required to double-check the snack order forms turned in by parents of children who have serious food allergies, and parents are only able to purchase snacks after the ingredients of those snacks are scrutinized by the school principals or nurses (Devoe, 2008). These approaches are similar to those suggested by the American Academy of

Allergy, Asthma, and Immunology (AAAAI). Others have also suggested that teachers should avoid using foods as rewards and replace the food items with other incentives (Ann Arbor Public School, 2005).

On the other hand, some schools have implemented management plans for potential food allergic reactions, including using an EpiPen (27%), calling 911 (25%), and contacting the affected student's parents or guardians (27%) (Burns, 2010). Other schools have also provided training for principals, teachers, and nurses on how to administer epinephrine (Rhim & McMorris, 2001). Among 1,207 school food service directors surveyed in 2009, 71.7% mentioned that they had a food allergy-management plan in place. Even so, the implementation of food allergy-management policies in schools was inconsistent (Butler, 2005). For instance, in their Peanut and Tree Nut Registry study, Sicherer et al. (2001) found that Emergency Action Plans (EAPs) were only followed in 73% of food allergic reaction cases. In addition, Powers, Bergren, and Finnegan (2007) found that 30 out of 94 attendees of a conference on school health issues did not follow the food allergy emergency plan as suggested by FAAN. Some essential components of the emergency plans were missing, such as emergency contact information, medication administration instructions, and health histories.

Despite the effort put in by schools to prevent food allergic reactions, parents have mixed feelings regarding schools' responses toward food allergies. Eighty percent of parents whose child had suffered an allergic reaction at school reported that the school failed to follow the food allergy-management protocol, and 5% thought that the school's response to life-threatening food allergies was unsatisfactory (Nowak-Wegrzyn et al., 2001). Many parents of children with food allergies also reported that the health professionals at the school were unprepared to accommodate their children (Nowak-Wegrzyn et al.).

Controversies regarding Food Allergy Policies at Schools

In order to better protect schoolchildren with allergies, a commitment needs to be sought from the entire school, and therefore, the decision-making process may be complicated. Many teachers have commented that one of the easiest ways to prevent food allergic reactions is to simply ban the allergenic food being sold or brought into school compounds (Higgs, 2008). Many schools have also implemented food bans in school cafeterias (SNA, 2009, 2011). This suggestion has created controversies, as some parents who have children with food allergies have advocated bans of peanuts and its by-products at both schools and daycare centers. One study attributed the low accidental exposure to peanut allergens at a school to the school-wide peanut ban (Banerjee et al., 2007).

On the other hand, other parties argue that such food bans are not justified. This movement would impose an extra burden on the institutions and on other parents and children who do not have food allergies. For instance, banning soybeans would place an undue burden on children who are vegetarian or certain ethnic constituents who consume soy as their main source of protein (Behrmann, 2010). Some stakeholders also argue that a complete ban of these food allergens would not guarantee zero incidents of food allergic reactions in schools.

Furthermore, the food allergy organizations or other food allergy initiatives have never agreed upon or advocated the peanut and nut bans at schools (Hu & Kemp, 2005), because no school could completely guarantee a nut-free environment in reality. Conversely, children with allergies might be given a false sense of security (Higgs, 2008) due to the food ban policies.

Other accommodations (e.g., separating eating areas, designating specific tables in the cafeteria for children with food allergies) have created social isolation and stigmatization (Marklund, Wilde-Larsson, Ahlstedt, & Nordstrom, 2007; Young et al., 2009). Such

accommodations include students with food allergies being asked to eat in the nurse's office (Nowak-Wegrzyn et al., 2000) or to receive their meals from different locations (Marklund et al.). These practices often indirectly label students with food allergies as different from their peers. In reality, eating together with classmates promotes a sense of belonging in the allergic children and makes them feel "like everyone else" (Munoz-Furlong, 1996). In addition, food allergy experts contend that anaphylaxis from cutaneous contact of an allergen is rare and that segregated dining areas are not necessary (Muraro et al., 2010).

Food Allergy Legislation

The legislature has special provisions for individuals with food allergies. For example, the Federal Americans with Disabilities Act 1990 (ADA) makes it compulsory for public schools to provide accommodations for children with food allergies. Such accommodations include ensuring that students have reliable access to medication, providing options for physical activities, and offering allergen-free classrooms (AAFA, 2005a). The Amendment of the Rehabilitation Act 1973, Section 504, prohibits federally funded schools from discriminating against students with disabilities or special needs. Students with food allergies are eligible to receive special meals without extra charge (Federal Register, 1982).

The USDA is the governing body that supervises the SNPs, which have special provisions for students with food allergies. In its guideline entitled "Accommodating Children with Special Dietary Needs," the USDA suggests that children with food allergies should be provided a safe replacement meal according to the instructions and advice of their physicians. However, the parents or guardians must provide a medical statement approved by a certified medical authority to request special meals (USDA, 2001). In addition, in some school cafeterias,

the food service staff are allowed to place purchase restrictions on students' accounts so that students cannot purchase food items that contain allergens (Wansink, Just, & Payne, 2008).

In addition to the national guidelines, some states (including Arizona, Connecticut, Maryland, Massachusetts, Mississippi, New Jersey, New York, Tennessee, Vermont, Washington, and West Virginia) have developed their own guidelines to assist school personnel in managing students with food allergies (FAAN, n.d.). Even so, a research study carried out in a school district in Virginia showed that not all schools were aware of or following the existing food allergy-related regulations. The degree of compliance varied significantly depending on the size of the school district examined (Powers et al., 2007; Rhim & McMorris, 2001).

The Massachusetts Food Allergy Awareness Act was passed in 2009 and made mandatory in 2011 in all commercial and non-commercial restaurants located in Massachusetts. The law is enforced in two different stages. During the first stage of implementation, the food service establishments in Massachusetts are required to exhibit food allergy-awareness posters in the employee areas and include reminder messages on menus. During the second stage, the food service facilities are required to have a "certified food protection manager" on board who is trained in a food allergen-awareness program recognized by the state Department of Public Health (FAAN, 2011; Massachusetts Department of Public Health, n.d.). Corresponding to this legislation, the Massachusetts Department of Elementary and Secondary Education required all personnel in charge to undergo food-allergy training covering several key topics related to food allergies (i.e., food allergies and intolerances, major food allergens, reading labels, food allergen handling practices). This was done so that they would be better prepared to face the issue of food allergies (Massachusetts Department of Elementary and Secondary Education, 2010). The state

of California will be declaring May 13–19 as statewide Food Allergy Awareness Week in 2012 to increase public awareness of food allergies (Moran, 2012).

The Food Allergy and Anaphylaxis Management Act of 2009 provided schools with guidelines to better manage food allergies and anaphylaxis. Kansas passed a law that granted schools access to epinephrine kits without prescriptions so that school nurses could react promptly in case of an anaphylactic shock emergency (AllergicChild, 2011). Many states have also passed laws allowing age-appropriate children to carry and self-administer their prescriptions at school (Leo & Clark, 2007). The Individuals with Disabilities Education Act (IDEA) also provides guidelines on strategies to support and accommodate students with disabilities and modifications that could be made to meet students' needs. IDEA also allocates funding to alleviate the financial burdens faced by schools in serving these students (National Dissemination Center for Children with Disabilities, 2010).

The Food Allergen Labeling and Consumer Protection Act (FALCPA) of 2004 required manufacturers to list the eight common allergens in plain English or use the “contains” statements to help the general public identify the allergens (FDA, 2004). Since the implementation of FALCPA, many studies have been performed to investigate the use of food labels among consumers with food allergies. Vierk, Koehler, Fein, and Street (2007) found that most of their respondents referred to food labels to avoid consuming foods that contained allergens. However, these respondents commented that some of the current food labels were “out-of-date” and that only general names of ingredients were listed without specifying the sources. They also reported being confused by the technical terms used on the food labels, lengthy ingredient lists, and the lack of uniformity of the names of the allergens used on the

labels. The Amendment to Food Code 2009 specifically addressed the importance of increasing food service employees' food allergy awareness through training (FDA, 2009).

Food Allergy Training

Food Allergy Intervention

The benefits of food allergy-education sessions are significant. For example, one study found that the annualized rate of food allergic reactions (i.e., number of reactions per year per person) decreased from 1.77 to 0.42 following an education session. The reported comfort score regarding administering epinephrine also increased from 4.63 to 6.23, even though the knowledge scores remained the same pre- and post-education sessions (Sicherer et al., 2011).

As indicated by previous studies, parents of children with food allergies and school personnel often feel anxious dealing with food allergies. To alleviate this problem, Vickers et al. (1997) developed some training materials for school administrators and parents with children with food allergies. The researchers also aimed to establish a supportive environment among these individuals. Prior to attending the training session, school administrators and parents felt that they lacked of food allergy knowledge, and they expressed their anxiousness regarding administering epinephrine. The anxiety of both parents and school staff decreased when they learned more about reaction prevention through the training materials. Despite the benefits, the training sessions were found to be time consuming and costly (Vickers et al.)

Results from other studies have also supported the advantages of food allergy-related training. A four-day intervention study was found to improve perceived competencies and reduced the perceived burden of parents with children with food allergies (LeBovidge et al., 2008).

Food Allergy Training in Food Service Establishments

Research shows that entry-level staff in food service establishments lack formal training prior to starting their jobs (Bureau of Labor Statistics, n.d.). Being relatively young, many food service establishment employees also lack experience (Milman, 1999). A study that involved 111 restaurant managers found that they lacked knowledge of food allergies. Only one third of these restaurants provided food allergy-training sessions for their employees (Mandabach, Ellsworth, VanLeeuwen, Blanch, & Waters, 2005). Most food service establishments did not provide employees with detailed protocols or training programs on handling clients with food allergies. However, these respondents agreed that serving clients with food allergies safely is important (Abbot, Byrd-Bredbenner, & Grasso, 2007)

Management is associated with food-safety training and handling practices (Allwood, Jenkins, Paulus, Johnson, & Hedberg, 2004). Barriers to providing food-allergy training in commercial food service establishments include the high cost of implementing training programs, the high turnover rate among staff, time constraints of employees, language barriers, and the indifference/lack of interest of employees (Abbot et al., 2007).

The prevalence of food allergies appears to be increasing, and many food allergic reactions have occurred in commercial restaurants. Since individuals with food allergies continue to dine out despite their previous food allergic reactions, the National Restaurant Association (NRA) developed an educational food allergy-training program for restaurant operators and suggested strategies to prevent the incidence of food allergic reactions at restaurants (NRA, n.d.). FAAN has also developed training videos and other printed materials for restaurant operators to educate their employees about serving customers with food allergies (FAAN, 2010).

Food-allergy training in school cafeterias has not been well researched, but previous studies show that it is needed to prevent allergic reactions to food. Evidence showed that school food service employees working at schools with students with nut allergies failed to identify a single sign of a mild or severe acute allergic reaction (Watura, 2002). A study conducted by Conklin and Nettles (1994) also showed that school food service employees lacked experience in serving students with special needs. Lemons (2004) compared the food allergy knowledge of school food service employees before and after a two-day workshop in Texas. The researcher concluded that food allergy knowledge before the training was not adequate but that the scores improved significantly following the food-allergy training.

Researchers have recommended that school food service personnel improve their skills in planning and preparing allergen-free or hypoallergenic food. A survey carried out by Gandy, Yardrick, Boudreaux, and Smith (1991) indicated that modified menus and recipes accounted for 57% of the meals served in public schools in Mississippi. Nevertheless, these alternative meals provided to the students were low in quality, because the school food service personnel lacked either the knowledge or the genuine interest needed to prepare more palatable allergen-free food (Marklund et al., 2007).

The professional organization and personnel in charge of School Nutrition Programs (SNPs) also recognized the importance of employee food-allergy training. The AAAAI recommended that school food service employees be educated about preventive measures to avoid cross contact when they handle, prepare, and serve food for students. The severity of food allergies that can lead to death (even after consuming a small amount of allergens) should be conveyed to the staff (AAAAI, 1998). Meanwhile, other researchers suggested that school personnel should be exposed to the potential dangers of food allergies, be aware of the list of

common allergens, and be educated on label reading. Good practices such as thorough cleaning of surfaces that come in contact with food, hand washing before and after handling food, and purchasing food with detailed and complete labels are recommended for school food service workers as well (Hay et al., 2006).

School food service directors, managers, supervisors, and production staff perceived that a moderate to high level of training and educational materials were needed to help them or the employees dealing with food allergies (Gandy et al., 1991; Verduin & Corbett, 2009). Kendrick and Gangaharan (2001) found that about 59% of the school food service managers and 34% of the school food service managers in their study have requested training information on “how to serve students with special nutrition needs.” Among the most beneficial tools for food-allergy management were educational materials on allergen identification, a database of common ingredients in meals, “best practice guides” and allergen-free recipes, as well as employee training materials. The most desirable topics for management training included label reading, allergen substitutions, and preventing cross contact. The most beneficial training methods for this population were presentations or workshops, handouts or brochures, in-services, posters, and web-based materials (Burns, 2010).

School food service directors play a decisive role in designing, planning, and/or executing policies in school cafeterias to promote good health among students and in implementing training for food service employees (Mincher, 2010). The *Competencies, Knowledge, and Skill Statements for District School Nutrition Directors/Supervisors* published by the National Food Service Management Institute (NFSMI) identified 13 competency areas that school nutrition directors/supervisors should possess to perform their daily jobs (Cater & Carr, 2004). Among the training-related competencies were “providing food safety training for

staff,” “conducting program assessment for identifying training needs,” “monitoring new employees for strengths and weaknesses to determine follow-up training needs,” “scheduling regular training sessions to develop employee knowledge and skills,” “conducting on-the-job training to improve skills and productivity,” and “encouraging staff participation in training and continuing education programs.”

This extensive list of skills is required to ensure the success of training programs. It also reflects the importance of the managerial role in initiating and implementing the training programs. On the other hand, food service directors and managers were found to spend a relatively small amount of time on coordinating employee training for food allergies (18 ± 28 minutes/month). More time was allocated to purchasing special food and equipment in order to provide special meals for students with special diet needs (107 ± 186 minutes/ months) (Conklin & Nettles, 1994).

Barriers to Implementing Employee Training

Barriers to initiating food-allergy training among food service employees in restaurants include the high cost of training, high staff turnover, time constraints, lack of language proficiency, and lack of interest or enthusiasm among employees (Abbot et al., 2007). Employers have suggested that providing training materials in multiple languages and awarding extra incentives would encourage employee participation in the training programs (Abbot et al.).

In the school food service setting, Giampaoli, Sneed, Cluskey, and Koenig (2001) investigated the attitudes of school food service directors and the perceived challenges of Hazard Analysis Critical Control Point (HACCP) program implementation. The uneasiness of the staff with the new system, lack of time for the food safety and sanitation training, poor resource management, and low employee motivation were identified as barriers. Participants in their study

claimed that they could have improved the food safety of their districts if there were more resources available to them (i.e., time, funding, employees, facilities). The HACCP implementation would also be more successful if there were lower rates of employee turnover and higher motivation among employees.

Hwang, Almanza, and Nelson (2001) found similar results in their study. They concluded that the major hindrances of HACCP program implementation were time constraints, high labor costs, insufficient training funds, lack of time to adopt the new HACCP implementation, and union issues. Among the major challenges of implementing HACCP in an Indiana school food service operation were time needed to run the program, labor costs, and lack of funding (Table 2.2). Many previous studies have identified lack of funds as the most common barrier to implementing programs and policies in the school food service environment (Mincher, 2010).

Table 2.2 Barriers to Providing Food Safety Training to School Food Service Employees

Barriers	Giampaoli et al. (2001)	Hwang et al. (2001)	Youn and Sneed (2003)
Lack of employee motivation	x		x
Lack of resources	x		
Lack of time (employees)	x	x	x
Lack of time (school food service directors)	x		x
Lack of training funds	x	x	x
Inadequate manpower	x		
Lack of skills to implement training	x		
Employee turnover	x		
Additional labor costs		x	
Lack of expertise			x

The barrier identified related to obtaining food-safety certification was the location of the facilities, which affected the coordination of the programs (Speer & Kane, 1990). Similar barriers were found to implementing nutrition programs at schools (Cho & Nadow, 2004; Stang,

Story, Kalina, & Snyder, 1997). Stang et al. indicated that lack of time was a barrier to providing nutrition education to school food service employees.

Theoretical Concept

Health Belief Model

This study used several constructs of the Health Belief Model (HBM) (i.e., attitudes, perceived benefits, perceived barriers, and self-efficacy) as a framework to investigate Child Nutrition Professionals (CNPs) about implementing food-allergy training in the school food service environment, as many of these constructs support the objectives of the study.

HBM was developed by Hochbaum, Kegels, and Rosenstock, who worked for the U.S. Public Health Services in the 1950s, investigating preventative health behaviors. HBM is one of the most frequently used behavior change and psychological models (Rosenstock, 1974). According to this model, concerns about health and perceptions about vulnerability to a condition and the costs and benefits are preconditions that determine how likely an individual is to perform a health behavior for disease prevention. More specifically, these preconditions are recognized as perceived susceptibility, perceived severity, perceived benefits, and perceived barriers.

Perceived susceptibility is a person's perceived risk of acquiring a certain condition as a result of his/her own behavior (Sharma & Romas, 2008). It is the self-perceived likelihood of developing a certain condition. Perceived severity measures "an individual self-assessment of the seriousness of the condition, and its potential consequences." (Rosenstock, 1974). The consequences could affect an individual medically, physically, psychologically, socially, or financially (Janz & Becker, 1984; Rosenstock, 1974). Both perceived susceptibility and severity

have a “strong cognitive component” and are partially dependent on knowledge. These two beliefs in turn affect an individual’s readiness and willingness to take action.

Perceived benefit is defined as an individual’s assessment of the positive consequences of adopting the behavior (Rosenstock, 1974). When the perceived benefits of carrying out the behavior outweigh the perceived barriers, the individual is more likely to perform the behavior. For example, the benefits of implementing HACCP-based food safety programs at childcare centers included identifying problems before regular health inspections and reducing food safety risks (Riggins & Barrett, 2008). A perceived barrier is defined as an obstacle that makes the action or decision difficult. These two constructs determine the beliefs that encourage or impede actions (Sheeran & Abraham, 1996). Barriers often mentioned by school food service directors in SNPs included time and financial constraints; lack of skills; and lack of parental, administrative, and personnel support (McDonnell, Probart, Weirich, Hartman, & Birkenshaw, 2004; Mincher, 2010).

Janz and Becker (1984) conducted a meta-analysis of 46 HBM-related studies and concluded that overall high perceived susceptibility, high perceived severity, high perceived benefits, and low perceived barriers would increase the likelihood of adopting certain behaviors. Their results also indicated that perceived barriers had the highest “significance ratio” (i.e., was the strongest predictor) among the four constructs.

Morris, Bakers, Belot, and Edwards (2011) investigated the preparedness of school nurses in the event of food allergic reactions and their past experience with stock epinephrine programs. Perceived susceptibility and past experience with anaphylaxis did not transform to action. The school nurses were not aware of the seriousness of anaphylaxis either. Barriers to implementing the stock epinephrine programs included lack of support or clear

guidelines/policies for the program and insufficient funding for purchasing the medication or implementing the training.

Since the desire to perform a behavior change does not always make an individual actually perform the action, two new constructs (i.e., cues to action and self-efficacy) were added to this model to encourage and empower the individual to make a move and perform the behavioral change (Green & Kreuter, 1999). Cues to action refer to the internal or external events, people, or other things that affect the perceived threats and increase the likelihood of implementing an action (Janz & Becker, 1984). Zola (1964) also viewed cues to action as “critical incidents” that initiate an action. Cues to action have been recognized as being able to activate readiness and stimulate overt behavior (e.g., policies mandated by SNPs). Food handlers who had experienced food poisoning before, who had family members who had experienced food poisoning before, or who had younger children at home were found to be more likely to conform to safe food handling practices than their counterparts (Lum, 2011).

Another construct, self-efficacy, was added in 1988 (Rosenstock, Strecher, & Becker) to better explain the practices of certain behaviors. Self-efficacy, as described by Bandura (1977), is an individual’s belief and confidence in his/her capability to accomplish a given responsibility. Self-efficacy determines the extent of effort an individual spends in performing a task; the duration of time he/she is able to withstand when facing a hardship; and how he/she acts, thinks, and/or reacts emotionally to an obstacle (Strecher, DeVellis, Becker, & Rosenstock, 1986). Further, Rosenstock et al. (1988) concluded that people must perceive themselves as competent in order to perform and maintain a short- or long-term behavior change. In addition, self-efficacy is often used as an assessment tool to evaluate an individual’s readiness to accept an assigned

task. Bandura (1977) suggested that self-efficacy could be used to explain the change of policy implementation.

Previous studies showed that individuals with high levels of self-efficacy have higher job efficiency (Manojlovich, 2005a, 2005b). In addition, a study conducted by Lum (2011) indicated that food handlers who demonstrated high levels of self-efficacy were more likely to follow safe food handling practices. In contrast, Mincher (2010) found that food service directors with higher self-efficacy scores experienced more difficulty adhering to school food policies than their counterparts due to higher levels of self-consciousness about the existing challenges. They were also able to identify more obstacles related to food policy implementation. Stang et al. (1997) found that many school food service directors/managers did not feel comfortable providing nutrition education to their employees if they had not been trained in the topic.

