

**RISK COMMUNICATION WHEN SERVING CUSTOMERS WITH FOOD  
ALLERGIES IN RESTAURANTS IN THE UNITED STATES**

by

HAN WEN

B.A., Sun Yat-sen University, 2010

M.A., University of Houston, 2012

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

2015

## **Abstract**

Food allergies affect nearly 15 million Americans, and accommodating customers with food allergies has become a challenge for the restaurant industry. One third of the fatal food allergy reactions occurred in restaurants, and it is important for the restaurant industry to properly communicate and manage the food allergy risks. This study explored perceived risks and risk communication related behaviors of restaurant staff when serving customers with food allergies by using both qualitative (interviews) and quantitative (online survey) approaches.

Telephone interviews with 16 restaurant managers were audio-recorded, transcribed verbatim, and organized to identify themes. Most participants were aware of the severity of food allergy reactions but perceived that it was the customers' responsibilities communicating their food allergies with restaurant staff before placing their orders. Training for service staff on food allergies and risk communication topics were limited, and some managers perceived such training unnecessary for restaurant business. Findings from interviews were used to develop an online survey instrument.

The survey instrument was pilot-tested and distributed to restaurant employee panels by an online survey research firm. Of 1,328 accessed the survey, 316 usable survey responses (23.8%) were collected from full-service restaurant service staff. Data analyses included descriptive statistics, independent samples t-test, ANOVA, and regression analyses. Results indicated that limited information about food allergies was provided on printed (35.1%) or online menus (28.2%), and very few restaurants had separate menus (8.5%) or complete ingredient lists (14.6%) for customers with food allergies. Meanwhile, restaurant servers lacked knowledge about common food allergens (12.7% correct), differences between food allergies and intolerances (34.2% correct), and government regulations related to food allergies (15.5%

correct). Most restaurant servers (82.0%) agreed or strongly agreed that initiating communication and preventing food allergy reactions were responsibilities of customers with food allergies. Perceived severity of food allergy reactions, previous communication training, sources of media exposure, and perceived responsibilities of preventing food allergy reactions were found to influence restaurant servers' risk reduction and communication behaviors ( $R^2=0.367$ ,  $p<0.001$ ). Restaurateurs, foodservice educators, food allergy advocates, and policy makers may use these findings when developing food allergy training and strategies to prevent food allergy reactions in restaurants.

**Words:** 350

**Keywords:** Food allergy, restaurant, manager, servers, risk perception, risk communication

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## **Dedication**

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# **Chapter 1 - Introduction**

## **Introduction**

Food allergies, abnormal immune responses to food, are becoming more common in the U.S. as the number of individuals with food allergies has continually increased (Boyce et al., 2010; Food Allergy Research & Education [FARE], 2015). It is estimated that 15 million Americans have food allergies (Branum & Lukacs, 2008). In particular, about 9 million adults (4% of adults) and 6 million children (8% of children) have food allergies (Centers for Disease Control and Prevention [CDC], 2011; FARE, 2015; Gupta et al., 2011; Liu et al., 2010).

The prevalence of food allergies has become a serious health and economic concern in the U.S. (CDC, 2011). In 2013, the CDC reported that there was a 50% increase in food allergy diagnoses for children from 1997 to 2011 (Jackson, Howie, & Akinbami, 2013). Among children with food allergies, approximately 40% of them had experienced severe food allergy reactions (Gupta, Holdford, Bilaver, Dyer, & Meltzer, 2013). It was also estimated that the total annual economic cost associated with children with food allergies in the U.S. was \$24.8 billion (Gupta et al., 2013).

Symptoms of food allergy reactions range from mild to severe and can be life threatening. One of the most severe allergy responses, anaphylaxis, can result in circulatory collapse, coma, and even death (Mandell, Curtis, Gold, & Hardie, 2005). Common food allergens and the prevalence of food allergies vary in different countries (Sampson, 2004). The ‘Big 8’ food allergens - including eggs, fish, milk, peanuts, soy, shellfish, tree nuts, and wheat - are major food allergens in the U.S., triggering more than 90% of food allergy reactions (Sicherer, Muñoz-Furlong, Godbold, & Sampson, 2010).