To improve one's self efficacy, Bandura (1997) suggested using role modeling to achieve this objective. A professional organization, as a platform whose members come to share their experiences toward achieving a goal, is an example of a role model. Gist (1989) compared the effectiveness of different self-efficacy enhancing methods and concluded that modeling significantly stimulates idea generation and hence improves problem-solving skills. Professional organizations (e.g., SNA, NFMI) and state agencies could act as mentors to improve self-efficacy (Mincher, 2010).

School food service directors are responsible for developing, providing, and implementing technical support and training for their employees (Putnam County School District, n.d.). They also supervise the employees and maintain good communication with other stakeholders (North Dakota Department of Public Instruction, 2001). Because school food service directors play a crucial role in ensuring the success of Child Nutrition Programs such as

obesity prevention and school wellness programs, they should be confident in performing their daily duties. DeMicco et al. (1997) commented that the managerial staff of Child Nutrition Programs should possess leadership and management skills to direct the department toward achieving its goals and missions.

This study also further investigated the roles of demographic characteristics and their relationship with other constructs, since previous literature provided robust evidence of these relationships.

Age. Studies investigating how age-related attitudes and perceptions have affected school wellness policies have yielded some mixed results. Mincher (2010) investigated how age affected the implementation of a school nutrition policy in an Ohio public school and showed that the relationship between these two variables was insignificant. However, a study by Kandiah, Parkinson, & Amend (2009) investigating the factors influencing school food service directors' competency in managing school lunch programs concluded that younger respondents were more optimistic about their jobs than older respondents. On the other hand, Giampaoli et al. (2001) showed that young school food service directors faced more challenges in implementing food safety and HACCP programs, particularly in managing their limited resources and motivating their employees.

Education level. The education levels of school food service directors vary, ranging from high school or technical school to graduate-level education. Some also hold Registered Dietitian (RD) credentials (Giampaoli et al., 2001; Price & Tellhohann, 1994). A study by Mincher (2010) revealed that the relationship between education level and the implementation of a comprehensive nutrition policy among school food service directors in Ohio was insignificant. Conversely, in a wholegrain consumption study conducted by Chu (2011), it was found that the

education level of school food service directors was positively associated with their knowledge of whole grains.

Length of service/years of employment. The relationship between length of service and other investigated variables has not been found to be significant. For example, Mincher (2010) found that the length of service did not affect school food service directors' decisions to implement a nutrition policy in Ohio public schools. Chu (2011) also concluded that school food service director's length of experience did not affect their knowledge about whole grains. In addition, Cater and Carr (2004) also concluded that school food service directors' rated importance of functional areas was similar despite the length of their employment.

Certification. Certification has been found to positively affect decisions related to nutrition policies in the school food service setting (Mincher, 2010). Food safety-certified school food service managers have been reported as possessing higher confidence and efficacy in implementing HACCP programs in their facilities (Youn & Sneed, 2003). Furthermore, Hwang et al. (2001) showed that food safety-certified managers working in larger school districts were more likely to implement HACCP programs than those who were not food safety certified.

District size. Small and large school districts reported having different operational practices; for instance, larger school districts were more likely to be equipped with technology infrastructures (Rushing, Nettles, & Johnson, 2009). A study conducted by the SNA about food bans indicated that larger school districts were more likely to have food bans in place at schools (SNA, 2009). Other school food service studies also indicated that school districts of different sizes showed discrepancies in HACCP implementation. For example, a food safety study conducted by Youn and Sneed (2003) concluded that larger school districts were more likely to have policies to ensure food safety in the school food service setting. They commented that small

districts needed more assistance from the federal and state agencies as well as National Food Service Management Institute (NFSMI) to help them implement the policies.

In addition to these characteristics, other research questions and hypotheses in this study were also developed based on findings from previous literature. Jackson, Wilkinson, Hood, and Phill (2000) concluded that individuals with personal experience and previous contact with malignant melanoma demonstrated higher levels of knowledge about this disease. Using Structured Equation Modeling (SEM), Levers-Landis et al. (2003) investigated the relationship between osteoporosis-preventive knowledge and self-efficacy of calcium intake among preadolescent girls. The study concluded that there was a positive relationship between knowledge scores and self-efficacy. Higher cancer knowledge scores were also correlated with higher levels of self-efficacy among Mexican-American women (Carpenter & Colwell, 1995).

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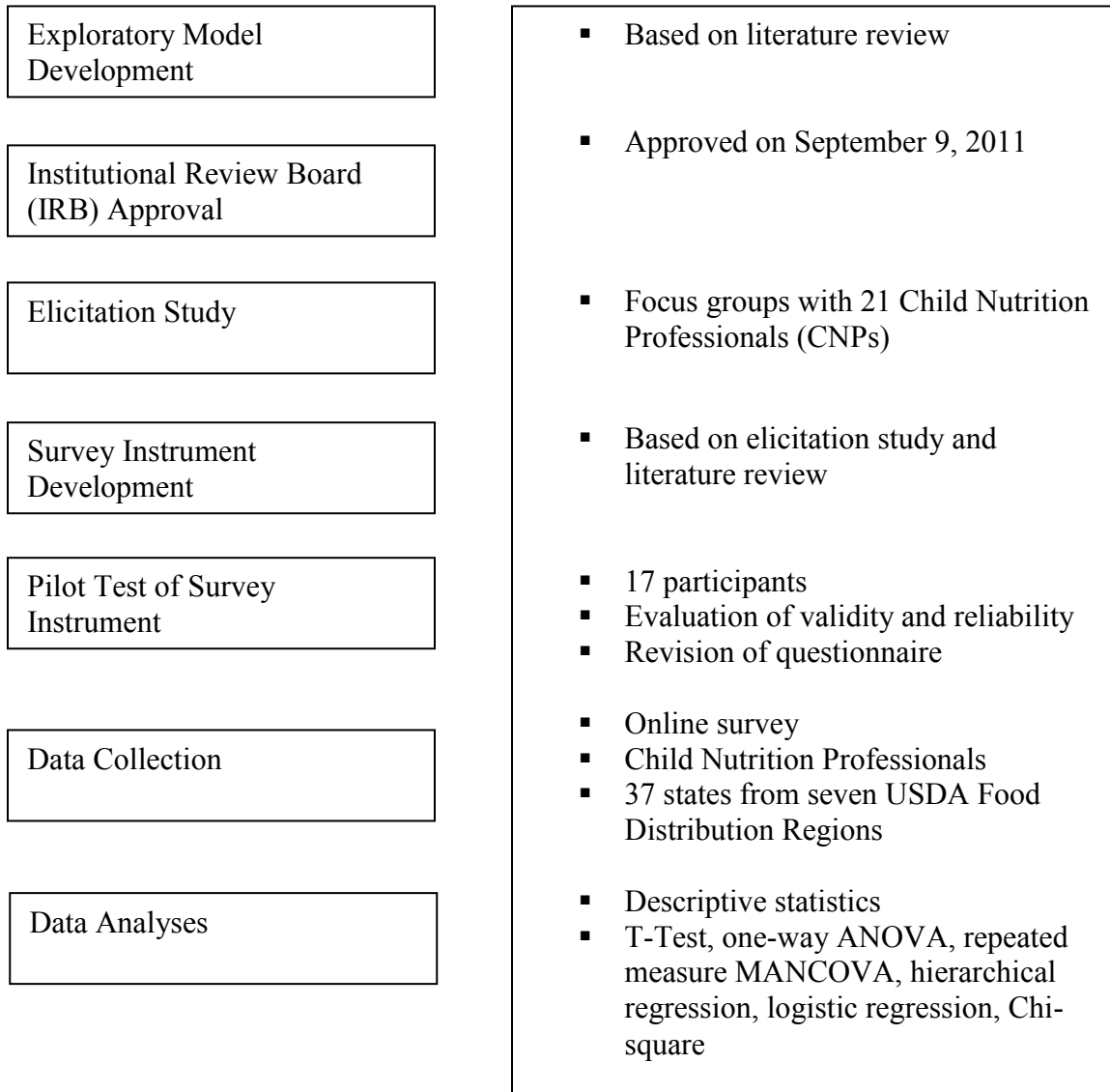
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CHAPTER 3 - METHODOLOGY

This chapter describes the procedures used to achieve the research objectives. The population and sample selection, instrument development, data collection, and data analyses are discussed in this section. The research procedure is also illustrated below in Figure 3.1.

Figure 3.1 Research Flow Chart



Selection of Sample

The research protocol, including the use of human subjects, was approved by the Institutional Review Board at Kansas State University prior to contacting participants (see Appendix A).

The target population was Child Nutrition Professionals (CNPs) (i.e., directors, managers, supervisors, head chefs, etc.) who have the authority to plan and implement training programs in school food service in the U.S. The list of names, address, and email contact information of CNPs across the U.S. was generated from a database that contained school district websites from 37 states, previously developed for use in other studies of Child Nutrition Programs. Each of the school district websites listed in the database was accessed individually, and the information pertaining to CNPs was compiled into a separate database and further categorized based on the seven USDA Food Distribution Regions. These seven regions are labeled as follows: Mid-Atlantic, Midwest, Mountain Plains, Northeast, Southeast, Southwest and Western (USDA, 2011). The 37 states included in this study and their representative regions are listed in Table 3.1. A map is supplied in Appendix B to illustrate the states and their representative regions.

Table 3.1 States and Representative Regions Included in the Study

<i>USDA Food Distribution (FD) Regions</i>	<i>States</i>
Mid-Atlantic	Delaware, New Jersey, Pennsylvania, Virginia
Midwest	Indiana, Michigan, Minnesota
Mountain Plains	Colorado, Iowa, Kansas, Montana, Nebraska, South Dakota, Utah, Wyoming
Northeast	Connecticut, Maine, Massachusetts, Vermont
Southeast	Alabama, Florida, Georgia, Kentucky, Mississippi, South Carolina, Tennessee
Southwest	Arkansas, Louisiana, Oklahoma, Texas
Western	Alaska, Arizona, California, Nevada, Oregon, Washington

The target population consisted of 3,588 CNPs, whose email addresses were successfully retrieved from the websites. The required sample size was calculated based on recommendations by Dillman, Smyth, and Christian (2007). With a population of 2,000–4,000, a sampling error of $\pm 5\%$, and a 50/50 split, it was calculated that a sample size of 322–351 was needed for the research (p. 57). With an assumption that 25% of the sample will respond with two reminder emails, and that some returned surveys would be incomplete, the researcher could be expected to obtain the number of survey responses required for statistical analyses by sending out 1,500 invitation emails to the potential participants. Participants were randomly selected from various regions based on their zip codes to generate a representative sample. The participants were informed of the opportunity to win one of 30 \$50 gift cards for a national retailer of their choice through a random prize drawing.

Elicitation Study: Focus Groups

Three focus groups were conducted among CNPs who attended a training program sponsored by the Kansas Department of Education's (KSDE's) Child Nutrition and Wellness Program and among directors attending the annual School Nutrition Association of Kansas (SNA-KS) conference. Each of the focus groups consisted of six to eight participants. Permission to recruit was sought from the program/meeting organizers. The program/meeting organizers then distributed the recruiting emails to all the attendees on behalf of the investigators (Appendix C and Appendix D). The attendees who were interested in participating in this study were asked to contact the investigators for scheduling. Confirmation and reminder emails were sent to the participants before each session.

Two researchers facilitated each of the focus groups. In each focus group, brief instructions were provided to the participants at the beginning of the session. The participants

were briefed about the purpose of the study, confidentiality and the anonymity of the data collection, and were told how the session would be carried out (Appendix E). In addition, each participant was asked to complete a demographic questionnaire and to sign a consent form prior to participating in the discussion.

A structured discussion guide was developed to assist the facilitators introducing the topic, opening a discussion, leading the key questions and closing the discussion (Hennink, Hutter, & Bailey, 2011) (Table 3.2). The questions were pilot-tested by graduate students who had working experience of the food service industry, to ensure the clarity of directions.

The CNPs were asked a set of open-ended questions, to identify their attitudes toward implementing food allergy training. They included questions pertaining to the perceived susceptibility and perceived severity of food allergies (i.e., worries about students experiencing food allergic reactions in the school cafeteria). The focus group participants also discussed perceived benefits and perceived barriers to implementing food allergy training. In addition, questions related to cues to action (i.e., situations that influence the decision to providing food allergy training) and self-efficacy (i.e., level of confidence to provide food allergy training) were asked (Appendix E). Probing techniques were used to generate discussion.

Each focus group session lasted for approximately one hour and the discussions were audio-recorded. Each participant received \$25.00 cash payment for their time and effort. The recorded files were transcribed by a professional transcription company (www.cabbagetreesolutions.com). The transcribed scripts were checked against the audio-recording and then coded by the two facilitators independently. The codes were repeatedly compared and reconciled to reduce redundancy. The extracted themes are summarized in Table 3.3.

Table 3.2 Focus Group Key Discussion Questions

<p><i>Introductory questions</i></p>	<p><i>Attitudes</i></p> <ol style="list-style-type: none"> 1. Would you share some of your thoughts regarding food allergies with us? 2. Have you ever worried about students experiencing a food allergic reaction at the school cafeteria? Why or why not?
<p><i>Key questions</i></p>	<p><i>Current Practices of Food Allergy Training</i></p> <ol style="list-style-type: none"> 3. What kind of training do you provide to the employees in your facility? How frequent is it? 4. How about food allergy training? How are the employees being trained? <p><i>Self-efficacy</i></p> <ol style="list-style-type: none"> 5. How confident are you in providing food allergy training to your employees? <p>(If none of them provided food allergy training)</p> <ol style="list-style-type: none"> 6. Have you thought about proving food allergy training yourself to the employees? 7. Who provided the food allergy training? <p><i>Perceived benefits</i></p> <ol style="list-style-type: none"> 8. What did the employees gain from the food allergy training? <p><i>Perceived barriers</i></p> <ol style="list-style-type: none"> 9. What affect your decision of providing and not providing food allergy training? <p><i>Cues to actions</i></p> <ol style="list-style-type: none"> 10. Are there certain situations that influence your decision to provide food allergy training?
<p><i>Closing questions</i></p>	<ol style="list-style-type: none"> 11. Do you have personal experience (yourself, family members, or friends) of dealing with food allergies?

Table 3.3 Extracted Themes from Focus Groups

<i>Categories</i>	<i>Themes</i>	<i>Frequency</i>
Attitudes toward food allergies	<ul style="list-style-type: none"> ▪ More food allergy prescription / documentation received from the physicians 6 ▪ Increased prevalence of food allergies 5 ▪ Increase in types and variety of food allergens 3 ▪ Parents over-react to their children’s food allergies 3 ▪ School food service employees are concerned about serving students with food allergies 3 	
Issues dealing with food allergies	<ul style="list-style-type: none"> ▪ Documentation issues (confidentiality, inconsistency, could not read physicians’ handwriting, homeless students with no documents) 10 ▪ Difficult to plan “matching menus” 4 ▪ Difficult to communicate with: <ul style="list-style-type: none"> - Parents of children with food allergies 3 - School personnel 3 - Health care providers (doctors, school nurses, etc.) 3 ▪ Special products are costly 2 ▪ Hard to fulfill last minute allergen-free meal requests 2 ▪ Difficult to obtain special products (logistics) 1 	
Perceived benefits	<ul style="list-style-type: none"> ▪ Improved food allergen handling practices 2 ▪ Improved attitudes (awareness and understanding) 4 ▪ Increased food allergy knowledge 4 ▪ Reduction of food allergic reactions/ provide safe dining environment 1 ▪ Increased cooperation of employees 1 ▪ Reduced anxiety of employees serving students with food allergies 1 	
Perceived barriers	<ul style="list-style-type: none"> ▪ Time constraints <ul style="list-style-type: none"> - School food service directors 8 - Employees (overloaded with work) 6 ▪ Support and communication from the school administrators, school nurses, parents, etc. 6 ▪ Lack of budget 4 ▪ Difficult to locate training resources 3 ▪ Employees’ lack of interest or motivation 2 	
Cues to action	<ul style="list-style-type: none"> ▪ Nature of the job (e.g., accommodate students’ needs) / fundamentals of school food service 4 ▪ Food allergic reactions that happened in the past 3 ▪ Personal experiences with food allergies (e.g., family and friends) 2 ▪ Media reports 2 ▪ Messages from professional meetings / conferences 2 ▪ Legislation (e.g., Americans with Disabilities Acts, Title 504) 1 	

Table 3.3 Extracted Themes from Focus Groups (continued)

<i>Categories</i>	<i>Themes</i>	<i>Frequency</i>
Topics desired for food allergy training	▪ Proper procedures in handling food allergens	3
	▪ Reading ingredient listings	1
	▪ Planning a hypo-allergenic menu	1
	▪ Identifying different types of food allergens	1
	▪ Identifying symptoms of food allergic reactions	1
Sources of training materials	▪ State agency (e.g., Kansas Department of Education)	2
	▪ Professional conferences / meetings (e.g., SNA)	2
	▪ Webinar / websites	2
	▪ Food allergy affiliated organizations (e.g., Food Allergy and Anaphylaxis Network)	1

Instrument Development

An online questionnaire was developed using the results from the focus groups and the information from the literature review. The questionnaire was divided into four sections as described below.

Demographic Characteristics of Respondents

Demographic questions were formulated using open-ended or multiple-choice formats. These questions were included to identify the demographic characteristics of school food service directors and school districts, and to compare effects on the construct measurements based on age, educational level, length of service, food safety certification and district size. Other questions, asking about the number of students with food allergies for example, were included in this section of the questionnaire. Questions such as age, number of students enrolled, participation rate in NSLP were formulated as open-ended questions, while others were multiple-choices questions. There were ten questions in total in this section.

Food Allergy Training Practices

Questions about food allergy practices measured whether there was any food allergy training in place in the school food service facility, as well as measuring the methods, frequency and resources of the food allergy training, if applicable. This section also included questions about food allergy documentation and incidences of food allergy cases in school food service facilities. A total of 14 items were included in this section.

Food Allergy Knowledge

Knowledge questions were developed based on the School Nutrition Association's *Food Allergy Guidance and Best Practices* (SNA, 2010), Food Allergy and Anaphylaxis Network's *School Guidelines for Managing Students with Food Allergies* with other related materials (FAAN, 2011), and the International Food Information Council Foundation's (IFIC) publication, *School Food service and Food Allergies: What We Need to Know* (IFIC, 2004). There were 12 questions included in this section, covering multiple key aspects of food allergies: symptoms (e.g., "Mark ALL symptoms that could indicate someone is having a food allergic reaction"), major food allergens (e.g., "Which of the following are the EIGHT MAJOR FOOD ALLERGENS"), label reading (e.g., "A person with peanut allergy should avoid products having which of the following on the ingredient label?"), treatment for food allergic reactions (e.g., "The most effective response to a severe food allergic reaction is...") and food allergy regulations (e.g., "Federal law requires all food allergens to be listed on the food labels.").

The total possible score for this section was 39. Seven questions were formulated as "True or False" questions. The correct answer was awarded one point, while the incorrect or "I don't know" answer was given zero points. One question was formulated as multiple-choice

format, and the rest of the questions (five questions) used a multiple-answer format with 31 points possible for getting all the answers correct.

Other Variables

A total of 31 questions were asked in this section (Table 3.4).

Attitudes toward food allergies

First, nine questions were asked to assess the respondents' attitudes toward food allergy, including the prevalence of food allergies, parents' reactions to food allergies, personal attitudes to serving students with food allergies, motivations to learn about food allergies and the perceived risks of students experiencing a food allergic reaction in the cafeteria. The respondents rated each item in this section using a five-point Likert-type Scale, ranging from 1, "strongly disagree", to 5, "strongly agree".

Issues involved in dealing with food allergies

To assess issues involved in dealing with food allergies, the respondents were asked to rate the level of difficulty in completing a listed of eight different tasks related to serving students with food allergies, using a five-point Likert-type Scale, ranging from 1, being "very difficult", to 5, being "very easy".

Perceived barriers in providing food allergy training

The 'perceived barriers' section measured the respondents' self-assessment of challenges in providing food allergy training. These seven items were also measured by a five-point Likert-type scale ranging from 1, "strongly disagree", to 5, "strongly agree". Prior to answering this question, the respondents were asked to indicate the level of ease or difficulty involved in

providing food allergy training to their employees. Only respondents who indicated “very difficult” (1) and “difficult” (2) in response to this question were eligible to rate a list of challenges identified in the focus groups, using a five-point Likert-type scale, ranging from 1, “strongly disagree”, to 5, “strongly agree”.

Cues to actions in providing food allergy training

Cues to action measured how the different cues prompted the respondents to provide food allergy training. Respondents rated all five items using a 5-point Likert-type scale, with 1 being “strongly disagree” and 5 being “strongly agree”.

Self-efficacy in providing food allergy training

Self-efficacy measured the respondents’ belief in their capability to perform and execute the food allergy training. This scale was measured using a five-point Likert-type Scale, ranging from 1, “strongly disagree”, to 5, “strongly agree”. The self-efficacy scale contained only three items.

The last two questions in the instrument sought to understand the food allergy statuses of the respondents and their family members. Detailed measures of the instrument are illustrated in Table 3.4. Complete online survey instrument is included in Appendix F.

The questionnaire was reviewed by three experts in the field of food allergy and school food service, and revised to establish the validity of the content.

Pilot Study

The inter-item reliability of multi-item scales was evaluated using Cronbach’s alpha test with the desirable goal $\alpha \geq 0.7$ (Cronbach, 1951). The participants of the pilot test were also

Table 3.4 Measures included in Online Questionnaire

<i>Categories</i>	<i>Question #</i>
Demographics	Q #1 – Q #12
Food allergy training practices	Q #13 – Q #27
Food Allergy knowledge	Q #28 – Q #33
Attitudes toward food allergies	Q #34
Issues Dealing with Food allergies	Q #36 – Q37
Perceived barriers	Q #38
Self-efficacy	Q #39
Food allergy status	Q #40 – Q #41

asked to rate the clarity of directions to make sure that they could follow the instructions of the questionnaire easily. An invitation to the pilot-study was sent to 72 participants randomly drawn from the database, and excluded from the data collection. The questionnaire was revised based on the results of the pilot study. Of 17 responses received, 15 were complete.

The results of Cronbach's alpha test indicated that groups of questions were reliable, i.e., issues involved in dealing with food allergies ($\alpha=0.81$); barriers to providing allergen-free food ($\alpha=0.90$); and cues to actions ($\alpha=0.82$).

The alpha value for attitudes toward food allergies with nine items was 0.73. The value of alpha increased to 0.76 with the deletion of the statement "A food allergic reaction is more likely to happen in a school cafeteria compared to the restaurants". A close examination of the total correlation of this item with other items on the scale was extremely low at .05, but all other items on this scale have good item- total correlations, ranging from 0.40 to 0.65 (Field, 2005).

Therefore, this item was not included in the data analysis for the attitude scale in the instrument.

The "self-efficacy" of the three items on the scale only had an α value of 0.60, which is below the desired level. Since the α value depends on the number of items on the scale (Cortina,

1993) and the α value increases with the number of items on the scale (Field, 2005), no further revisions to the questionnaire were made (Table 3.5).

Table 3.5 Results of Cronbach’s Alpha Test for the Survey Instrument

<i>Categories</i>	<i>No. of items</i>	<i>Cronbach's Alpha</i>
Attitudes toward food allergy	8	0.76
Issues dealing with food allergies	8	0.81
Perceived barriers	7	0.90
Cues to action	5	0.82
Self-efficacy	3	0.60

Data Collection

The final questionnaire was uploaded onto the Axio Online Survey System. An invitation email with the link to access the online survey was sent to a random selection of 1,500 CNPs from a national database (n=3,588) compiled across all seven USDA Food Distribution regions. The database included email contact information of child nutrition directors through public websites across the U.S. The invitation email explained the purpose of the study and the confidentiality and anonymity of their responses (Appendix G). The invitation email was sent as a blind carbon copy (BCC) to the sampled individual to avoid disclosure of participants’ identity (Dillman, 2000). Dillman (2000) suggested that follow-up emails at one week intervals were effective to “*jog memories*” and “*rearrange priorities*” (Dillman, 2000, p. 170), and hence helps to increase the response rate. Two additional contacts were made, as suggested (Appendix H and Appendix I). The participants were informed of an opportunity to win one of 30 \$50 gift cards from a national retailer of their choice. Detail information about the emailing schedule and total number of responses received was presented in Table 3.6.

Table 3.6 Emailing Schedule for the Online Survey and the Number of Reponses

	<i>Date</i>	<i>Responses</i>
Initial emails	February 6, 2012	145
First reminder emails	February 13, 2012	164
Second reminder emails	February 20, 2012	106
Cut-off date & total responses as of the cut-off date	February 26, 2012	415
Incomplete responses		75
Complete responses for data analyses		340

Data Analysis

The Statistical Package for the Social Sciences (SPSS) version 17.0 (2007, SPSS, Chicago, IL) was used to analyze the data. Prior to data analysis, dummy coding was applied to recode several variables into zeros and ones. These variables included whether a participant had received training previously, had a food allergy, or had family members with food allergies. Answers of “Yes” to these variables were recoded into “1” and the rest into “0”.

The recoding technique was also applied to regroup participants based on the number of students enrolled into small, medium and large district sizes. The district size categorization was defined based on previous studies by Hwang and Sneed (2004), Longley (2007), and Mincher (2010), and was grouped into small (student enrollment up to 2,499), medium (enrollment of 2,500–9,999 students) and large districts (more than 10,000 students enrolled). The self-efficacy level was also recoded into low and high categories, based on the cutoff point at 50 percentile.

To rank the most desirable topics for food allergy training, each respondent ranked three given topics out of six options. The top ranked item was then recoded into “3”, the second recoded into “2”, and the third recoded into “1”. Other items that were not picked as the top three were given a value of “0”. For knowledge questions, correct answers were re-coded to “1” and incorrect answers to “0”. Total knowledge scores (the sum of correct answers) were calculated using the “compute” function of SPSS prior to further analysis.

The differences in variables within each category of attitudes toward food allergy, barriers to providing allergen-free meals, and perceived barriers to providing food allergy training were tested using the repeated measures multivariate analysis of variance (MANOVA) test. Independent sample t-tests and analysis of variance (ANOVA) with post hoc analysis were used to compare mean scores of knowledge and other scaled data between and among CNPs' with different demographic characteristics.

Hierarchical regression analysis was used to investigate the relationships between independent variables (i.e., knowledge) and dependent variables (i.e., participants' demographic information, previous food allergy training, and history of personal and family food allergies). Logistic regression was used to investigate variables that associated with the implementation of food allergy training in the past 12 months. The chi-square test was used to investigate whether distributions of categorical variables (i.e. high and low self-efficacy) differ from one another. Statistical significance was set at $p < 0.05$.

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CHAPTER 4 - RESULTS

The purpose of this study is to assess Child Nutrition Professionals' (CNPs) knowledge, attitudes toward food allergies, and food allergy training practices in the U.S. The study was conducted in two phases and included both qualitative and quantitative methods.

The specific objectives of the qualitative study, conducted through focus groups, was to explore school food service directors' attitudes about food allergies; to identify issues surrounding dealing with food allergies; to explore current food allergy training practices in school food services; and to investigate perceived barriers to the provision of food allergy training and the events or circumstances that affect this decision. In addition, the study aimed to identify themes for the development of the online survey instrument.

The objectives of the quantitative study, an online survey, were manifold. First, the study aimed to examine current practices related to food allergy training in school food service establishments. Second, it sought to evaluate CNPs' knowledge about food allergy, to identify the factors that predict CNPs' food allergy knowledge, to assess CNPs' attitudes to food allergy in the context of school food service, and to investigate issues involved in dealing with food allergies. Third, in relation to training, the study aimed to identify barriers to providing employee allergy training in school food service contexts, to recognize events or circumstances that might affect the decision to provide food allergy training, and to examine CNPs' self-efficacy in providing food allergy training. Differences in knowledge, attitudes, and current practices were also evaluated based on the demographic characteristics of respondents and facilities. Last but not least, the study aimed to identify factors related to food allergy training implementation in the past 12 months.

Qualitative Research: Focus Groups

Participants

A total of 21 participants took part in one of three focus groups. The majority of participants (n=15) were school food service directors (71%), and the others were food service managers, supervisors, or coordinators of Child Nutrition Programs. Ten participants (48%) had professional credentials, such as being a Registered Dietitian (RD) and/or a School Nutrition Specialist (SNS). Years of experience in school food service management positions varied among participants, and ranged from 3 months to 24 years (mean=11.5 years). The participants also worked in school districts of various sizes (range 160–50,100 student enrollment; mean=11,860). Sixteen participants (76%) reported having students with documented food allergies in their school districts.

Attitudes toward Food Allergies

The participants were asked to discuss their thoughts on food allergies. The participants felt that food allergies had become more prevalent in the school food service setting, a typical response being: *“I grew up not knowing anybody that had a wheat allergy or a milk allergy, but it’s becoming a lot more prevalent.”* The types of food allergens were also thought to have increased, and more students were allergic to multiple food allergens.

The participants, in general, showed their commitment to serving students with food allergies. One of the participants commented, *“They (school food service employees) care about the kids, and they don’t want to make them sick.”* Despite understanding the role of school food service in ensuring the safety of the students, the participants felt that these students needed to learn to be more independent, as *“They can’t expect the world to take care of them on every little*

thing.” Furthermore, the participants felt that food allergic reactions could happen even if the food service employees tried to be diligent, particularly as “*you don’t know what a kid brings in his sack lunch.*” (Table 4.1).

Table 4.1 Selective Quotes: Attitudes toward Food Allergy

<i>Attitudes toward Food Allergies</i>	<i>Quoted Responses</i>
Increase in prevalence	<i>“It’s becoming a lot more prevalent and accommodations are being expected.”</i>
Increase in types of allergies	<i>“I want to say more and more variety in this year, and it’s more specific too.”</i>
An additional burden	<i>“It is frustrating because all this work and extra labor and money, food costs to serve them an allergen-free lunch.”</i>
Lack of control	<i>“You don’t know what a kid brings in his sack lunch.”</i>
Inconsistency of demands	<i>“There is an inconsistency between the demands that the families ask from us versus what the families are willing to do themselves at home.”</i>

Issues in Dealing with Food Allergies

The focus group participants recognized challenges in acquiring more detailed information on how to handle food allergy situations. A few participants wondered if the physicians actually performed the food allergy diagnostic test: “*What actual tests are they (physicians) performing, or are they going by a verbal request from the parent.*” The physicians might just follow instructions given by the parents because they might “*want to be on the safe side*” and to “*get the parents out of their offices.*” In addition, some physicians’ notes just include, “no dairy”. Participants wondered if this means no milk and/or eggs, because dairy could mean different things to different people.

Communication with school stakeholders, including school administrators, school nurses and parents, was another concern: “*Direct communication between the families and doctors,*

nursing staff, teachers and school food service employees usually would not happen at school, unless there was “a big issue” [that] happened.” Despite understanding the importance of keeping the student’s profile confidential, the participants hoped they would be informed about a student’s food allergies in a “timely manner”.

Meeting the various demands of the parents of students with food allergies was challenging to our participants. Some parents did not want their children to be “singled out”, but others did not want their children “around anyone that has brought something that will cause an allergic reaction.” This caused a dilemma for participants, who wished that parents had more “realistic expectations” of school food service (Table 4.2).

Table 4.2 Selective Quotes: Issues in Dealing with Food Allergies

<i>Issues in Dealing with Food Allergies</i>	<i>Quoted Responses</i>
Confidentiality issue	<i>“It is a HIPAA (Health Insurance Portability and Accountability) thing and they can’t share that information but if that child is within my classroom and I was a teacher, I sure would want to know that.”</i>
Additional cost	<i>“Their free meals are going to cost me twice as much as what I’m going to get reimbursed.”</i>
Availability of special products	<i>“Securing the product. Usually whatever “voodooos”, I don’t have to buy it.”</i>
Inconsistency of information	<i>“A parent tells me one thing but the form signed by a physician says something different.”</i>
Employees’ lack of skills	<i>“Someone that does not have any food service experience is not going to know to look for eggs in the 50th ingredient down the line.”</i>

Practices of Food Allergy Training

Training was an area of concern. The participants indicated that only informal training, for example, “one-on-one” training or “talking about food allergies in back to school meetings”,

had been provided to employees in their school districts. The participants were asked if they themselves were confident in providing food allergy training. Most of them had a lack of confidence in their ability to providing food allergy training, and preferred for “*individuals with credentials*” to be available: “*I would like to see some professional training because it is more in-depth. They have done the research.*” The specific topics that the participants would like incorporating into future training included identifying different types of food allergens, recognizing the symptoms of allergic reactions to food, handling food allergens, and reading food labels.

Perceived Barriers to Providing Food Allergy Training to the Employees

The participants agreed that additional food allergy training would be beneficial because it would support proper food allergen handling practices and improve the knowledge of employees in this area. The participants also wanted food allergy training to be “*easily accessible*”, so that they could request state officers to conduct this type of training.

Even so, the participants recognized that there were extra costs associated with food allergy training: the training fees and compensation for the attendees. “*I think we’re benefiting from the food allergy training, but it’s very difficult to justify. If we paid \$10 an hour for everybody (to go to training), I have 50 employees!*” one of the participants stated. The problem was aggravated when there was a budget cut in the school food service operation: “*The mechanics of it are phenomenal, and in a shrinking budget year, it’s tough to decide what to do.*”

Participants also identified “*scheduling*” and “*time constraints*” as barriers to providing food allergy training: “*The challenges would be getting the staff together and just relying on the budget.*” A few participants encountered problems with high turnover rates in their district, which led to additional expenditures in the training of new and temporary employees.

Lack of time was also mentioned as a barrier to providing food allergy training: *“It’s the director doing it in the midst of everything else they’re doing, so they can’t focus on that.”* One of the participants claimed that it was difficult to locate the training resources to conduct the training herself, because *“they are not in one place.”* (Table 4.3).

Table 4.3 Selective Quotes: Perceived Barriers to Providing Employee Food Allergy Training

<i>Perceived Barriers</i>	<i>Quoted Responses</i>
Employees’ time constraints and lack of funding	<i>“The challenges would be getting the staff together and just relying on the budget.”</i>
CNPs’ time constraints	<i>“It’s the director doing it in the midst of everything else they’re doing so they can’t focus on that.”</i>
Difficult to locate training resources	<i>“I know there are a lot of resources out there but it’s not in one place.”</i>

Triggers for Food Allergy Training

The participants discussed different events or circumstances that might trigger their decision to provide employee food allergy training. A few participants suggested that having family members and close friends with food allergies would make them more aware of preventive measures. Three participants commented that a past experience of anaphylactic shock at school had been “monumental.” Some of them also made the decision because they were inspired by messages delivered to them in professional meetings or at conferences (Table 4.4).

Table 4.4 Selective Quotes: Cues to Action for Employee Food Allergy Training

<i>Cues to Actions</i>	<i>Quoted Responses</i>
Personal experience	<i>“My husband had a lot of allergies. He had the needle test.”</i>
Past experience	<i>“If you have one of those that happened within your school, it’s extremely monumental.”</i>
Professional meeting/conferences	<i>“At the chapter meetings that are affiliated with the School Nutrition Association.”</i>

Quantitative Research: Online Survey

Of 1,500 invitation emails that were sent out, 72 were returned, yielding the effective sample size of 1,428. Of those 415 responded (29.1%), 75 were incomplete and removed from the data analyses. A total of 340 usable surveys (23.8%) were included in data analyses. The average completion time for this survey was 25 minutes and 54 seconds.

Demographic Characteristics

The majority of respondents were females (n=309, 90.9%), and 51–60 years of age (n=163, 47.9%). Most of the respondents held a bachelor degree (n=109, 32.1%) and were employed as Director of a Child Nutrition Program in a school district (n=264, 77.6%). Others were employed as Managers (10.0%), Supervisors (2.9%), and Program Coordinators (9.4%). The respondents had different professional credentials, with approximately 39% (n=131) holding School Nutrition Specialist (SNS) or School Nutrition Professional (SNP) certificates, followed by another 18% (n=60) who were Registered Dietitians (RDs).

About 73% (n=248) of respondents held ServSafe® certification, followed by Food Handler's certifications (n=103, 20.3%). Other respondents also indicated that they were certified in Hazard Analysis Critical Control Point (HACCP) (n=5, 1.5%) and other food safety certifications offered by the School Nutrition Association (SNA) (n=3, 1.0%).

Length of service in school food service ranged from three months to 40 years (mean=16.0±9.8 years). Length of employment in a management or supervisory position in Child Nutrition Programs ranged from three months to 35 years (mean=12.5±8.4 years). Of 294 respondents worked at district level, similar numbers of them worked for small (up to 2,499 student enrollment, n=116, 39.2%) and medium-sized (2,500-9,999 student enrollment, n=112,

37.8%,) school districts, while the rest (more than 10,000 enrollment, n=68, 23.0%) were from large districts. The average participation in NSLP was 67.0±19.3. Detailed demographic characteristics of respondents were illustrated in Table 4.5.

Table 4.5 Characteristics of Respondents (n=340)

<i>Characteristics</i>	<i>n</i>	<i>%</i>
Gender		
Male	31	9.1
Female	309	90.9
Age (years)		
21-30	19	5.6
31-40	45	13.2
41-50	75	22.1
51-60	163	47.9
61 or older	38	11.2
Education level		
High school or GED	53	15.6
Some college	73	21.5
Associate degree	32	9.4
Bachelor's degree	109	32.1
Master's degree	61	17.9
Doctoral degree (PhD, EdD, etc)	2	0.6
Other	10	2.9
Job Title		
Director of a school district	264	77.6
Manager of a single school	34	10.0
Coordinator of over several schools	26	7.6
Coordinator of a certain program within a school district	6	1.8
Supervisor within a single school	10	2.9
Professional credentials		
School Nutrition Specialist (SNS)/ School Nutrition Professional (SNP)	131	38.5
Registered Dietitian (RD)	60	17.6
Certified Dietary Manager (CDM)	20	5.9
Dietetic Technician, Registered (DTR)	5	1.5
Other	158	46.4
Food safety certification ^a		
ServSafe®	248	72.9
Food handlers' certification	103	30.3
Food safety certification by state	78	22.9
I do not currently hold any food safety certification	30	8.8
Other	27	7.9

^a The total number of responses exceeds 340 due to multiple responses.

Respondents' Previous Food Allergy Training

Of 340 respondents, 60% (n=204) have received food allergy training before, most of them through professional conferences or workshops (n=166), followed by self-study (n=131), and in their daily job (n=122). Most of the respondents indicated that they have obtained food allergy training materials from state agencies (n=165, 48.5%), the School Nutrition Association (SNA) (n=161, 47.4%), and USDA Food and Nutrition Services (FNS) (n=149, 43.8%). Others indicated that they had obtained resources from the Academy of Nutrition and Dietetics, (formerly known as the American Dietetic Association [ADA]), state Dietetic Associations, school nurses and contract management companies (Table 4.6).

Table 4.6 Respondents' Previous Food Allergy Training (n=340)

<i>Characteristics</i>	<i>n</i>	<i>%</i>
Previous food allergy training received		
Yes	204	60.0
No	136	40.0
Methods of training ^a		
Professional conferences or workshops	166	48.8
Self-study (e.g., reading, education modules, etc.)	131	38.5
Through the day to day job	122	35.9
Academic degree program (college courses, technical schools, etc.)	47	13.8
Other	15	4.4
Sources of food allergy training materials ^a		
State agency (e.g., Department of Education)	165	48.5
School Nutrition Association (SNA)	161	47.4
USDA, Food and Nutrition Services (FNS)	149	43.8
National Food service Management Institute (NFSMI)	100	29.4
Food Allergy and Anaphylaxis Network (FAAN)	87	25.6
I have not obtained materials from any these organizations	73	1.5
Other	31	9.1

^a The total number of responses exceeds 340 due to multiple responses.

***Food Allergy Documentation, Incidences and Training Practices in
School Food Service***

Among 296 respondents who worked for a school district, 221 of them had received food allergy documentation in the current academic year (range=1–910, median=20). Of 44 respondents in charge of a single school, 35 of them had received the similar documentation (range=1–100; median=3).

Allergic reactions in school cafeteria were rare, a total of 251 of respondents (73.5%) indicating “zero” incidences in the past 12 months. Only small number of participants reported one (n=18, 5.4%), two (n=13, 3.8%), and three (n=2, 0.6%) cases of allergic reactions in their facilities.

In order to evaluate the extent of diet modification for allergen-free meals, the respondents were asked how different or similar the allergen-free menu items were from regular menu items using a 5-point scale, ranging from 1, “very different”, to 5, “exactly the same”. The mean score for this measure was 2.6 ± 1.2 , indicating that allergen free meals are more dissimilar than similar to the regular menus. However, most of the respondents (n=150, 44.1%) indicated that their students with food allergies were served menu items that were “somewhat similar” to the regular menu items.

More than half of the respondents (n=200, 59%) had not provided food allergy training to their employees in the past 12 months. Of those who have provided food allergy training (n=140), most of the training was provided by the respondents themselves (n=99). Food allergy training was provided as a stand-alone course (n=74), as a part of a food safety training session (n=68), or in a group setting (n=96). Detailed findings are summarized in Table 4.7.

Table 4.7 Food Allergy Training Practices in School Food Service Environment (n=340)

<i>Characteristics</i>	<i>n</i>	<i>%</i>
Food allergy training provided to employees ^a		
Yes	140	41.2
No	200	58.8
Food allergy training provider ^{b c}		
Themselves	99	70.7
Another staff manager	38	27.1
State agency staff	33	23.6
Private training provider	16	11.4
Other	20	14.3
Structure of training ^b		
Part of food safety training	66	47.1
Separate session(s) on food allergies	74	52.9
Form of training ^b		
Group training	96	68.6
Individual “one-on-one” training as needed	30	21.4
Other	14	10.0
Frequency of training ^{b c}		
Annually to all food service employees	76	54.3
Once a year for food service employees who work directly with children with food allergies	52	37.1
When a food service employee is newly hired	33	23.6
Other	19	13.6
Total hours of training provided ^b		
Less than 1 hour	59	42.1
1–2 hours	69	49.3
3–4 hours	8	5.7
More than 4 hours	4	2.9

^a Sample size = 340^b Sample size = 140^c The total number of responses exceeds 140 due to multiple responses.