Several federal laws were established to regulate the management of food allergies in different industries and types of food service establishments. For the manufacturing industry, the Food Allergen Labeling and Consumer Protection Act (FALCPA) of 2004 requires that all foods regulated by the Food and Drug Administration (FDA) that contain ingredients or proteins derived from the major eight food allergens be clearly declared on food labels. For educational settings, the Food Allergy and Anaphylaxis Management Act (FAAMA) of 2011 mandated that the U.S. Department of Health and Human Services develop a guideline to manage food allergies in schools. In response to FAAMA, the CDC published the first national *Voluntary Guidelines for Managing Food Allergies in Schools and Early Care and Education Programs* in 2013 (CDC, 2013).

Compared with the manufacturing industry and educational settings, there are limited legislative and regulatory guidelines relating to the management of food allergies in the restaurant industry. At the federal level, only the FDA Food Code states that the person in charge in restaurants should have knowledge about major food allergens, cross-contact, and symptoms of food allergy reactions (FDA, 2009; 2013). At the state and city level, food allergy legislation varies greatly. As of 2015, Massachusetts, Michigan, Rhode Island, and Virginia are the only four states with established legislation for improving restaurant staff's awareness of food allergies to ensure the safety of customers with food allergies (FARE, 2015). Several cities, including New York and St. Paul, MN, require that all restaurants display food allergy posters in staff areas (FARE).

Even though many researchers around the world have tried to find a cure for food allergies, no effective treatment has been found (FARE, 2015). Considering the fact that ingestion of a small amount of food allergen can cause a severe food allergy reaction, strict

avoidance of food allergens and early recognition and response to a food allergy reaction are considered very important for individuals with food allergies (FARE; Sicherer & Teuber, 2004). Consumers usually take various prevention strategies before and during dining out to prevent potential food allergy reactions (Kwon & Lee, 2012; Kwon, Sauer, Wen, Bisges, & Myers, 2013).

Despite these strategies, customers with food allergies have experienced difficulty when dining out because some restaurant employees did not know about food allergies, did not understand special requests, and were not aware of the severity of food allergy reactions (Kwon & Lee, 2012; Kwon et al., 2013). Furthermore, researchers have found that a significant number of customers with food allergies had experienced food allergy reactions after eating in restaurants (Bock, Muñoz-Furlong, & Sampson, 2001, 2007; Wanich et al., 2008).

Miscommunication between and among restaurant staff and customers with food allergies, unexpected or hidden food allergens, and cross-contact in food preparation areas have been recognized by customers with food allergies as major causes of food allergy reactions in restaurants (Furlong, DeSimone, & Sicherer, 2001; Kwon & Lee, 2012; Leftwich et al., 2011).

Researchers found that 33% of fatal food allergy reactions occurred in the U.S. from 2001 to 2006 were triggered by foods prepared away from home (Bock et al., 2001, 2007; Wanich et al., 2008). Most food allergy reactions occurred when consumers believed that the foods they were eating were safe (Sampson, Mendelson, & Rosen, 1992), and when customers failed to notify restaurant staff about their food allergies (Mandabach et al., 2005).

Due to the increasing number of individuals with food allergies and the variety of food allergens, accommodating customers with food allergies has been a challenge for restaurateurs (Abbot, Byrd-Bredbenner, & Grasso, 2007; Ahuja & Sicherer, 2007; Kronenberg, 2012).

Previous researchers found that restaurant employees lacked awareness regarding food allergens in the menu, ways to prevent cross-contact with food allergens, and the severe effects of food allergy reactions (Abbot et al.). Moreover, restaurant employees' confidence levels were greater than their knowledge levels when serving customers with food allergies (Ahuja & Sicherer).

The risks involved in providing allergen-free foods and the severity of food allergy reactions have highlighted the importance of food allergy training and education in the restaurant industry (Abbot et al., 2007; Ahuja & Sicherer, 2007; Mandabach, Ellsworth, Vanleeuwen, Blanch, & Waters, 2005). Food allergy training is essential for restaurant employees who handle food items that are or contain food allergens (Bailey, Albardiaz, Frew, & Smith, 2011). Even though the FDA Food Code requires all restaurants to “ensure that employees are properly trained in food safety, including food allergy awareness, as it relates to their assigned duties” (FDA, 2013, p. 31), researchers have found that most foodservice employees did not receive food allergy training (Choi & Rajagopal, 2013; Mandabach et al., 2005).