Total scores were calculated by adding up the point representing by each rank e.g., first (3 points), second (2 points), and third (1 point) multiply by the frequency. For example, the total score for “Identifying food items that contain allergy” was calculate as $(153*3)+(60*2)+(54*1)$. The mean scores were calculated by total score divided by number of respondents. The food allergy training topics that were identified as being most important were “Identifying food items

that contain allergens” (1.9±1.2) followed by “Avoiding cross-contact with food allergens” (1.0±1.1) and “Reading ingredient listings” (0.9±1.1).

Table 4.8 Ranked Topics of Importance for Food Allergy Training (n=340)

<i>Topics</i>	<i>Total scores</i>	<i>Mean±SD</i>	<i>Rank 1</i>	<i>Rank 2</i>	<i>Rank 3</i>	<i>Not ranked</i>
Identifying food items that contain allergens	633	1.9±1.2	153 (45.0)	60 (17.6)	54 (15.9)	73 (21.5)
Avoiding cross-contact with food allergens	365	1.1±1.1	46 (13.5)	80 (23.5)	67 (19.7)	147 (43.2)
Reading ingredient listings	303	0.9±1.1	45 (13.2)	60 (17.6)	48 (14.1)	187 (55.0)
Responding to an food allergic reaction	278	0.8±1.1	40 (11.8)	42 (12.4)	52 (15.3)	206 (60.6)
Recognizing symptoms food allergic reactions	256	0.8±1.1	37 (10.9)	57 (16.8)	53 (15.6)	193 (56.8)
Identifying appropriate substitutions	205	0.6±0.9	19 (5.6)	41 (12.1)	66 (19.4)	214 (62.9)

SD= Standard deviation

Food Allergy Knowledge

Of the maximum 39 points possible, the mean food allergy knowledge score was 31.9±3.3, ranging from 22 to 38. CNPs had basic food allergy knowledge about consequences (i. e., the fact that a food allergic reaction could lead to death [98.2%]), causes (92%), and the lack of a cure for food allergies (85%).

Approximately 21% (n=71) of respondents failed to point out the fact that lactose intolerance and milk allergy are two different conditions. Only one fourth of the respondents (n=85) recognized that only the major eight, not all food allergens need to be listed on food labels according to the current Food Allergen Labeling and Consumer Protection Act (FALCPA).

For the multiple answer questions, approximately 40% (n=138) correctly identified all the symptoms of a food allergic reaction. More than 95% of the respondents were able to identify most of the common symptoms of food allergic reactions, with the exception of asthma (n=186, 55%). Although the percentage of respondents who recognized individuals major allergens were greater than 90%, except soy (n=215, 63.2%) and fish (n=226, 66.5%); only 29% (n=100) recognized all eight major allergens. About 54% respondents (n=184) thought that artificial colorings were major food allergens.

About 19% (n=63) of the respondents correctly identified all terms used to indicate the presence of peanut or peanut derivatives that an individual with a peanut allergy should avoid, but only 21% (n=76) of them correctly placed “arachis oil” in this category. Slightly less than 15% (n=50) identified that milk allergen may be present in the form of “artificial butter flavor” (Table 4.9).

Table 4.9 Respondents' Answers to Food Allergy Knowledge Questions (n=340)

<i>Questions</i>	<i>1 point</i>	<i>0 point</i>
Food allergic reactions happen when the body’s immune system reacts to proteins in the food.	199 (58.5)	141 (41.5)
Lactose intolerance is the same as having a milk allergy.	269 (79.1)	71 (20.9)
A child can die from a food allergic reaction.	334 (98.2)	6 (1.8)
Modern medicine can cure food allergies.	299 (87.9)	41 (12.1)
A food allergic reaction can occur if a child touches a food item that contains allergens.	313 (92.1)	27 (7.9)
If a student has a milk allergy, removing cheese from an already assembled deli sandwich will prevent an allergic reaction.	290 (85.3)	50 (14.7)
Federal law requires all food allergens to be listed on food labels.	85 (25.0)	255 (75.0)
Mark ALL symptoms or conditions that could indicate someone is having a food allergic reaction.		
Anaphylaxis	299 (87.9)	41 (12.1)
Asthma	186 (54.7)	154 (45.3)
Vomiting	242 (71.2)	98 (28.8)
Hives/rashes	335 (98.5)	5 (1.5)
Facial swelling	331 (97.4)	9 (2.6)
Swelling of throat	334 (98.2)	6 (1.8)
Tingling sensation in or around the mouth	326 (95.9)	14 (4.1)
Shortness of breath	322 (94.7)	18 (5.3)

Table 4.9 Respondents' Answers to Food Allergy Knowledge Questions (continued)

<i>Questions</i>	<i>1 point</i>	<i>0 point</i>
Which of the following are the <u>EIGHT MAJOR FOOD ALLERGENS</u> ? Please choose up to 8 of the foods or ingredients below.		
Eggs	332 (97.6)	8 (2.4)
Wheat	325 (95.6)	14 (4.4)
Soy	215 (63.2)	125 (36.8)
Milk	325 (95.6)	15 (4.4)
Fish	226 (66.5)	114 (33.5)
Peanut	340 (100.0)	0 (0.0)
Tree nuts (almonds, walnuts, pecans, etc.)	311 (91.5)	29 (8.5)
Shellfish (shrimp, lobster, crab, etc.)	333 (97.9)	7 (2.1)
Artificial colorings (red dyes, yellow dyes, etc.) ^b	184 (54.1)	156 (45.9)
Corn ^b	257 (75.6)	83 (24.4)
Beef ^b	333 (97.9)	7 (2.1)
Citrus fruits (lemon, orange, etc.) ^b	290 (85.3)	50 (14.7)
Herbs (basil, thyme, chives, rosemary, etc.) ^b	330 (97.1)	10 (2.9)
A person with a <u>peanut allergy</u> should avoid products having which of the following on the ingredient label? Mark ALL that apply.		
“Arachis Oil”	70 (20.6)	270 (79.4)
“Whey” ^b	333 (97.9)	7 (2.1)
“Contains peanuts”	333 (97.9)	7 (2.1)
“May contain ground nut/mixed nuts”	320 (94.1)	20 (5.9)
“Processed in a factory which also processed food containing peanuts”	334 (98.2)	6 (1.8)
A student with a milk allergy should avoid products having which of the following on the ingredient label. Mark ALL that apply.		
“Whey”	240 (70.6)	100 (29.4)
“Casein”	209 (61.5)	131 (38.5)
“Contains milk”	338 (99.4)	2 (0.6)
“Milk solids”	329 (96.8)	11 (3.2)
“Artificial butter flavor”	50 (14.7)	290 (85.3)
The most effective response to a severe food allergic reaction is: <u>Injecting epinephrine (EpiPen)</u>	321 (94.4)	19 (5.6)

^a Number of respondents (percentage)

^b Incorrect answers

A one-way ANOVA analysis was used to compare the differences in mean knowledge scores based on the demographic characteristics of the participants, including education level, credentials, district size, previous food allergy training, their own food allergy status, and the food allergy status of their family members.

The results indicated that food allergy knowledge scores varied significantly depending on the educational level of the respondents ($F=11.5, p <.001$). Further analysis using LSD post hoc analyses showed that the respondents with a doctoral degree had significantly higher knowledge scores (34.0 ± 4.2) compared to respondents with a master's degree (33.3 ± 2.8), bachelor's degree (32.5 ± 2.9), associate degree (31.4 ± 2.9), some college education (31.2 ± 2.8), or a high school degree (29.4 ± 2.0) (Table 4.10).

Table 4.10 ANOVA with Post Hoc Analyses of Respondents' Knowledge Scores Based on Educational Level (n=340)

<i>Educational level</i>	<i>Mean±SD</i>	<i>F</i>	<i>Sig.</i>
		11.5	$p <.001$
High school or GED	29.4 ± 2.0^x		
Some college	31.2 ± 2.8^y		
Associate degree	31.4 ± 2.9^y		
Bachelor's degree	32.5 ± 2.9^{xy}		
Master's degree	33.3 ± 2.8^{xy}		
Doctoral degree	34.0 ± 4.2^z		
Other	33.6 ± 2.5^{xy}		

^{x, y, z} Means with different superscripts differ significantly by LSD's post hoc test ($p < 0.05$).

Food allergy knowledge scores also differed based on the size of the school districts the respondents worked for ($F=13.65, p <.001$). The respondents who worked for small districts (up to 2,499 enrollment) had significantly lower food allergy knowledge scores (31.2 ± 2.9) than their counterparts from medium (2,500-9,999 enrollment) ($32.7\pm 3.0, p <.05$) and large (10,000 enrollment and above) ($33.5\pm 3.1, p <.001$) districts (Table 4.11).

Table 4.11 ANOVA with Post Hoc Analyses of Respondents' Knowledge Scores Based on School District Size (n=296)^a

<i>District Size Represented by Respondents</i>	<i>Mean± SD</i>	<i>F</i>	<i>Sig.</i>
		13.7	$p <.001$
Small (up to 2,499)	31.2 ± 2.9^x		
Medium (2,500–9,999)	32.7 ± 3.0^y		
Large (10,000 and more)	33.5 ± 3.1^y		

^{x, y} Means with different superscripts differ significantly by LSD post hoc test ($p < 0.05$).

^a Based on 296 respondents worked for a school district

Using hierarchical regression analysis, relationships between knowledge scores and independent variables were identified. The first model, with three independent variables, age, personal and family food allergy statuses only explained 3% of the variance ($\Delta R=.03$, $R^2_{adj}=.02$, $p < .05$). When other variables (i.e., education level, years of experiences in school food service and as managerial staff, and previous food allergy training received) were added, the second model was greatly improved, with an additional 23% of the variance explained ($\Delta R=.23$, $R^2_{adj}=.24$, $p < .001$). In the second model, age of the respondents ($\beta = -.16$, $p < .01$), education level ($\beta = .31$, $p < .001$), years of experience in management positions ($\beta = .17$, $p < .05$) and previous training received ($\beta = .24$, $p < .001$) were significant predictors of food allergy knowledge scores (Table 4.12).

Table 4.12 Hierarchical Multiple Regression Analyses Predicting Food Allergy Knowledge from Other Independent Variables (n=340)

<i>Variables</i>	<i>Model 1</i>			<i>Model 2</i>		
	<i>B</i>	<i>SE</i>	<i>β</i>	<i>B</i>	<i>SE</i>	<i>β</i>
Constant	33.23	.63		32.85	.86	
Age	-.42	.17	-.13*	-.50	.18	-.16**
Personal food allergy issues	-.69	.47	-.08	-.82	.42	.10
Family food allergy issues	.46	.36	.07	.38	.32	.06
Education level				.67	.11	.31***
Years of Experience (regardless position)				-.01	.03	-.02
Years of Experience (management position)				.07	.03	.17*
Previous food allergy training status				1.56	.33	.24***
R^2	.03			.25		
ΔR^2	.03**			.23***		
<i>Adjusted R²</i>	.02			.24		

*** $p < .001$ ** $p < .01$ * $p < .05$

Attitudes toward Food Allergies

Respondents had positive attitudes toward food allergy in general. Most of the respondents (n=161, 47.4%) felt that it was worthwhile to learn more about food allergy management (mean=4.3±1.0). The mean scores for the other questions were around 3.5 on the

five-point Likert Scale. The distribution of most of the attitude questions showed that the majority of respondents had a positive attitude toward food allergy and food allergy training. The only exception was the question, “Parents often over-react when their children have food allergies”, which led to a split between positive and negative responses (Table 4.13).

Table 4.13 Attitudes of Respondents about Food Allergies in School Food service Environment (n=340)

<i>Items</i>	<i>Mean±SD</i>	<i>Strongly disagree</i>	<i>Disagree</i>	<i>Neither agree nor disagree</i>	<i>Agree</i>	<i>Strongly agree</i>
		←————— <i>n (%)</i> —————→				
It is worthwhile to learn more about food allergy management	4.3±1.0 ^v	15 (4.4)	6 (1.8)	18 (5.3)	140 (41.2)	161 (47.4)
Accommodating students with food allergies requires extra time and effort	3.8±1.1 ^w	20 (5.9)	30 (8.8)	40 (11.8)	151 (44.4)	99 (29.1)
Food allergies have become more prevalent in my school district	3.8±1.1 ^w	17 (5.0)	31 (9.1)	71 (20.9)	114 (33.5)	107 (31.5)
Providing allergen-free meals is an important part of my job	3.8±1.0 ^w	9 (2.6)	22 (6.5)	98 (28.8)	121 (35.6)	90 (26.5)
Food allergy is a major concern in school food service compared to other issues	3.6±1.0 ^{wx}	10 (2.9)	34 (10.0)	102 (30.0)	134 (39.4)	60 (17.6)
Some doctors provide food allergy documentation for children without having done thorough diagnostic testing	3.5±1.0 ^{wx}	18 (5.3)	26 (7.6)	117 (34.4)	127 (37.4)	52 (15.3)
I am experiencing a broader variety of food allergies in my school district	3.5±1.1 ^{wxy}	18 (5.3)	57 (16.8)	78 (22.9)	128 (37.6)	59 (17.4)
Parents often over-react when their children have food allergies	2.8±1.0 ^{wxyz}	35 (10.3)	86 (25.3)	135 (39.7)	65 (19.1)	19 (5.6)

Five-point Likert Scale: 1=Strongly disagree; 3=Neither agree nor disagree; 5=Strongly agree
SD=Standard Deviation

^{v, w, x, y, z} Means with different superscripts differ significantly in the repeated measure of MANOVA ($p < 0.05$).

Issues in Dealing with Food Allergies

Respondents were asked to rate the level of difficult involved in providing food allergy training to their employees, ranging from 1, “very difficult”, to 5, “very easy”. The overall mean for this multiple item scale was 2.6 ± 0.7 .

None of these items had a mean score of more than three on the five-point Likert-type scale. This result indicated that performing the listed tasks was somehow difficult for the respondents. Of all the items, the respondents rated “Meeting last-minute allergen-free meal requests” as the most difficult task to perform (2.2 ± 1.0 , $p < .01$). Results indicated that it was significantly easier for the participants to verify the physician’s order concerning a child’s food allergy ($p < .001$) and to communicate with other stakeholders about the students’ food allergy ($p < .001$) based on repeated measures of MANOVA (Table 4.14).

A one-way ANOVA analysis was conducted to compare mean scores of the ease or difficulty of accomplishing the task of serving students with food allergies among school districts of various sizes. Result indicated that the ratings of the respondents to “Meeting last-minute allergen-free meal requests” were significantly different among groups ($F = 6.81$, $p < .001$). LSD post hoc analysis showed that respondents from larger districts faced more difficulties in fulfilling these last-minute requests. A similar result was also found for “Purchasing allergen-free products” ($F = 6.96$, $p < .001$).

Table 4.14 Issues in Dealing with Food Allergies (n=340)

<i>Items</i>	<i>Mean±SD</i>	<i>Very Difficult</i>	<i>Difficult</i>	<i>Neither difficult nor easy</i>	<i>Easy</i>	<i>Very easy</i>
	← <i>n (%)</i> →					
Meeting last-minute allergen-free meal requests	2.2±1.0 ^w	86 (25.3)	136 (40.0)	73 (21.5)	39 (11.5)	6 (1.8)
Purchasing allergen-free products	2.5±1.0 ^x	53 (15.6)	135 (39.7)	99 (29.1)	42 (12.4)	11 (3.2)
Obtaining detailed information about a specific student's food allergy	2.5±1.1 ^x	59 (17.4)	122 (35.9)	90 (26.5)	56 (16.5)	13 (3.8)
Ensuring employees have adequate skills to prepare allergen-free food	2.6±1.0 ^x	38 (11.2)	134 (39.4)	107 (31.5)	50 (14.7)	11 (3.2)
Having up-to-date ingredient information	2.6±1.0 ^x	41 (12.1)	143 (42.1)	82 (24.1)	63 (18.5)	11 (3.2)
Planning allergen-free menus similar to the regular menus	2.6±0.9 ^x	26 (7.6)	139 (40.9)	123 (36.2)	49 (14.4)	3 (0.9)
Verifying the physician's order that a child has a food allergy	2.8±1.1 ^{xyz}	40 (11.8)	87 (25.6)	122 (35.9)	73 (21.5)	18 (5.3)
Communicating with other stakeholders about students' food allergies	2.9±1.0 ^{xy}	29 (8.5)	94 (27.6)	110 (32.4)	90 (26.5)	17 (5.0)

Five-point Likert Scale: 1=Very Difficult; 3=Neither difficult nor easy; 5=Very easy

SD=Standard Deviation

^{w, x, y, z} Means with different superscripts differ significantly in the repeated measure of MANOVA ($p < 0.05$).

Despite the insignificance of ANOVA analysis on the overall effect, LSD post hoc analysis of each individual item indicated that large school districts faced more problems in ensuring their employees had adequate skills to prepare allergen-free foods than small school districts ($p < .05$). In addition, medium-sized school districts also reported having significantly more difficulty in verifying physicians' orders than small school districts ($p < .05$) (Table 4.15).

Table 4.15 ANOVA Analyses of Issues in Dealing with Food Allergies Based on School District Size (n=296)^a

<i>Items</i>	<i>Mean±SD</i>				<i>F</i>	<i>p</i>
	<i>Overall</i>	<i>Small</i>	<i>Medium</i>	<i>Large</i>		
Meeting last-minute allergen-free meal requests	2.2±1.0	2.4±1.0 ^x	2.1±1.0 ^y	1.9±0.9 ^y	6.81	<.001***
Purchasing allergen-free products	2.4±1.0	2.7±1.0 ^x	2.3±1.0 ^y	2.2±0.9 ^y	6.96	<.001***
Obtaining detailed information about a specific student's food allergy	2.5±1.1	2.6±1.1	2.4±1.0	2.3±1.0	1.40	.25
Having up-to-date ingredient information	2.5±1.0	2.6±1.0	2.4±1.0	2.5±1.0	0.96	.38
Planning allergen-free menus similar to the regular menus	2.5±0.9	2.6±0.9	2.3±1.0	2.2±0.9	1.47	.23
Ensuring employees have adequate skills to prepare allergen-free food	2.5±1.0	2.6± 1.0 ^x	2.5±1.0 ^x	2.4±0.9 ^y	2.36	.10
Verifying the physicians' order that a child has a food allergy	2.8±1.0	2.9±1.0 ^x	2.6±1.1 ^y	2.7±0.9 ^x	2.30	.10
Communicating with other stakeholders about students' food allergies	2.9±1.0	2.9± 1.1	2.9±1.1	2.8±0.9	0.50	.61

Five-point Likert Scale: 1=Very Difficult; 3=Neither difficult nor easy; 5=Very easy
SD=Standard Deviation

^a Based on 296 respondents worked for a school district

^{x, y} Means with different superscripts differ significantly using the LSD post hoc test ($p < 0.05$).

*** $p < .001$

An independent t-test was used to determine if there were similar issues faced by the respondents from school food service facilities that had experienced food allergic reactions in the past 12 months and those that had not. Even though the overall mean scores of these eight items between facilities that had experienced food allergic reactions (2.3±0.6) and those that had not (2.7±0.7) were not statistically different ($F=2.67, p=.10$), further analysis showed significant differences existed between individual items as illustrated in table 4.16.

Table 4.16 Comparison of Issues Dealing with Food Allergies between School Food Service Facilities with and without Previous Food Allergic Reactions (n=287)^a

<i>Items</i>	<i>Previous food allergic reactions (n=34)</i>	<i>No Previous Food allergic reaction (n=253)</i>	<i>t</i>	<i>p</i>
Meeting last-minute allergen-free meal requests	2.3±1.0	1.9±0.8	8.19	.01**
Purchasing allergen-free products	2.6±1.0	1.0±0.8	9.50	.01**
Obtaining detailed information about a specific student's food allergy	2.6±1.1	2.3±0.9	4.14	.03*
Ensuring employees have adequate skills to prepare allergen-free food	2.7±1.0	2.4±0.9	.69	.41
Having up-to-date ingredient information	2.7±1.0	2.3±1.0	.29	.59
Planning allergen-free menus similar to the regular menus	2.7±0.9	2.3±0.8	.09	.76
Verifying the physician's order that a child has a food allergy	2.9±1.1	2.7±1.1	.52	.47
Communicating with other stakeholders (school administrators, nurses, parents, etc.) about students' food allergies	3.0±1.1	2.5±1.0	.03	.87

Five-point Likert Scale: 1=Very Difficult; 3=Neither difficult nor easy; 5=Very easy
SD=Standard Deviation

** $p < .01$ * $p < .05$

^a Based on 287 respondents responded to this question.

Perceived Barriers to Providing Employee Food Allergy Training

Perceived barriers to providing employee food allergy training were assessed two-tiers. The respondents who selected “difficult” and “very difficult” in answer to the question “Providing food allergy training to the food service employees in my school district is...” were referred directly to a list of challenges about implementing employee food allergy training.

Time constraints on the respondent themselves (3.8±1.0), as well as the employees (3.5±1.1) were among the greatest challenge to providing employee training, while “Lack of support from school administrators and staff” was not viewed as being as much of a problem as

the other challenges (2.9±1.1). About 43% (n=45) of respondents expressed a neutral view on the support offered by school administrators and staff (Table 4.17).

Table 4.17 Perceived Barriers to Providing Employee Food Allergy Training (n=97)^a

<i>Items</i>	<i>Mean±SD</i>	<i>Strongly disagree</i>	<i>Disagree</i>	<i>Neither agree nor disagree</i>	<i>Agree</i>	<i>Strongly agree</i>
		←————— <i>n (%)</i> —————→				
I don't have enough time	3.8±1.0 ^w	2 (1.9)	11 (10.5)	18 (17.1)	49 (46.7)	25 (23.8)
I don't have adequate funding	3.5±1.1 ^x	5 (4.8)	14 (13.3)	28 (26.7)	35 (33.3)	23 (21.9)
Employees don't have time to attend food allergy training	3.5±1.1 ^x	6 (5.7)	13 (12.4)	24 (22.9)	42 (40.0)	20 (19.0)
Training resources are not easily accessible	3.5±1.0 ^x	3 (2.9)	13 (12.4)	31 (29.5)	40 (38.1)	18 (17.1)
There is a lack of food allergy expertise in my district	3.4±1.0 ^x	5 (4.8)	10 (9.5)	35 (33.3)	42 (40.0)	13 (12.4)
Employees aren't interested in learning about food allergies	3.2±1.0 ^{xy}	7 (6.7)	18 (17.1)	34 (32.4)	38 (36.2)	8 (7.6)
I don't have support from school administrators and staff	2.9±1.1 ^{xyx}	11 (10.5)	21 (20.0)	45 (42.9)	19 (18.1)	9 (8.6)

Five-point Likert Scale: 1=Strongly disagree; 3=Neither agree nor disagree; 5=Strongly agree
SD=Standard Deviation

^a Based on 97 respondents who indicated providing employee food allergy training was “difficult” or “very difficult”

^{w, x, y, z} Means with different superscripts differ significantly in the repeated measure of MANOVA ($p < 0.05$).

A one-way ANOVA procedure was conducted to test the significant differences for each individual item based on school district size. The differences were significant for the two items, “I don't have enough time” ($F=3.49, p < .05$) and “Employees don't have time to attend food allergy training” ($F=5.10, p < 0.01$). Respondents from medium-sized school districts reported that time-related issues were a problem significantly more often than respondents from small school districts did. Despite the insignificance on the main effect, the additional LSD post hoc

analysis also indicated respondents from small school districts felt providing food allergy training to their employees was more of a challenge, due to the lack of expertise in their districts compared to their counterparts from large school districts ($p < .05$) (Table 4.18).

Table 4.18 ANOVA analysis of Perceived Barriers to Providing Employee Food Allergy Training Based on District Size (n=97)^a

<i>Items</i>	<i>Mean±SD</i>				<i>F</i>	<i>p</i>
	<i>Overall</i>	<i>Small</i>	<i>Medium</i>	<i>Large</i>		
I don't have enough time	3.8±1.0	3.5±1.2 ^x	4.1±0.8 ^y	3.8±1.0 ^x	3.59	.02**
I don't have adequate funding	3.5±1.1	3.3±1.2	3.8± 1.1	3.5±0.9	1.26	.29
Employees don't have time to attend food allergy training	3.5±1.1	3.1±1.3 ^x	3.7± 1.0 ^y	3.9±0.7 ^y	5.10	.001***
Training resources are not easily accessible	3.5±1.1	3.6±1.2	3.7±0.9	3.2±0.9	1.47	.24
There is a lack of food allergy expertise in my district	3.4±1.0	3.6±1.2 ^x	3.5±0.9 ^x	3.1±0.9 ^y	2.18	.12
Employees aren't interested in learning about food allergies	3.2±1.0	2.9±1.1	3.3±1.0	3.4±0.9	2.29	.11
I don't have support from school administrators and staff (e.g., superintendents, school staff, school nurses, etc.)	3.0±1.1	3.0±1.2	2.9±1.0	2.9±1.0	.14	.87

SD=Standard Deviation

^a Based on 97 respondents who indicated providing employee food allergy training was “difficult” or “very difficult”

^{x,y} Means with different superscripts differ significantly using the LSD post hoc test ($p < 0.05$).

*** $p < .001$ ** $p < .01$

Triggers for Food Allergy Training

When asked about how likely certain conditions might influence their decision to provide food allergy training, the respondents rated an allergic reaction that happened in the cafeteria in the past (4.1±1.0), followed by a regulatory requirement for accommodating students with food allergies (4.1±0.8) would trigger a training. Additional repeated measures of MANOVA further

confirmed that these two events might significantly influence the decision to provide training, compared to other circumstances (Table 4.19).

Table 4.19 Triggers for Food Allergy Training (n=340)

<i>Items</i>	<i>Mean±SD</i>	<i>Very unlikely</i>	<i>Unlikely</i>	<i>Neither likely nor unlikely</i>	<i>Likely</i>	<i>Very likely</i>	
		←————— <i>n (%)</i> —————→					
An allergic reaction happened in the cafeteria	4.1±1.0 ^x	8 (2.4)	16 (4.7)	62 (18.2)	105 (30.9)	149 (43.8)	
Regulatory requirements for managing food allergies in schools (e.g., The Rehabilitation Act of 1973)	4.1±0.8 ^x	5 (1.5)	4 (1.2)	67 (19.7)	155 (45.6)	109 (32.1)	
Lessons learned about the importance of food allergy prevention from professional conferences/meetings (e.g. SNA)	3.9±0.9 ^y	7 (2.1)	16 (4.7)	64 (18.8)	182 (53.5)	71 (20.9)	
Media reports about fatal food allergic reactions in schools	3.8±0.9 ^y	7 (2.1)	20 (5.9)	83 (24.4)	157 (46.2)	73 (21.5)	
Personal experience of food allergy (e.g., family and friends having a food allergy)	3.8±1.0 ^y	11 (3.2)	15 (4.4)	95 (27.9)	140 (41.2)	79 (23.2)	

Five-point Likert Scale: 1=Very unlikely; 3=Neither likely nor unlikely; 5=Very likely
SD=Standard Deviation

^{x, y} Means with different superscripts differ significantly for repeated measures of ANOVA ($p < 0.05$).

Self-efficacy

The overall mean self-efficacy score of 3.7±0.8 indicated that the respondents demonstrated moderate levels of self-efficacy in providing food allergy training to their employees. The mean score of each individual item on the self-efficacy scale was less than four on the five-point Likert-type Scale, despite the fact that the majority of the respondents agreed or strongly agreed of items listed in this scale (Table 4.20).

Table 4.20 Self-efficacy of Respondents in Providing Employee Food Allergy Training (n=340)

<i>Items</i>	<i>Mean±SD</i>	<i>Strongly disagree</i>	<i>Disagree</i>	<i>Neither agree nor disagree</i>	<i>Agree</i>	<i>Strongly agree</i>
I can overcome challenges to providing food allergy training if I try hard	3.9±0.9 ^x	8 (2.4)	15 (4.4)	69 (20.3)	174 (51.2)	74 (21.8)
I can find information about food allergies for employee training	3.6±1.0 ^y	14 (4.1)	38 (11.2)	76 (22.4)	153 (45.0)	59 (17.4)
I can provide food allergy training to my employees when needed	3.6± 1.0 ^y	13 (3.8)	41 (12.1)	75 (22.1)	161 (47.4)	50 (14.7)

Five-point Likert Scale: 1=Strongly disagree; 3=Neither agree nor disagree; 5=Strongly agree
SD=Standard Deviation

^{x, y} Means with different superscripts differ significantly for repeated measures of MANOVA ($p < 0.05$).

Chi-square analysis was used to compare the ease of providing employee food allergy training (easy, neutral, difficult) based on the respondents' self-efficacy level (high or low). Chi-square results showed that the respondents with a low self-efficacy level felt it was more difficult to provide food allergy training to their employees compared to their counterparts, $\chi^2(2) = 13.47$, $p < .001$ (Table 4.21)

Table 4.21 Level of Ease and Difficulty of Providing Employee Food Allergy Training Based on Self-efficacy (n=340)

<i>Level of ease or difficult to provide food allergy training</i>	<i>Level of self-efficacy</i>		<i>Chi-square</i>	<i>Sig.</i>
	<i>Low self-efficacy</i>	<i>High self-efficacy</i>		
	<i>n (%)</i>			
Difficult	18 (5.3)	13 (3.8)	13.47	$p < .001$
Neutral	62 (18.2)	36 (10.6)		
Easy	88 (25.9)	123 (36.2)		

Food Allergy Training Decision

Logistic regression analysis (Logit) was performed to identify the variables that differentiate the school food service facilities in which food allergy training had and had not been provided in the past 12 months. Prior to running the logit analysis, data was tested for multicollinearity. The correlations between all the variables were below the recommended level of .80 (Tabachnick & Fidell, 2001), and hence multicollinearity was not an issue.

The goodness-of-fit of model was used to assess the significance of all three models. The χ^2 for Model 1 was 11.82, with an observed significance level of $p < .01$. The Nagelkerke R^2 was .05, indicating the model was not a very good fit. This model could only differentiate whether the training had or had not been implemented with an accuracy of 60.9%.

The significance level of $p < .001$ associated with χ^2 for Model 2 (129.46) showed that the overall fit of this model had significantly improved. This model has a Nagelkerke R^2 value of .43, and could discriminate between the school food service facilities in which food allergy training had or had not been implemented with an accuracy of 76.5%. The logit model showed that receiving previous food allergy training ($p < .001$) and food allergy knowledge scores ($p < .001$) were significant here. Higher food allergy knowledge scores ($B = .20$) and previous food allergy training ($B = .20$) positively predicted the likelihood that food allergy training had been provided in the last 12 months.

The χ^2 for Model 3 was 136.97, and the model was significant ($p < .001$). This model was improved from Model 2 by 7.51%, and therefore the increment was insignificant. Even so, self-efficacy was found to be a significant predictor in Model 3 ($B = .76$, $p < .001$). This model could differentiate whether the training has and has not been implemented with the accuracy of 78.5% (Table 4.23).

Table 4.22 Logistic Regression of Factors Differentiating Facilities with and without Food Allergy Training in Past 12 months (n=340)

<i>Variables</i>	<i>Model 1</i>				<i>Model 2</i>				<i>Model 3</i>			
	<i>B</i>	<i>Wald</i>	<i>Exp(B)</i>	<i>95% CI</i>	<i>B</i>	<i>Wald</i>	<i>Exp(B)</i>	<i>95% CI</i>	<i>B</i>	<i>Wald</i>	<i>Exp(B)</i>	<i>95% CI</i>
Constant	-0.59	7.46**	0.55		-8.90	31.70***	0.00		-9.36	27.73***	0.00	
Years of school food service experience	-0.05	5.03*	0.95	(0.92, 0.99)	-0.01	0.08	0.99	(0.90, 1.04)	-0.01	0.10	0.99	(0.94, 1.04)
Years of school food service experience in management position	0.08	10.35***	1.08	(1.03, 1.13)	0.03	1.16	1.03	(0.98, 1.09)	0.04	1.38	1.04	(0.98, 1.10)
Previous food allergy training received-					2.49	54.75***	12.04	(6.23, 23.37)	2.36	47.34***	10.62	(5.42, 20.81)
Previous food allergic reaction					0.12	0.21	1.13	(0.67, 1.89)	0.05	0.03	1.05	(0.62, 1.79)
Food allergy knowledge scores					0.20	18.58***	1.23	(1.12, 1.34)	0.18	13.87***	1.20	(1.09, 1.32)
Self-Efficacy									0.76	7.05**	2.14	(1.22, 3.76)
Cues to Action									-0.03	0.35	0.55	(0.89, 1.07)
Attitudes toward food allergies									0.02	0.64	1.03	(0.97, 1.09)
-2 log Likelihood	448.88				331.24				323.73			
Model χ^2	11.82**				129.46***				136.97***			
Nagelkerke R^2	.05				.43				.45			

CI=confidence interval

*** $p < .001$ ** $p < .01$ * $p < .05$

CHAPTER 5 - DISCUSSIONS AND IMPLICATIONS

Qualitative Research: Focus Groups

The purpose of this study was to explore Child Nutrition Professionals' (CNPs) attitudes toward food allergies and the current practices of food allergy training in school food service operations. The study also sought to explore issues related to dealing with food allergies.

The participants revealed that they were having increased numbers of students with food allergies in their districts. A study by Gandy, Yardrick, Boudreaux, and Smith (1991) indicated that food allergies contributed to 57% of the modified menus and recipes in school food service and therefore should be taken seriously. They faced more challenges preparing food that contained allergens they were unfamiliar with. Since these food allergens could be present in many food items, the school food service employees should make extra efforts to check with the manufacturers if they suspect the presence of food allergens in some products.

The participants pointed out several issues related to food allergies, such as difficulties in communicating with other stakeholders about food allergies. A student's food allergy information was not always shared and disseminated through the communication chain. This could lead to the accidental exposure or ingestion of a food allergen by a student (Nowak-Wegrzyn, Isenberg, & Wood, 2000). In order to enhance information sharing, the school food service management team needs to be included when discussions happen between parents, teachers, and school nurses regarding a child's food allergy and in other food allergy-related meetings.

Issues related to obtaining accurate food allergy information from physicians were also raised by our participants. Support and cooperation from school healthcare providers (i.e., physicians and school nurses) should be sought to ease the understanding and interpretation of food allergy documentation. Despite the fact that there is a confidentiality

issue involved, the school food service staff should be given the authority to access, acquire and request the relevant information, if necessary.

While bigger school districts face challenges such as a large number of students on free or reduced meal plans without proper documentations or more requests for allergen-free food, smaller school districts have more concerns related to accessibility of special products and the availability of health professionals, for example nurses and Registered Dietitian (RD) stationed at school. These findings suggest that the federal or state agency should allocate resources tailored to the needs of school districts of different sizes. For example, they could make special products more accessible by suggesting reliable suppliers to small school districts or they could negotiate with suppliers to bring in special products with regular deliveries for those that “*don’t even have a Dillon (national chain retailer) nearby.*”

Food allergy training is not mandated by the federal government at this juncture, and its implementation varies from state to state. The Massachusetts Department of Elementary and Secondary Education (ESE) mandates that school food service staff members undergo food allergy awareness training in conjunction with the Allergen Awareness Act, unless they fulfill two exempted conditions specified in this law (ESE, 2011). The impacts of this mandated law might need to be evaluated, before other states adopting this practice to nurture a safe dining environment by taking preventive measures.

Some of the barriers to providing food allergy training were similar to those found in previous studies related to different program implementation in school food service: time and financial constraints, employee turnover, and lack of resources (Giampaoli, Sneed, Cluskey, & Koenig, 2002). To alleviate barriers such as time constraints and limited budget, training sessions could be incorporated as part of the food safety training or as a “Back to School” workshops. A federal or state agency may need to subsidize the training program and make it more affordable to the Child Nutrition Programs and their staff.

Participants suggested topics that they would like to be included in the food allergy training. This finding was consistent with a previous study performed by Kendrick and Gangaharan (2001). The researchers reported that the most desirable topics for food allergy training included label reading, allergen substitutions, and cross-contact prevention. The training materials should be concise and include those topics that participants identified as crucial in serving students with food allergies.

Previous studies indicated that school food service employees needed assistance to plan hypoallergenic menus (Gandy et al., 1991). Allergen-free meals provided to students with food allergies were often not palatable because the school food service personnel either lacked the knowledge or genuine interest needed to prepare more palatable allergen-free food (Marklund, Wilde-Larsson, Ahlstedt, & Nordstrom, 2007). These areas also need to be addressed in the training sessions.

The majority of participants did not feel comfortable providing food allergy training to employees themselves, because many of them had never been trained in this topic. It was evident that CNPs needed extra guidance and coaching from professional organizations and state agencies to assist them with training sessions. Since some participants were not able to locate and retrieve the food allergy information they needed, the federal and state child nutrition program leaders and professional organizations may need to publicize the resources available through multiple channels (i.e., professional meetings, workshops, publications and other communication channels).

The study suggested several stimuli that prompted participants to provide food allergy training. Efforts should be made to encourage participants to take preventive measures, rather than reactive measures, before a food-related allergic reaction occurs or they are “*on the television*”, as one of the respondents stated.

Quantitative Research: Online Survey

To our knowledge, this is the first study that comprehensively assessed CNPs' food allergy knowledge and investigated issues for dealing with food allergies as well as attitudes toward food allergies in the school food service environment. This study also sought to examine current practices related food allergy training, which has not yet been investigated in-depth.

This study supported the effectiveness of reminder emails in increasing the response rate. The response rate increased as much as 113.1% and 64.6% within a week after the first and second reminder emails were sent, respectively. Sheehan (2001) showed that follow-up reminders increased the response rate in the online survey by as much as 25% and multiple follow-ups resulted in higher response rates compared to a single reminder. An analysis of email survey response rates over 15 years (1986-2000) indicated that email became a more popular survey tool over the years, but that mean response rates appeared to be dwindling (i.e. 61.5% in 1986 vs. 24% in 2000) (Sheehan).

During the current academic year, 74.6% respondents (n=221) working for a school district and 93% respondents (n=41) representing a single school reported that they had received food allergy documentations. These numbers of food allergy documentations reported were similar to the 84% food allergy documentations received by school nurses in a study conducted by Carlisle et al. (2010). This significant number of food allergy documentations received further confirmed food allergy may become a future challenge in the school food service environment (Young, Muñoz-Furlong, & Sicherer, 2009).

Food Allergy Training

Two-thirds of the respondents had undertaken food allergy training, mainly through three channels: self-study, professional conferences, and daily work. Another study found

that school nurses learned about food allergy management through conferences (37%), course work (29%) and mentoring (20%) (Carlisle et al., 2010). These findings suggested that different learning platforms could be potentially utilized by CNPs to improve their understanding about food allergies. In addition, Molaison and Nettles (2010) concluded that many school food service directors and managers obtained their resources through district offices, which was consistent with both the focus group and this online survey. The crucial role played by district and state agencies, such as the Department of Education, as resource disseminators, and results of this study is consistent with previous findings.

Compared to the food safety training that is mandated by the federal government, implementation of food allergy training is typically voluntary. The School Nutrition Association (SNA) Operations Report 2011 showed that 55.6% of the respondents required all of their employees to be trained about food safety. An additional 28.5% required employees holding a particular position in their operation to be trained about food safety (SNA, 2011). However, this study showed that less than half of the respondents have provided food allergy training to their employees (41.2%, n=140). Food allergy presents similar challenges as foodborne illnesses, and therefore, food allergy training should be encouraged in Child Nutrition Programs.

Furthermore, the length of food allergy training reported by the respondents of this study was shorter than other food safety training. On average, most kitchen managers received more than 10 hours of food safety training while food handlers underwent 8 hours of training (SNA, 2009). Of those who provided food allergy training in this study, 59 participants indicated that they spend less than one hour for food allergy training and 69 between one and two hours for food allergy training. Considering the detrimental effects of food allergic reactions and seemingly inadequate lengths of food allergy training in CNPs,

efforts to promote food allergy training needed to be encouraged. Future researchers are encouraged to identify best practices, frequency, and duration of food allergy training.

The respondents ranked a list of topics for food allergy training based on their perceived importance. The three top-ranked topics were: identifying food items that contain allergens, avoiding cross-contact with food allergens, and reading ingredient listings. The findings were consistent with previous research. Verduin and Corbett (2009) surveyed 844 school nutrition professionals and concluded that label reading (66%), menu or recipe substitution (56%), and cross-contact prevention (50%) were among the important topics related to food allergies.

Other critical food allergy-related topics identified through previous studies were recognizing symptoms of food allergies, responding to food-related allergic reactions, emergency plan development and handling food allergens (Carlisle et al., 2010). In addition, how to use self-injectable epinephrine and emotional and social management were also key components of food allergy educational materials (Sicherer, Furlong, DeSimone, & Sampson, 2011). Molaison and Nettles (2010) recommended that school food service employees to be trained in diet modification and how to react to emergency situations. Identifying these topics may be beneficial to developing training materials that best assist school food service operations in serving students with food allergies and in preventing information overload.

Results of the logistic regression found only participants' previous food allergy training and food allergy knowledge scores were associated with the food allergy training in the past 12 months. Participants who have been previously trained about food allergy might be more aware of the values (Walker, Stanton, Kazi, Salmon, & Jenkins, 2009) and importance of having a food allergy training in place. Those who were more knowledgeable about food allergies might also more confident to talk to their employees about food allergies (Manojlovich, 2005a, 2005b; Lum, 2010). Previous food allergy reaction did not associate

with the decision of implementing food allergy training might due to the low incidence of food allergic reaction happened in the cafeterias as reported by the respondents, and hence did not increase the perceived necessity of implementing food allergy training.

Food Allergy Knowledge

The average food allergy knowledge score of the respondents was 31.9 ± 3.3 of maximum possible 39 points, indicating that their knowledge level was fair. Even so, the results indicated several aspects for food allergy knowledge that need improvement. The respondents were unable to discern food allergies and food intolerance. Previous literature indicated similar confusion among restaurant managers (Mandabach, Ellsworth, VanLeeuwen, Blanch, & Waters, 2005) and the general public (Gupta et al., 2009).

The Food Labeling and Consumer Protection Act 2004 (FLCPA) mandates food manufacturers to identify the eight major allergens and their protein derivatives on the food labels. The manufacturers are required to list these major food allergens either in the ingredient list using plain English or to use the word “contains” to help consumers identify the presence of allergens (U.S. Food and Drug Administration [FDA], 2004). Other food allergens are not required to be included in the label according to this law. This finding was similar to the outcome of research conducted among individuals with food allergies by Kwon and Lee (2012). It showed that more than 50% of the consumers with food allergies failed to recognize this legal requirement. Findings of this study indicated that research respondents needed to gain better understanding about food allergy-related law and regulations.

In general, the participants were able to recognize most of the symptoms of a food allergic reaction, except asthma and vomiting. Recognizing all food allergy symptoms could be life saving, as many food-related allergic fatalities were due to failure to recognize and respond to the symptoms (Yunginger, Squillace, Richard, Jones, & Helm, 1989). Even so,

this topic only ranked fifth as a topic of importance by the respondents. Therefore, food-related allergic symptom may need more recognition for training emphasis.

Questions related to the terminology used to identify the presence of food allergens indicated that improvement is needed in this area. Kwon and Lee (2012) also found that 68% of consumers with food allergies failed to identify “arachis oil” as an alternate name for peanuts and 61.3% did not realize that an individual with a milk allergy should avoid food items that contain “artificial butter flavor”. The respondents of this study made similar mistakes while answering the food allergy knowledge questions. School food service employees should be educated about the terminology associated with food allergens, so they will be able to accurately identify the allergenic ingredients in a product, especially any hidden allergens that cannot be detected by sight.

The results of hierarchical regression analysis showed that respondents’ food allergy knowledge was significantly associated with the number of years of experience in management positions along with previous food allergy training. Focus group and online survey participants both indicated that they learned about food allergies through their daily job and/or professional conferences which supported this finding. Therefore, continuous education opportunities should be made available to CNPs to improve their knowledge.

Attitudes about Food Allergies in School Food Service

Respondents agreed the most with the attitude statement, “It was worthwhile learning more about food allergy management” (4.6±1.0). This result may be due to food allergies being widely discussed as an emerging public health issue (Skypala, 2011). Agreement on the increased prevalence of food allergies in school food service operations is consistent with both previous study (Molaison & Nettles, 2010) and focus group results. These findings suggest that food allergies will become one of the most significant special needs in school food service operations.

On the other hand, about one third of respondents were neutral and 10% (n=34) disagreed with the statement “Food allergy is a major concern in school food service operations.” This might be due to the presence of other more pressing issues in school food service operations. The School Nutrition Operations Report 2009 identified that funding (65.2%) and the cost of food preparation (74.9%) ranked as the top trends at the district level, compared to special needs diets/ food allergies (14.5%) (SNA, 2009). Furthermore, the most recently published School Nutrition Operations Report 2011 stated that “Implementation of new nutritional standards and meal patterns” was ranked the most pressing issue at both district (60.3%) and national (69.5%) levels by the directors. This was followed by the cost of food and funding (SNA, 2011). Issues related to accommodating students with special needs or food allergies was rated only by 1.2% respondents at the district and 0.2% at the national levels as one of the primary concerns (SNA, 2011). In order to provide safe food to children with food allergies, the CNPs need to be convinced about the urgency of providing employee food allergy training, despite having to deal with other operational issues.

The transition period from home to school is often stressful for parents of children with food allergies (Gillespie & Chalmers, 2002) because school staff might not pay full attention to individual students with food allergies (Vickers, Maynard, & Ewan, 1997). The survey respondents also slightly disagreed that parents over-reacted to their children’s food allergies (2.8±1.0). Focus group participants expressed differing views about these “over-reacting” parents of children with food allergies. A few expressed understanding about the parental anxiety of “*turning over responsibility*” when sending children to school, while others felt that parents over-protected their children. The proportion of children with food allergies in Child Nutrition Programs remains unknown. However, school food service operations should build trust among parents and the school food service staff to provide allergen-free food to their children.

Issues for Dealing with Food Allergies

The research revealed issues for dealing with food allergies. “Meeting last minutes allergen-free meal requests” was difficult for respondents and this result is consistent with the focus group. The focus group participants commented that preparing and serving allergen-free meals required pre-planning and communication between nurses, parents, and school foodservice employees and extra time was needed to accomplish the test. Last-minute meal request increases the liability of school food service operation due to lack of immediate reference and incomplete information that leads to wrong meals being delivered to the students. USDA Food and Nutrition Service (FNS) advised the school food service operator to be prepared for providing meal substitutions to children with food allergies even before the new semester started (School Nutrition Foundation, 2010). In addition, this study found that larger school districts faced more problems dealing with this issue, as the number of food allergy documentations was significant greater than for smaller school districts (mean=12 vs. 8 documentations). Back to School Trends Report 2010 (SNA, 2010) showed the increment of request for special diets was significantly greater in larger school districts (more than 10,000 student enrollment) compared to smaller school districts.

Focus group participants and online survey respondents demonstrated differing opinions about the ease of purchasing allergen-free products based on the school district size. Logistical issues and the accessibility of special products were the main concerns of focus group participants from smaller school districts. Online survey respondents from larger schools faced the same problems but this might be due to the additional costs associated with special products. In general, Nettles, Carr, Johnson, and Federico (2008) and Rushing, Nettles, and Johnson (2009) concluded that operational issues and practices were similar among school districts of various sizes.

Respondents also indicated that “Obtaining detailed information about a specific student’s food allergy” was a challenge. Findings from a study conducted by Molaison and Nettles (2010) revealed that keeping students’ information confidential was important while accommodating students with special needs. Some parents might not report their children’s food allergies to school (Molaison and Nettles). Agreement and cooperation needs to be sought between parents, school administrators, school nurses and school food service staff in relation to sharing students’ medical information. This ensures that important information is shared in a timely manner before any undesirable incident occurs.

Focus group participants voiced their concerns about doctors’ prescription without performing diagnostic tests, but the mean score for this question from the online survey was not as pronounced (3.5 ± 1.0). Respondents further reported “Verifying the physician’s order that a child has a food allergy” was less problematic when being asked to rate a list of issues for dealing with food allergies. This might be because many food allergy cases are handled by school nurses or other professionals, such as dietitians as reported by these respondents.

Perceived Barriers for Food Allergy Training

Some of the barriers identified in providing food allergy training were similar to findings from previous studies in school food service operations. Lack of resources, time constraints, high costs, employee anxiety, lack of assistance in implementing the program, high employee turnover, and shortage of staff were identified as barriers to implementing Hazard Analysis Critical Control Point (HACCP) system in Child Nutrition Programs (Giampaoli et al., 2002; Hwang, Almanza & Nelson 2001). Results of this study also showed that respondents’ time constraints were primary barriers to food allergy training implementation. To address these problems, training may be customized to the school food service environment and should be conducted at a time that is convenient to the employees.

CNPs may also be guided on which agencies they could contract for employee training, due to busy schedules in food service operations.

This study further pointed out that differences exist in perceived barriers to providing food allergy training based on school district size. The cost of food allergy training needs to be further explored, so that adequate financial resources could be allocated to school food service staff, making the training more affordable. The lack of expertise indicated by smaller school districts suggests that CNPs need external assistance to support their training programs. Different technology such as video and webinars could also be utilized for training, since they overcome geographical restrictions and reduce costs associated with traveling (Miller & Moreland, 2007).

The focus group participants commented that it was difficult to retrieve all the necessary information about food allergies, as *“they are not in one place”*. Survey respondents slightly agreed on this fact compared to other barriers. Previous literature also indicated that many school food service directors and managers were not aware of the resources offered by the Department of Education, SNA, National Restaurant Association (NRA), local health agencies, and extension offices (Hwang et al., 2001). In fact, federal government (i.e., USDA, FNS, state agencies (i.e., Massachusetts Department of Education) and professional organizations (i.e., National Food Service Management Institute, [NFSMI]) have many printed and/or online food allergy materials that are readily available for school food service staff, but they may be unknown to CNPs. Hence, lists of resources should be kept handy and marketed to CNPs, so that they could be optimally utilized by school food service staff.

The participants did not view getting support from the school administrators and staff as much a challenge compared to other listed barriers in relation to providing employee food allergy training. Support from other stakeholders and the wider community are crucial in the

school food service environment. Furthermore, other food allergy studies also conclude the significant roles of school nurses in the school environment. School nurses handle most health-related issues at school and play an important role in ensuring the needs of students with food allergies are met (Concepcion, Murphy, & Canham, 2007). Multi-departmental collaboration is essential to better accommodate students with food allergies.

Triggers for Food Allergy Training

“An allergic reaction that happened in the cafeteria” (4.1 ± 1.0) and “Regulatory requirements for managing food allergies at schools” (4.1 ± 0.8) were two significant triggers for providing employee food allergy training. The cost associated with food-related allergic reactions might prompt the respondents to provide food allergy training. An allergic reaction in the school cafeteria could potentially jeopardize the reputation of the food service establishment and incur a significant amount of medical and financial expenses (Patel, Holdford, Edwards, & Carroll, 2011; Voordouw et al., 2010).

Mandatory food allergy training has not been initiated in the school food service environment. Previous study indicated that mandated programs and policies (e.g., Child Nutrition and Women and Child (WIC) Reauthorization Act) would bring positive changes to the school food service environment (Food Research and Action Center, 2006; Lambert, Raidl, Carr, Safaii, & Tidwell, 2007). Even though mandatory food allergy training might prompt the implementation of this training, additional supports including financial support, may need to be provided prior to the reinforcement of the any new regulations. In addition, stage-by-stage implementation of food allergy training, with realistic timelines is plausible to encouraging food allergy training in the long run.

“Personal experience with food allergy” was rated as the situation that was the least likely to trigger the decision to provide employee food allergy training. It was noted that there is a difference between the risk of dining out with food allergies at commercial and non-

commercial restaurants. Hence, personal experience with food allergy might not be reflected in school food service operations. The evidence also showed that respondents viewed school cafeterias as less risky dining places (2.5 ± 1.0) and therefore, personal experience might not be applied in the school food service context. In addition, other barriers identified in this study, such as resource constraints (i.e., time, funding, and expertise) need to be reduced before the decision to provide employee food allergy training could be made.

Self-efficacy

Self-efficacy is one of the key elements that could result in professional behaviors and practices as indicated by Bandura (1997). Morris, Baker, Belot, and Edwards (2011) found that 65% of the research participants were not confident about serving and managing children with food allergies. Therefore, food allergy management skills need to be improved. In common with this finding, both the focus group and online survey participants were “moderately confident” in providing food allergy training to employees, due to the perceived lack of skills and expertise required to provide such training.

Mincher (2010) reported that school food service directors with higher self-efficacy scores faced more difficulty in implementing and sustaining food-related policy. “Self-consciousness” about their shortcomings and insufficiency might have explained this phenomenon. Conversely, study respondents with higher self-efficacy found it easier to provide food allergy training to their employees. This finding suggested that self-efficacy is a plausible way to encourage the decision to provide employee training. Therefore, future research needs to investigate the effectiveness of different strategies in enhancing the self-efficacy of participants.

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CHAPTER 6 - SUMMARY AND CONCLUSION

In this final chapter, the major findings of both the qualitative and quantitative studies and evaluation of the research objectives stated in Chapter 1 are included. In addition, this chapter discusses several practical implications for school food service staff, Child Nutrition Professionals (CNPs), and researchers; suggested topics for future research; and the limitations of this study.

Summary of Research

Food allergies are an emerging public health concern and their prevalence seems to increase over the years (Gupta et al., 2011; Skypala, 2011). Despite lacking realistic estimates about the prevalence of food allergies and the proportion of students with food allergies in the School Nutrition Programs (SNPs) nationwide (Molaison & Nettles, 2010), preventive measures need to be taken to ensure the safety of these students. Training is one of the feasible ways to improve the food allergy knowledge of school food service employees (Lemons, 2004), but in-depth research about food allergy training practices is still lacking. It is difficult to encourage these practices without understanding the challenges faced in providing employees with food allergy training.

The purpose of this study was to assess Child Nutrition Professionals' (CNPs) knowledge, attitudes toward food allergies, and food allergy training practices in school food service operation in the U.S. The study was conducted in two phases: qualitative study and quantitative study to confirm these findings. A series of research questions and hypotheses were developed to describe food allergies in the school food service environment and current food allergy training and practices.

Qualitative Research: Focus Groups

The focus group study involved 21 CNPs in one of three focus groups. The majority of participants (n=15) were Food service Directors (71.4%). Ten participants (48%) had professional credentials. Years of experience in a school food service management position ranged from three months to twenty-four years (mean=11.5 years). Participants also worked in various size school districts (range=160–50,100 students; mean=11,860).

A general summary of themes extracted from the focus groups are as follows:

Current food allergy training practices

- Most of the training was “informal”
- Providers of food allergy training programs were CNPs themselves or representatives from other agencies
- Training resources were obtained from federal, state, and/or other professional organizations

Attitudes about food allergy in school food service operations

- Prevalence of food allergy has increased over the years
- Types and variety of food allergies reported increased in current school years
- Parents might over-react to their children’s food allergies
- School food service employees were committed to serving students with food allergies
- Food allergy documentation received from health care professionals (i.e. physicians) has increased

Issues in dealing with food allergies

- Communicating with other stakeholders, for example parents, school administrators and health care professionals about food allergies

- Acquiring and verifying accuracy of information provided by physicians regarding the students' food allergies
- Meeting requests for last-minute allergen-free meals
- Obtaining and securing allergen-free products
- Ensuring employees are skillful in preparing allergen-free food

Perceived barriers to providing employee food allergy training

- Time constraints of CNPs and school food service employees
- Indifference and lack of motivation demonstrated by employees
- Lack of financial resources to support training
- Limited training resources (i.e. materials and expertise)
- Lack of support from school stakeholders

Cues to actions

- Previous experience of on-site food-related allergic reactions
- Media reports about food allergy cases occurring in school environments
- Food allergy regulations required by the federal government
- Lessons learned from professional conferences and/or meetings
- Personal experience with food allergies

Quantitative Research: Online survey

A total of 340 CNPs responded to the online survey, yielding a 23.8% response rate. Most online survey respondents were females (n=309, 90.9%), 51-60 years old (n=163, 47.9%), had a bachelor degree (n=109, 32.1%), possessed School Nutrition Specialist/School Nutrition Professional credentials (n=131, 38.5%), and were ServeSafe[®] certified (n=248, 72.9%). The average year of service in management positions was 12.5±8.4. Similar numbers of respondents (about 40%) worked for small (up to 2,499 student enrollment) and medium

school districts (2,500-9,999 student enrollment). Two thirds of the respondents (n=204) have been trained about food allergies through various channels. A summary of the major findings from the online survey is below:

Research Question 1: How is food allergy training provided to food service employees?

Research Question 2: What percentage of school food service operations has provided food allergy training to their employees?

Of 340 respondents, less than half have provided food allergy training to their employees (n=140, 41.2%). Most training sessions were provided by the respondents themselves (n=99, 70.7%) as a group (n=96, 68.8%). Most of the food allergy training was provided annually to all employees (n=76, 54.3%) and lasted for one to two hours (n=69, 49.3%). These results were consistent with findings from focus groups. Many focus group participants described their food allergy training programs as “*informal*” and were provided by themselves. Although food allergy training is not mandated by federal government, the number of food-related allergic reactions (Sicherer, Furlong, DeSimone, & Sampson, 2001) and fatalities resulting from food-related allergic reactions occurring in school settings (Munoz-Furlong & Weiss, 2009) are evidence that there is a need for such training.

Research question 3: How knowledgeable are the CNPs in relation to food allergies?

Respondents demonstrated decent levels of food allergy knowledge, as evident by their average score of 31.9 ± 3.3 of 39 total score. Results of this knowledge assessment section identified several knowledge deficit areas. The differences between food allergy and food intolerance is one of the areas that needs further improvement. About 21% (n=71) failed to differentiate between food allergy and food intolerance. Recognizing signs and symptoms, especially vomiting and asthma, also need to be emphasized, as many of the respondents failed to answer these questions correctly (i.e., 154 for asthma and 98 for vomiting). Failure to identify the initial symptoms of food-related allergic reactions led to delays in epinephrine

injection, which ultimately results in fatalities (Bock, Munoz-Furlong, & Sampson, 2001; Sampson, Mendelson, & Rosen, 1992). However, respondents only ranked this topic as the fifth important topic to be included in food allergy training.

Understanding the special terminology that indicates the presence of major food allergens needs to be enhanced, as many respondents were unable to correctly identify “whey” (29.4%), “casein” (38.5%), and “artificial butter flavor”(85.3%) as indicators of the presence of milk in a product. This finding also further confirmed that food allergen identification and label reading are important topics for food allergy training.

Research question 4: What factors predict food the allergy knowledge scores of CNPs?

Null hypothesis: There is no relation between respondents' age, education level, history of personal or family food allergies, years of school food service experience, and previous food allergy training and their knowledge scores.

Two models were developed to identify the factors that predicted CNP knowledge scores using hierarchical multiple regression. Model 1 only explained a small portion of the variance (3%) and age was the only significant predictor in this model ($p < .05$). Model 2 explained 25% of the variance and was significant ($p < .001$). The food allergy knowledge of respondents was significantly predicted by their age ($\beta = -.16, p < .01$), education level ($\beta = .31, p < .001$), years of school food service experience in management positions ($\beta = .17, p < .05$) and previous food allergy training received ($\beta = .24, p < .001$). Therefore, the null hypotheses were not supported, based on the findings of the study.

Research question 5: What are the attitudes of school food service directors about food allergies?

CNP attitudes about food allergies were measured by eight items on a five-point Likert-type Scale, ranging from 1 being “strongly disagree” to 5 being “strongly agree”. The overall mean attitude score was 3.6 ± 0.7 , but respondents indicated agreement on most of the

items listed on this scale, suggesting they have positive attitudes about serving students with food allergies in school food service. Focus group participants also expressed commitment toward serving students with these special needs, as it links with the mission of SNPs. More than 50% of participants agreed that doctors provided food allergy documentation without performing a diagnostic test, which supported the statements made by the focus group participants.

In contrast to the focus group study, respondents did not feel that parents were over-reacting to food allergies (2.8 ± 1.0). Previous literature indicated that food-related allergic reactions resulted in several deaths in the U.K. among individuals under 16 years old. Macdougall, Cant, and Colver (2002) showed that parents' worries about food allergies are not exaggerated.

Research question 6: What issues faced by CNPs while serving students with food allergies?

The study identified numerous issues faced by respondents in their school food service operations. On the five-point scale ranging from 1 (very difficult) to 5 (very easy), "Meeting last-minute allergen-free meal requests" (2.3 ± 1.0) was rated as the top issue encountered by respondents. This was followed by "Purchasing allergen-free products" (2.6 ± 1.0) and "Obtaining detailed information about a specific student's food allergy" (2.6 ± 1.1). Focus group participants voiced similar opinions. However, "Verifying the physician's order that a child has a food allergy" (2.8 ± 1.1) and "Communicating with other stakeholders" (2.9 ± 1.0) were rated the least problematic food allergy issues. These two results were inconsistent with the focus group findings.

Research question 7: What are the barriers to CNPs providing employee food allergy training?

This study identified barriers to providing employee food allergy training. Some of the barriers identified were similar to findings from previous studies in school food service operations. For instance, time constraints of respondents (3.8 ± 1.0) and their employees (3.5 ± 1.1), lack of financial support for training (3.5 ± 1.1), and difficult to access training materials (3.5 ± 1.0). These findings were also consistent with key issues pointed out by focus group participants. Even so, the focus group participants commented that accessibility to training resources and expertise could be a problem but that representatives of the Department of Education were able to travel to a site and conduct employee training upon request. Therefore, they were not deprived of opportunities to be trained about food allergies.

Support from school administrators and staff was rated less of a challenge about providing employee food allergy training and this finding was consistent with result reported by Mincher's (2010) implementation of food-related policies at school environment. In contrast, study conducted by Lambert, Raidl, Carr, Safaii, and Tidwell (2007) showed it was relatively difficult to gain support from school administrators about participating in School Breakfast Program (SBP). Support from other stakeholders' or community is crucial in the school food service environment. It also showed that food allergy management often involved collaboration between multiple departments, including nurses, school nutrition professionals and other school food service personnel, parents, and teachers (Verduin & Corbett, 2009).

Research question 8: What circumstances or events influence school food service directors' decisions to provide food allergy training to their employees?

"An allergic reaction that happened in the cafeteria" (4.1 ± 1.0) and "Regulatory requirements for managing food allergies at schools" (4.1 ± 0.8) were two significant triggers

for providing employee food allergy training. Often time, mandated policy, such as School Wellness Policy, would prompt the school food service to implement and adopt a new program (USDA, n.d.), yet a thorough assessment of the environment is needed prior to making any programs mandatory.

Research question 9: How confident are the CNPs in providing employee food allergy training?

Respondents demonstrated moderate self-efficacy levels (mean= 3.7±0.8) in providing food allergy training to their employees. This finding confirmed the results of focus group sessions. Additional Chi-square analysis $\chi^2(2)=13.47, p <.001$ showed that respondents with higher self-efficacy faced less difficulty in providing food allergy training in their facilities. Previous literature further explained that individuals with greater levels of self-efficacy were able to sustain higher levels of pressure and were more creative and capable in finding solutions (Kuokkanen & Leino-Kilpi, 2001).

Research question 10: How do knowledge levels, issues faced dealing with food allergies and perceived barriers for food allergy training differ, based on the demographic characteristics of participants and facilities?

Null hypothesis: There is no difference in knowledge level, issues faced when dealing with food allergies, or perceived barriers to providing employee food allergy training based on demographic characteristics of the respondents and facilities.

The null hypothesis was not supported based on the findings of the study. Differences and similarities of respondents' knowledge levels were compared using t-test and ANOVA analyses. Participants who had attained higher education levels ($F=11.46, p <.001$) and who were from larger school districts ($F=13.65, p <.001$) were more knowledgeable about food allergies.

Issues for dealing with food allergies were compared using t-test and one-way ANOVA based on district size. Respondents from different sized school district and who worked for facilities with and without food-related allergic reactions rated differently “Meeting last-minute allergen-free meal requests” ($p < .01$), “Purchasing allergen-free products” ($p < .01$) and “Obtaining information about students’ food allergies” ($p < .05$), based on their perceived ease or difficulty in performing these tasks.

Perceived barriers to providing food allergy training were also compared with one-way ANOVA analysis, based on school district size. Time constraints were rated differently by the respondents. These findings further supported a previous study which concluded dissimilarities of operational issues and practices faced by CNPs based on their district size (Rushing, Nettles, & Johnson, 2009).

Research Question 11: What factors are related to the implementation of food allergy training in the past 12 months?

Null hypothesis: There is no relationship between independent variables (years of school food service experience, previous food allergy training, previous food allergic reaction, food allergy knowledge, self-efficacy, cues to action, and attitudes about food allergies) and the practice of food allergy training in the past 12 months.

Using Logistic regression analysis, three models were developed to investigate the factors related to implementation of food allergy training in the past 12 months. Independent variables included in the first model were years of school food service experience, regardless the position and in management position; additional three variables (i.e., previous food allergy training, previous food allergic reactions, and food allergy knowledge) in the second model; and another three variables (i.e., self-efficacy, cues to action, and attitudes toward food allergies) in the third model.

The third model, with the Chi-square, χ^2 of 136.97 ($p < .001$) was the best fit model of all models. This model 3 improved by 7.51 compared to model 2, which showed insignificant results. Three variables: respondents' previous food allergy training status ($p < .001$), food allergy knowledge scores ($p < .001$) and self-efficacy ($p < .01$), were significant factors that differentiated between facilities in which training was implemented in the past 12 months. These three factors were all positively related to training provision in the past 12 months and the overall accuracy of classification of this model was 78.5%. Based on these findings, the null hypothesis was not supported.

Implications and Future Research

The outcomes of the study may benefit stakeholders in school food service by providing better understanding of food allergy issues. This study further encourages food allergy training practices in the future by revealing potential training resources, barriers, and triggers to providing this training. Based on the findings of this study, several recommendations and suggestions for future studies are made.

It is evident that food allergies will be an important issue in school food service operations, considering the increased prevalence over time (Gupta et al., 2010; Molaison & Nettles, 2010). For instance, 2010 Back to School Trends Report (SNA, 2010) showed that all school sizes have indicated an increase in requests for special diets. This increment was significant in larger school districts, with more than 10,000 student enrollment). In addition, among 1,207 school food service directors surveyed in 2009 by the SNA, 71.7% mentioned that they had food allergy management plans in place (SNA, 2009).

Despite having positive attitudes and showing commitment to serving students with food allergies, the CNPs might need other stimuli to transform these attitudes into the actual behavior of implementing food allergy training. Based on this study, past food-related allergic reactions and mandatory requirement by the federal government were among factors

affecting food allergy training. Another study pointed out that other school personnel would not support a SBP unless it was mandated by law (Lambert et al., 2007). Even so, it may still be necessary that food allergy training is implemented voluntarily and stage-by-stage as a part of federally mandated food safety programs in school food service establishments. Therefore, there is a need to investigate how to motivate CNPs to implement food allergy training, instead of making this training mandatory. Also, a realistic timeline would help CNPs to be more prepared and less overwhelmed by any new program implementation (Giampaoli, Sneed, Cluskey, & Koenig, 2002).

In addition, barriers such as time constraints and inadequate funding need to be addressed before food allergy training can be further encouraged. CNPs need to be convinced about the benefits of having employees trained about food allergies and to view this training as a long-term investment in school food service operations (Giampaoli et al., 2002). Future studies could investigate the costs associated with this training, so that school food service staff could be reasonably subsidized. Alleviating the financial burden (SNA, 2009, 2011) already faced by CNPs may also need to come before making the training happen in school food service.

To remove the time barrier, food allergy training needs to be streamlined, but still contain information that is best applied to the school food service environment. This study concluded that food allergen identification, cross-contact avoidance, and label reading are three key elements to include in food allergy training. This research further identified food allergy knowledge deficit areas of the respondents. Based on these findings, the content of current food allergy educational materials might need to be revised. Future studies could also consider frequency and duration of food allergy training programs, to ensure that implementation of the program is practicable.

When time constraints of employees limit training implementation, internet-based training may be a plausible solution. This is because training method is more flexible, portable, and allows better scheduling of training sessions (Wolfson, 1986) and could be delivered in an on-demand manner (Zhang, Zhao, Zhou & Nunamaker, 2004). Even so, it was found to be the least preferred training method for school service managers (Sullivan, Harper & Charles 2002). Previous literature reviews identified that group educational sessions, such as conferences, seminars and workshops are preferred training methods for site managers. However, these methods need to be reinvestigated to see if they are practical for other school food service employees (Sullivan et al., 2002). If food allergy training could not be provided immediately, posters related to food allergies may be placed in school cafeterias, to make school food service personnel aware of food allergies and risks. Constant exposure to the food allergy information via posters might be beneficial, as Spitzer (1939) concluded that regular reinforcement is crucial to enhance knowledge retention.

Training resources are available through federal, state, and professional organizations that are actively involved in food allergy advocate efforts. Even so, much of this information could not be retrieved easily, unless the respondents had been previously exposed to them, as indicated by the participants. The federal and state agencies, as well as professional organizations, such as the National Food Service Management Institute (NFSMI), SNA, Food Allergy and Anaphylaxis Network (FAAN) should market their resources, so the usage of these materials could be maximized for the benefits of school food service.

Food allergy training was mainly in-house and provided by respondents but they were not confident in their ability to train their employees. It is of great importance to foster a higher degree of self-efficacy among the participants, despite the challenges identified through the assessment of perceived barriers. Self-efficacy could be cultivated through coaching, mentoring and feedback (Giampaoli, Cluskey, & Sneed, 2002; Sneed, Strohbehn,

& Gilmore, 2004). Further study is needed to assess the effectiveness of different strategies to improve the self-efficacy of respondents.

In addition, the qualitative study of this research suggested effective communication between multiple departments in the school food service environment is needed. This should foster mutual support and understanding among all parties. Molaison and Nettles' (2010) study emphasized the crucial roles played by parents and school healthcare professionals as information providers in accommodating students with food allergies. Hence, a team approach is desirable for the management of food allergies.

Moreover, the students' medical information might be considered as confidential, and therefore not shared between teachers, school health care providers, parents and school food service staff. It was noted that being uninformed about children's food allergies could indirectly result in the detrimental consequences of food allergies. Therefore, all relevant parties may need to reach a consensus on to what extent this information could be shared.

Limitations

Qualitative Research: Focus Groups

Several limitations are inherent in this focus group research. A qualitative research does not intend to reach generalizable conclusions but to collect depths of knowledge about attitudes and behavior patterns of small number of participants. Therefore, despite the small sample size, the goals and objectives were achieved through focus groups. Furthermore, the demographic survey of participants showed wide variations of participants (age, education levels, size of districts or schools, etc.).

Quantitative Research: Online Research

This quantitative online research has some limitations. Dillman (2007) addressed that the complexity of online survey tools and limited computer accessibility may have negative

effects on online survey participation. There was evidence showing that the response rate for the online survey was not as favorable as for the mailed survey. Comparison of online versus mail survey methods by Kaplowitz (2004) showed that mailed surveys yielded a response rate of 10% higher than online surveys. In addition, Sullivan et al., (2002) found that some food service managers had no access to the internet. However, both of these research projects (Kaplowitz; Sullivan et al.) were completed at least 8-10 years ago, and it is difficult to confirm that availability of online access has significant influence on this study.

The response rate of this online survey was approximately 24%, which was similar to a more recent online survey by Molaison and Nettles (2010). The low response rate might be due to the administration of the survey over a period when new dietary guidelines had just been released. Because of this, CNPs might not have had an adequate amount of time to respond to this survey. Two email communications from CNPs who were not able to participate in this survey but who wanted to comment about food allergy issues supported this explanation. Despite these shortcomings of online surveys, this study used this approach due to cost effectiveness and the ability to reach respondents in a relatively short period of time.

Another limitation of this study was that the CNPs who chose to participate in this survey might already have had a greater concern and interest about food allergies, therefore demonstrating higher food allergy knowledge scores than non-respondents. Because the survey was conducted in voluntary basis, non-response bias was not addressed.

In addition, the study was conducted in the school food service environment in the U.S. only. Therefore, the results may not be generalized beyond the school food service setting or beyond the U.S. territory.

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Appendix A - Institutional Review Board Approval Letter

TO: Junehee Kwon
104 Justin

Proposal Number: 5962

FROM: Rick Scheidt, Chair 
Committee on Research Involving Human Subjects

DATE: September 2, 2011

RE: Approval of Proposal Entitled, "Investigation of School Food Service Director's Knowledge, Attitudes, and Behavior Related to Food Allergy Training."

The Committee on Research Involving Human Subjects has reviewed your proposal and has granted full approval. This proposal is **approved for one year from the date of this correspondence, pending "continuing review."**

APPROVAL DATE: September 9, 2011

EXPIRATION DATE: September 9, 2012

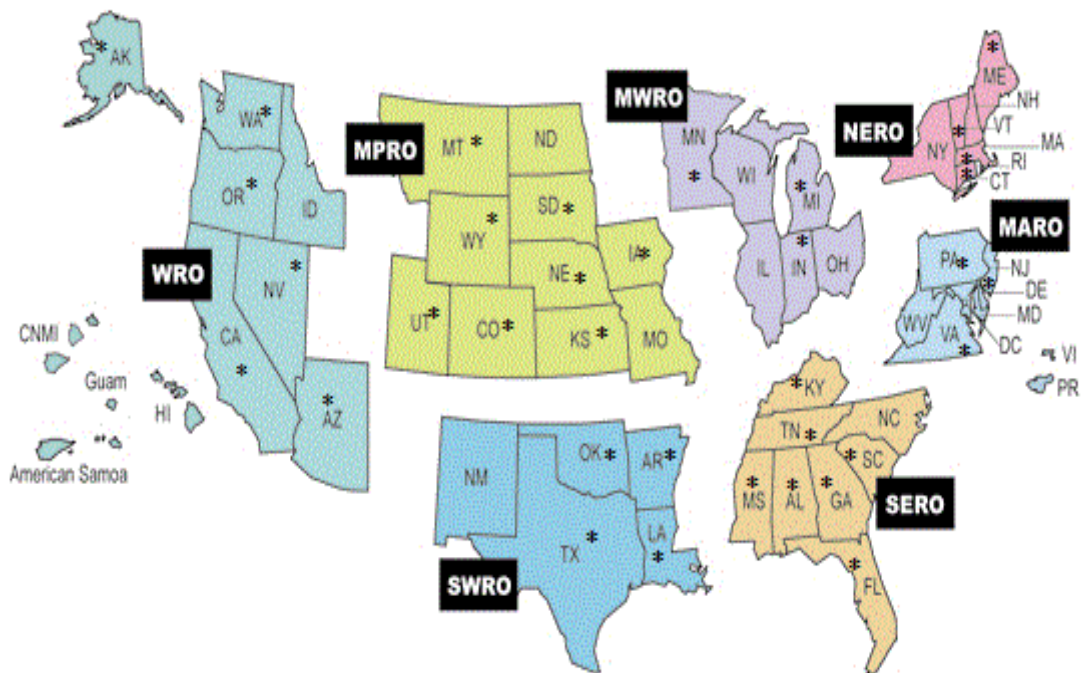
Several months prior to the expiration date listed, the IRB will solicit information from you for federally mandated "**continuing review**" of the research. Based on the review, the IRB may approve the activity for another year. **If continuing IRB approval is not granted, or the IRB fails to perform the continuing review before the expiration date noted above, the project will expire and the activity involving human subjects must be terminated on that date. Consequently, it is critical that you are responsive to the IRB request for information for continuing review if you want your project to continue.**

In giving its approval, the Committee has determined that:

- There is no more than minimal risk to the subjects.
 There is greater than minimal risk to the subjects.

This approval applies only to the proposal currently on file as written. Any change or modification affecting human subjects must be approved by the IRB prior to implementation. All approved proposals are subject to continuing review at least annually, which may include the examination of records connected with the project. Announced post-approval monitoring may be performed during the course of this approval period by URCO staff. Injuries, unanticipated problems or adverse events involving risk to subjects or to others must be reported immediately to the Chair of the IRB and / or the URCO.

Appendix B - Map of USDA Food Distribution Region



MARO=Mid-Atlantic Region
 MPRO=Mountain Plains Region
 MWRO=Midwest Region
 NERO=Northeast Region
 SERO=Southeast Region
 SWRO=Southwest Region
 WRO=Western Region
 * States where the sample was drawn

**Appendix C - Invitation to Participation in Focus Groups:
Email to JumpStart Program Participants**

Dear JumpStart Participants:

Good afternoon. We are looking forward to having you on the KSU campus for the fall 2011 KSDE Child Nutrition & Wellness JumpStart program on October 5 and 6.

I am sending a special invitation for you to participate in an important project while here on campus. On the final day of the program (October 6) at 3:00 pm, researchers with KSU's Department of Hospitality Management & Dietetics will be conducting a focus group. The purpose of the session is to gather your insight about food allergies and related training in school food service operations. I think you will agree this is an important topic.

We expect the session will take about one hour. The focus group will also be conducted in the KSU Student Union - the same building as the JumpStart program (State Room #2). State Room #2 is located on the lower level of the union in the perimeter of the main dining area. We will have people available to escort you there too.

For your time and participation, you will be compensated \$25.

We hope that you will consider participating in this important project. If you have any questions, please feel free to let me know. If you know right away that you will be participating, please feel free to let me know too.

Kevin L. Sauer, PhD, RD, LD
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Associate Professor
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**Appendix D - Invitation to Participation in Focus Groups:
Email to SNA-KS Fall Conference Participants**

Dear Child Nutrition Professional,

I am writing to invite you to participate in a special research project at the upcoming 2011 SNA-KS Fall Conference. This project is being conducted by staff from the Dept. of Hospitality Management & Dietetics at Kansas State University.

At the conference, we will be conducting a focus group to gather insight about food allergies and related training in school food service operations. The tentative times for the focus group are EITHER Friday (October 7) afternoon between the scheduled tour and dinner (4:30 pm – 5:30 pm) OR Saturday (October 8) afternoon before President's Reception (4:00 pm – 5:00 pm). I think you will agree this is an important topic and hope you will consider participating in this important project.

For your time and participation, you will be compensated \$25. Capacity will be limited.

If you would like to participate, please feel free to let me know via email by Monday October 3. Please include which day (Fri or Sat) you prefer. Once we hear from those interested, we will send a confirmation email by Wednesday, October 5 informing you of the exact time and location at the conference. If you have any questions, please feel free to let me know.

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Appendix E - Protocol for Focus Group

INTRODUCTION

Hello, my name is _____ and I am a doctoral student from Kansas State University. This is _____. She/ he is one of the Supervisory Committee Members of my doctoral program. Thanks for your time to participate in our discussion today. The purpose of today's session is to gather your thoughts and opinions about food allergy and food allergy training for your employees.

GUIDELINES

Please listen to a few instructions before we proceed.

- 1) There are two copies of consent forms in front of you. Please review and sign one copy of them and return it to me. You can keep the other copy for your own record.
- 2) Also, please complete the short questionnaire regarding your demographic information.
- 3) This session will be audio-recorded. Please speak out, so that we would not miss any of your responses. This also helps everyone in the room to hear you.
- 4) There is no right or wrong answers to the questions. Please provide your honest opinion. If you have different points of view from the others, feel free to share them. We encourage everyone to participate in the discussion.
- 5) This session will last for about an hour, and you will be compensated \$25 cash for your time at the end of today's discussion. The State of Kansas mandates us to provide social security numbers of those who receive payment of \$20 or greater. It is to make sure WE provide the payment that we promised to provide to our participants and for KSU to issue 1099 form in case any of you receive \$600 or greater per year by participating in research. Your social security number will be sent directly to our accounting department for their record without making any copies.

Do you have any questions before we begin?

QUESTIONS

Attitudes towards Providing Employee Food Allergy Training

Perceived severity

1. Would you share some of your thoughts regarding food allergies with us?

Probe questions

- Do you have personal experience dealing with food allergies? (i.e. himself/herself, family, relatives, friends, etc?) (**Cues to action**)
- What had been your experience serving students with food allergies?

Perceived susceptibility

2. Have you ever worried about students experiencing food allergic reaction at the school cafeteria? Why or Why not?

(Let us put food allergy aside from now)

Current Practices of Food Allergy Training

3. What kind of training do you provide to the employees in your facility?

Probe questions

- How frequent do you provide any training to the employees?
- Who are the attendees of the training? (i.e. all employees, new employees, etc.,)

4. How about food safety/ food allergy training?

Probe questions

- Is the training mandatory?
- Was it conducted as part of other training or do you specifically plan to train your employees on food safety and food allergy?
- How long was the training?
- How important food allergy training is compared to other kinds of training?
- Who provided the food safety training?

(If the training was provided by themselves)

- How have you been trained to provide this training? (e.g. self-study, workshop, etc.)
- What kinds of topics did you talk about in the food allergy training?
- Where did you get the information/ materials for the training?

Self efficacy

5. How competent are you about providing food allergy training to your employees?

(If none of them provided food allergy training)

6. Have you thought about providing food allergy training yourself to the employees?

Probes

- If you have an opportunity to provide food allergy training, what do you think are the important topics to be included in this training?
- Do you feel training will change the behavior of your employee in serving students with food allergies? Why or why not?

7. If I followed you through the food safety or food allergy training, what would I see you doing?

Probe questions

- What happened in the training session you conducted?
- What would I see the attendees doing?

Perceived benefits

8. What did the employees gain from the food allergy training?

Probes

What did the training focus on?

Perceived barriers

9. What make you providing or not providing food allergy training?

Probe questions

- What are some challenges you have experienced when providing food allergy training? Could you give me some examples?
- How were these challenges overcome?

Cues to actions

10. Are there certain situations that influence your decision about providing food allergy training? Please share with us.

Probe questions

- Have you experienced anyone getting a food allergic reaction in your operation? How did it affect you and your operation?
- Do you think having a student with food allergy in the cafeterias has affected your and/or your employees' awareness about food allergies? How so?

CLOSING

Thank you very much for your participation in today's focus group. Today's results will be summarized and used for developing an online survey, to investigate school food service directors' attitudes and behaviors related to food allergy training.

Appendix F - Online Survey Instrument

AXIO SURVEY

Investigation of School Foodservice Directors' Knowledge, Attitudes, and Behaviors related to Food Allergy Training

Opening Instructions

The completion of this online questionnaire constitutes your informed consent as a participant in research. Your confidentiality is guaranteed and only summarized data will be published in research journals.

Page 1

Question 1 ** required **

Section I: Demographic information

This section is designed to obtain demographic information about you and your school district. Please respond to each of the questions by checking the statements that best apply to you, or by filling in the blanks.

What is your gender?

- Male
- Female

Question 2 ** required **

What is your age?

- 21 – 30 years old
- 31 – 40 years old
- 41 – 50 years old
- 51 – 60 years old
- 61 or older

Question 3 ** required **

What is your highest educational level?

- High school or GED
- Some college
- Associate degree
- Bachelor's degree
- Master's degree
- Doctoral degree (PhD, EdD, etc.)
- Other:

Question 4 ** required **

What is your scope of responsibility with the Child Nutrition/School Foodservice Program?

- Director of Child Nutrition Program in a school district
- Manager of a Child Nutrition Program of a single school
- Coordinator of Child Nutrition Program over several schools
- Coordinator of a certain program (e.g., food safety) within a school district
- Supervisor within a single school

Question 5 ** required **

Please check ALL professional credentials you currently hold or write in the name of your credential in the space provided if it is not listed.

- Registered Dietitian (RD)
- School Nutrition Specialist (SNS)/ School Nutrition Professional (SNP)
- Dietetic Technician, Registered (DTR)
- Certified Dietary Manager (CDM)
- Other:

Fill out this page only if you answered:

- Director of Child Nu... OR Manager of a Child N... OR Supervisor within a ... OR Coordinator of a cer... OR Coordinator of Child... on question 4. What is your scope of responsibi... on page 2 .

Question 6 ** required **

How many year(s) have you worked in the school foodservice setting (regardless of positions)?

Characters Remaining:

Question 7 ** required **

How many year(s) have you worked in the school foodservice in a management or supervisory position (e.g., director, manager, supervisor, etc.)?

Characters Remaining:

Fill out this page only if you answered:

- Director of Child Nu... OR Coordinator of a cer... OR Coordinator of Child... on question 4. What is your scope of responsibi... on page 2 .

Question 8 ** required **

Approximately, how many students are enrolled in **your district**?

Characters Remaining:

Question 9 ** required **

On average, what percentage of students in **your district** participates in the National School Lunch Program (NSLP)?

Characters Remaining:

Fill out this page only if you answered:

- Supervisor within a ... OR Manager of a Child N... on question 4. What is your scope of responsibi... on page 2 .

Question 10 ** required **

Approximately, how many students are enrolled in **your school**?

Characters Remaining:

Question 11 ** required **

On average, what percentage of students in **your school** participates in the National School Lunch Program (NSLP)?

Characters Remaining:

Fill out this page only if you answered:

- Director of Child Nu... OR Manager of a Child N... OR Supervisor within a ... OR Coordinator of a cer... OR Coordinator of Child... on question 4. What is your scope of responsibi... on page 2 .

Question 12 ** required **

Which of the food safety certifications do you currently hold? (Check ALL that apply)

- Food handlers' certification
- ServSafe®
- Food safety certification by state
- I do not currently hold any food safety certification
- Other:

Fill out this page only if you answered:

- Director of Child Nu... OR Coordinator of a cer... OR Coordinator of Child... on question 4. What is your scope of responsibi... on page 2 .

Question 13 ** required **

Section II: Food Allergy Practices

This section is designed to ascertain the incidences of food allergy cases and the existence of food allergy practices in your district or school(s). Please respond to each of the questions by checking the statements that best apply to you, or by filling in the blanks.

During this current academic year, how many students in your district have provided documentation to you that they have a food allergy? Please answer in **number of student(s)**. If you don't know the answer, write "**IDK**".

Characters Remaining:

Fill out this page only if you answered:

- Supervisor within a ... OR Manager of a Child N... on question 4. What is your scope of responsibi... on page 2 .

Question 14 ** required **

Section II: Food Allergy Practices

This section is designed to ascertain the incidences of food allergy cases and the existence of food allergy practices in your district or school(s). Please respond to each of the questions by checking the statements that best apply to you, or by filling in the blanks.

During this current academic year, how many students in your school have provided documentation to you that they have a food allergy? Please answer in **number of student(s)**. If you don't know the answer, write "**IDK**".

Characters Remaining:

Fill out this page only if you answered:

- Director of Child Nu... OR Manager of a Child N... OR Supervisor within a ... OR Coordinator of a cer... OR Coordinator of Child... on question 4. What is your scope of responsibi... on page 2 .

Question 15 ** required **

How different are the menu items served to students with food allergies from your regular menu items?

- They are exactly the same
- They are somewhat similar
- Neutral
- They are somewhat different
- They are completely different

Question 16 ** required **

In the **past 12 months**, how many food allergic reaction occurrences have you had in your cafeterias? Please answer in **number of case(s)**. If you don't know the answer, write "**IDK**".

Characters Remaining:

Question 17 ** required **

Have you ever received any food allergy training?

- Yes
 No

Page 10

Fill out this page only if you answered:

- Director of Child Nu... OR Manager of a Child N... OR Coordinator of Child... OR Coordinator of a cer... OR Supervisor within a ... on question 4. What is your scope of responsibi... on page 2 .
- AND Yes on question 17. Have you ever received any food ... on page 9 .

Question 18 ** required **

How have you been trained about food allergies? (Check ALL that apply)

- Through my daily job
 Self-study (e.g., reading, education modules, etc.)
 Professional conferences or workshops
 Academic degree program (college courses, technical schools, etc.)
 Other:

Page 11

Fill out this page only if you answered:

- Director of Child Nu... OR Manager of a Child N... OR Coordinator of Child... OR Coordinator of a cer... OR Supervisor within a ... on question 4. What is your scope of responsibi... on page 2 .
- AND Yes OR No on question 17. Have you ever received any food ... on page 9 .

Question 19 ** required **

Have you obtained food allergy training materials from any of the following organizations?
(Check ALL that apply)

- National Foodservice Management Institute (NFSMI)
- USDA, Food and Nutrition Services (FNS)
- State agency (e.g., Department of Education)
- School Nutrition Association (SNA)
- Food Allergy and Anaphylaxis Network (FAAN)
- I have not obtained food allergy training materials from any these organizations
- Other:

Question 20 ** required **

Have ANY of your employees received food allergy training in the **past 12 months**?

- Yes
- No

Page 12

Fill out this page only if you answered:

- Director of Child Nu... OR Manager of a Child N... OR Coordinator of Child... OR Coordinator of a cer... OR Supervisor within a ... on question 4. What is your scope of responsibi... on page 2 .
- AND Yes OR No on question 17. Have you ever received any food ... on page 9 .
- AND Yes on question 20. Have ANY of your employees recei... on page 11 .

Question 21 ** required **

What percentage (%) of your school foodservice employees have received food allergy training?

Characters Remaining:

Question 22 ** required **

Who provided the food allergy training? (Check ALL that apply)

- I provided the food allergy training myself
- Another management staff member (e.g., area coordinator) in our district
- State agency staff
- Another private training provider (please specify in the column below)
- Other:

Further comments about your response:

Page 13

Fill out this page only if you answered:

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- AND Yes OR No on question 17. Have you ever received any food ... on page 9 .
- AND Yes on question 20. Have ANY of your employees recei... on page 11 .

Question 23 ** required **

Typical food allergy training for your foodservice employees is provided as:

- Part of food safety training
- Separate session(s) on food allergies (not a part of another training)

Question 24 ** required **

Your foodservice employees received food allergy training as:

- Group training
- Individual “one-on-one” training as needed
- Other:

Question 25 ** required **

How often do you provide food allergy training to foodservice employees in your district? (Check ALL that apply)

- When a foodservice employee is newly hired
- Annually to all foodservice employees
- Once a year for foodservice employees who work directly with children with food allergies (e.g. managers, cook, etc.)
- Other:

Question 26 ** required **

How many total hours of food allergy training do your employees receive?

- Less than 1 hour
- 1 - 2 hours
- 3 - 4 hours
- More than 4 hours

Page 14

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- AND Yes OR No on question 17. Have you ever received any food ... on page 9 .
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Question 27 ** required **

Please rank the top **THREE(3)** food allergy training topics below, with 1 being the most important.

- Identifying food items that contain allergens
- Avoiding cross-contact with food allergens
- Reading ingredient listings
- Identifying appropriate substitutions
- Recognizing symptoms food allergic reactions
- Responding to an food allergic reaction

Page 15

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- AND Yes OR No on question 17. Have you ever received any food ... on page 9 .
- AND Yes OR No on question 20. Have ANY of your employees recei... on page 11 .

Question 28 ** required **

Section III: Knowledge questions

Please answer the questions below about food allergies. Please indicate “I don’t know” if you are not sure about your answer.

1 - True | 2 - False | 3 - I don't know

	1	2	3
28.1 Food allergic reactions happen when the body’s immune system reacts to proteins in the food.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
28.2 Lactose intolerance is the same as having a milk allergy.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
28.3 A child can die from a food allergic reaction.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
28.4 Modern medicine can cure food allergies.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
28.5 A food allergic reaction can occur if a child touches a food item that contains allergens.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
28.6 If a student has a milk allergy, removing cheese from an already assembled deli sandwich will prevent an allergic reaction.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
28.7 Federal law requires all food allergens to be listed on the food labels.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Page 16

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- AND Yes OR No on question 17. Have you ever received any food ... on page 9 .
- AND Yes OR No on question 20. Have ANY of your employees recei... on page 11 .

Question 29 ** required **

Mark ALL symptoms that could indicate someone is having a food allergic reaction.

- Anaphylaxis
- Asthma
- Vomiting
- Hives/rashes
- Facial swelling

- Swelling of throat
- Tingling sensation in or around the mouth
- Shortness of breath

Question 30 ** required **

Which of the following are the **EIGHT(8) MAJOR FOOD ALLERGENS**? Please choose up to 8 of the foods or ingredients below.

- Artificial colorings (red dyes, yellow dyes, etc.)
- Eggs
- Wheat
- Corn
- Soy
- Milk
- Beef
- Fish
- Citrus fruits (lemon, orange, etc.)
- Peanut
- Tree nuts (almonds, walnuts, pecans, etc.)
- Shellfish (shrimp, lobster, crab, etc.)
- Herbs (basil, thyme, chives, rosemary, etc.)

Page 17

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- AND Yes OR No on question 17. Have you ever received any food ... on page 9 .
- AND Yes OR No on question 20. Have ANY of your employees recei... on page 11 .

Question 31 ** required **

A person with peanut allergy should avoid products having which of the following on the ingredient label? Mark ALL that apply.

- "Arachis Oil"
- "Whey"
- "Contains peanuts"
- "May contain ground nut/mixed nuts"
- "Processed in a factory which also processed food containing peanuts"

Question 32 ** required **

A student with a milk allergy should avoid products having which of the following on the ingredient label. Mark ALL that apply.

- “Whey”
- “Casein”
- “Contains milk”
- “Milk solids”
- “Artificial butter flavor”

Question 33 ** required **

The most effective response to a severe food allergic reaction is:

- Inducing vomiting
- Injecting epinephrine (EpiPen)
- Providing a pain reliever (Tylenol, Aspirin, etc.)
- Providing an antihistamine pill (Benadryl, Claritin, etc.)

Page 18

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- AND Yes OR No on question 17. Have you ever received any food ... on page 9 .
- AND Yes OR No on question 20. Have ANY of your employees recei... on page 11 .

Question 34 ** required **

Section IV: Attitudes about food allergy and food allergy training

This section is designed to understand your perceptions about food allergy and food allergy training. Please indicate how much you agree or disagree with the following statements, using the 5-point scale with 1 being "strongly disagree" and 5 being "strongly agree".

1 - Strongly Disagree | 2 - Disagree
3 - Neither Agree nor disagree | 4 - Agree | 5 - Strongly Agree

34.1 Food allergies have become more prevalent in my school district.

1	2	3	4	5
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

34.2 I am experiencing a broader variety of food allergies in my school district.

<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
-----------------------	-----------------------	-----------------------	-----------------------	-----------------------

- 34.3 Parents often over-react when their children have food allergies.
- 34.4 Some doctors provide food allergy documentation for children without having done thorough diagnostic testing.
- 34.5 Accommodating students with food allergies requires extra time and effort.
- 34.6 Food allergy is a major concern in school foodservice compared to other issues.
- 34.7 It is worthwhile to learn more about food allergy management.
- 34.8 A food allergic reaction is more likely to happen in a school cafeteria compared to restaurants.
- 34.9 Providing allergen-free meals is an important part of my job.

Page 19

Fill out this page only if you answered:

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- AND Yes OR No on question 17. Have you ever received any food ... on page 9 .
- AND Yes OR No on question 20. Have ANY of your employees recei... on page 11 .

Question 35 ** required **

Please indicate the level of difficulty in completing the following tasks.

1 - Very difficult | 2 - Difficult
3 - Neither difficult nor easy | 4 - Easy | 5 - Very easy

- | | 1 | 2 | 3 | 4 | 5 |
|--|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|
| 35.1 Verifying the physicians' order that a child has a food allergy | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| 35.2 Planning allergen-free menus similar to the regular menus | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| 35.3 Purchasing allergen-free products | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| 35.4 Having up-to-date ingredient information | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| 35.5 Meeting last-minute allergen-free meal requests | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| 35.6 Ensuring employees have adequate skills to prepare allergen-free food | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| 35.7 Communicating with other stakeholders (school administrators, nurses, parents, etc.) about students' food allergies | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| 35.8 Obtaining detailed information about a specific student's food allergy | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |

Fill out this page only if you answered:

- Director of Child Nu... OR Manager of a Child N... OR Coordinator of Child... OR Coordinator of a cer... OR Supervisor within a ... on question 4. What is your scope of responsibi... on page 2 .
- AND Yes OR No on question 17. Have you ever received any food ... on page 9 .
- AND Yes OR No on question 20. Have ANY of your employees recei... on page 11 .

Question 36 ** required **

Providing food allergy training to the foodservice employees in my school district is:

- Very difficult
- Difficult
- Undecided/neutral
- Easy
- Very easy

Fill out this page only if you answered:

- Very difficult OR Difficult on question 36. Providing food allergy training ... on page 20 .
- AND Coordinator of Child... OR Manager of a Child N... OR Director of Child Nu... OR Coordinator of a cer... OR Supervisor within a ... on question 4. What is your scope of responsibi... on page 2 .
- AND Yes OR No on question 17. Have you ever received any food ... on page 9 .
- AND Yes OR No on question 20. Have ANY of your employees recei... on page 11 .

Question 37 ** required **

You have indicated food allergy training is difficult or very difficult. Please indicate your degree of agreement with the following statements.

Providing food allergy training to my employees is difficult because:

1 - Strongly Disagree | 2 - Disagree
3 - Neither Agree nor disagree | 4 - Agree | 5 - Strongly Agree

	1	2	3	4	5
37.1 I don't have enough time	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
37.2 I don't have adequate funding	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
37.3 I don't have support from school administrators and staff (e.g., superintendents, school staff, school nurses, etc.)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
37.4 There is a lack of food allergy expertise in my district	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
37.5 The training resources are not easily accessible	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
37.6 Employees aren't interested in learning about food allergy	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
37.7 Employees don't have time to attend food allergy training	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Page 22

Fill out this page only if you answered:

- Very difficult OR Difficult OR Undecided/neutral OR Easy OR Very easy on question 36. Providing food allergy training ... on page 20 .
- AND Director of Child Nu... OR Manager of a Child N... OR Supervisor within a ... OR Coordinator of a cer... OR Coordinator of Child... on question 4. What is your scope of responsibi... on page 2 .
- AND No OR Yes on question 17. Have you ever received any food ... on page 9 .
- AND Yes OR No on question 20. Have ANY of your employees recei... on page 11 .

Question 38 ** required **

Please indicate how likely each of the following events might influence your decision to provide food allergy training.

1 - Very unlikely | 2 - Unlikely | 3 - Neither likely or unlikely
4 - Likely | 5 - Very likely

	1	2	3	4	5
38.1 Lessons learned about the importance of food allergy prevention from professional conferences/meetings (e.g., SNA)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
38.2 Personal experience with food allergy (e.g., family and friends having food allergy)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
38.3 An allergic reaction that happened in the cafeteria	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
38.4 Media reports about fatal food allergic reactions at schools	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
38.5 Regulatory requirements for managing food allergies at schools (e.g., The Rehabilitation Act of 1973)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Fill out this page only if you answered:

- Very difficult OR Difficult OR Undecided/neutral OR Easy OR Very easy on question 36. Providing food allergy training ... on page 20 .
- AND Director of Child Nu... OR Manager of a Child N... OR Supervisor within a ... OR Coordinator of a cer... OR Coordinator of Child... on question 4. What is your scope of responsibi... on page 2 .
- AND No OR Yes on question 17. Have you ever received any food ... on page 9 .
- AND Yes OR No on question 20. Have ANY of your employees recei... on page 11 .

Question 39 ** required **

How much do you agree or disagree with the following statements? Use the 5-point scale with 1 being "strongly disagree" and 5 being "strongly agree".

1 - Strongly Disagree | 2 - Disagree
3 - Neither Agree nor disagree | 4 - Agree | 5 - Strongly Agree

	1	2	3	4	5
39.1 I can provide food allergy training to my employees when needed.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
39.2 I can find information about food allergies for employee training.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
39.3 I can overcome challenges to providing food allergy training if I try hard	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Fill out this page only if you answered:

- Very difficult OR Difficult OR Undecided/neutral OR Easy OR Very easy on question 36. Providing food allergy training ... on page 20 .
- AND Director of Child Nu... OR Manager of a Child N... OR Supervisor within a ... OR Coordinator of a cer... OR Coordinator of Child... on question 4. What is your scope of responsibi... on page 2 .
- AND No OR Yes on question 17. Have you ever received any food ... on page 9 .
- AND Yes OR No on question 20. Have ANY of your employees recei... on page 11 .

Question 40 ** required **

Do you have a food allergy?

- Yes
- No

Question 41 ** required **

Do you have family members or friends with food allergies?

- Yes
- No

Closing Message

Thank you SO much for participating in the survey! Please click on this [link](#) to enter the raffle to win one of thirty \$50 gift cards from a national retailer. Thank you so much!

- End of Survey -

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**Appendix G - Invitation Email to Online Survey
Participants**

February 6, 2012

Dear Child Nutrition Program Professional:

Greetings!

You are invited to a survey titled, "Investigation of School Food service Directors' Knowledge, Attitudes, and Behaviors related to Food Allergy Training". As the number of children with food allergies increases, many child nutrition professionals are experiencing various requests/issues related to food allergies at school cafeterias. The purpose of the survey is to assess child nutrition professionals' knowledge and attitudes related to food allergy and food allergy training and to examine current food allergy training practices in Child Nutrition Programs.

In order to get a better understanding about the training environment, this survey is intended for the personnel who is in charge of menu planning or providing employee training. If you feel there is another staff member who would be better suited for this survey, please kindly forward this email to the person(s) in your district. The link to this survey is <https://surveys.ksu.edu/TS?offeringId=190824>

Completion of the survey will take 15-20 minutes of your time. Your participation is completely voluntary. Your response will remain completely confidential. Only the summary of the results will be reported in manuscripts or abstracts. The survey is anonymous and a separate link will be used to collect your email address if you would like to enter a drawing to win one of thirty \$50 gift cards.

This study has been approved by the committee for Research Involving Human Subjects (IRB# 5963) on September 2, 2011 at Kansas State University. If you have any question regarding this study, please feel free to contact Dr. Junehee Kwon at (785) 532-5369 (email: jkwon@ksu.edu) or Yee Ming Lee at (832) 964-8653 (email: em04@ksu.edu). For questions about your rights as a participant or the manner in which the study is conducted, you may contact Dr. Rick Scheidt, Chair of the Committee on Research Involving Human Subjects, (785) 532-3224, 203 Fairchild Hall, Kansas State University, Manhattan, KS 66506.

Once again, the link to this online survey is <https://surveys.ksu.edu/TS?offeringId=190824>

We appreciate for your time and effort in participation of this survey.

Sincerely,

Yee Ming Lee, MS
Ph.D Candidate
Department of Hospitality Mgt & Dietetics
Dietetics
Kansas State University

Junehee Kwon, PhD, RD
Associate Professor
Department of Hospitality Mgt &
Kansas State University

Appendix H - First Reminder Email

February 13, 2012

Dear Child Nutrition Professional:

A week ago, you received an invitation to a survey, “Investigation of School Food service Directors’ Knowledge, Attitudes, and Behaviors related to Food Allergy Training.” If you have already completed the questionnaire, please accept our sincere thanks.

If you did not have a chance to complete the survey, please complete it online by clicking on the list below at your convenience.

<https://surveys.ksu.edu/TS?offeringId=190824>

Your response is valuable as it helps us to better understand school food service directors’ attitudes about food allergy practices and challenges in schools. If you have any questions, please feel free to contact us.

We appreciate for your time and effort for participating in this survey.

Sincerely,

Yee Ming Lee, MS
Ph.D Candidate
Department of Hospitality Mgt & Dietetics
Kansas State University
em04@ksu.edu

Junehee Kwon, PhD, RD
Associate Professor
Department of Hospitality Mgt & Dietetics
Kansas State University
jkwon@ksu.edu

Appendix I - Second Reminder Email

February 20, 2012

Dear Child Nutrition Professional:

You may have already completed the survey, "*Investigation of School Food service Directors' Knowledge, Attitudes, and Behaviors related to Food Allergy Training*" that was sent to you two weeks ago. If so, please accept our sincere thanks for your time and your input.

If you did not have a chance to complete the survey, please consider responding to this survey by **February 27, 2012 (Monday)**. The survey link will be closed by Midnight February 27. You can access the survey online by clicking the link below.

<https://surveys.ksu.edu/TS?offeringId=190824>

Your response is valuable as it helps us to better understand your attitudes about food allergy and current practices and challenges dealing with food allergies at nation's schools. If you have any questions about the study, please feel free to contact us.

We appreciate your time and effort for this study.

Sincerely,

Yee Ming Lee, MS
Ph.D. Candidate
Department of Hospitality Mgt & Dietetics
Kansas State University
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Junehee Kwon, PhD, RD
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jkwon@ksu.edu