Risk perception, which refers to an individual's views toward the risk involved in a particular situation (Schroeder, Tonsor, Pennings, & Mintert, 2007), was highly relevant to the food safety context and was related to the safe food handling behavior of foodservice employees. In particular, researchers have found that food handlers' low-risk perceptions could negatively affect their safe food handling behavior (Clayton, Griffith, Price, & Peters, 2002). In other words, the greater the risk a person perceived, the more likely that he or she would take action to reduce the risk (Yeung & Morris, 2001).

Risk communication, which is the “process of exchanging information among interested parties about the nature, magnitude, significance, or control of a risk” (Covello, 1992, p. 359), is a special concern in the food safety context because understanding risks influences how

individuals or groups perceive, process, and act upon specific risks (Glanz, Rimer, & Viswanath, 2008). How the risk or danger is being described, assessed, and managed may help prevent negative outcomes (McComas, 2006) such as foodborne illnesses and food allergy reactions.

Researchers contended that both restaurants and customers with food allergies should share the responsibility for safe, allergen-free foods (Abbot et al., 2007; Choi & Rajagopal, 2013). Customers should be responsible for clearly communicating their needs and provide as much information as possible to the restaurant staff, while the restaurant employees should be responsible for communicating with customers about whether or not their operation can accommodate allergen-free orders (Abbot et al.). It was also found that customers who perceived less control of food allergy risks tended to rely more on the risk management of the establishments (Van Kleef et al., 2006).

### **Statement of Problems**

Previous research has indicated that the miscommunication between and among restaurant staff and customers, unexpected or hidden food allergens, and cross-contact with allergens were perceived as major causes of food allergy reactions in restaurants (Furlong et al., 2001; Kwon & Lee, 2012; Leftwich et al., 2011). Of these, establishing proper communication between and among customers and foodservice employees may be one of the most important steps in preventing food allergy reactions in restaurants (Leftwich et al., 2011) as it initiates increased attention to food preparation and service staff in serving customers with food allergies.

There is a lack of legislation or training guidelines for food allergy management in restaurants. Considering the increased number of individuals with food allergies (Branum & Lukacs, 2008; FARE, 2015) and the devastating consequences of food allergy reactions (Mandell et al., 2005), it is important for the restaurant industry to focus on food allergy risk management

and communication. However, most food handlers perceive the foodservice industry as a low-risk business, which may negatively affect their safe food-handling behaviors (Clayton et al., 2002). Food allergy risk communication and management, as a part of food safety risk management, is important for restaurants in reducing the chance of food allergy reactions when serving customers with food allergies (Kronenberg, 2012).

Based on the previous literature, this study was conducted to address the following research questions:

- 1) How much are restaurant servers aware of the severity of food allergy reactions?
- 2) How do restaurant servers perceive the risk related to serving customers with food allergies?
- 3) What are the factors influencing the perceived food allergy risks of restaurant servers?
- 4) In which ways do restaurants share the information about food allergies with customers?
- 5) What type of risk communication behaviors do restaurant servers perform when serving customers with food allergies?
- 6) How do restaurant servers perceive the effectiveness of strategies when communicating with customers with food allergies?
- 7) What type of messages do restaurateurs use to communicate food allergy risks with customers?
- 8) What are factors influencing restaurant servers' risk reduction and communication behaviors?

- 9) What are the training needs in the restaurant industry regarding food allergy risk communication?

### **Null Hypotheses**

According to the research questions, the following null hypotheses were proposed and investigated:

H<sub>0</sub>1: Food allergy training does not have an effect on food allergy knowledge.

H<sub>0</sub>2: Food allergy knowledge does not have an effect on perceived severity.

H<sub>0</sub>3<sub>a</sub>: Cues to action do not have an effect on food allergy risk perceptions.

H<sub>0</sub>3<sub>b</sub>: Perceived severity does not have an effect on food allergy risk perceptions.

H<sub>0</sub>3<sub>c</sub>: Perceived susceptibility does not have an effect on food allergy risk perceptions.

H<sub>0</sub>4: Food allergy risk perceptions do not have an effect on food allergy risk communication behaviors.

H<sub>0</sub>5: Perceived responsibilities do not have an effect on the relationship between food allergy risk perceptions and food allergy risk communication behaviors.

H<sub>0</sub>6: Policies and procedures related to food allergies do not have an effect on the relationship between food allergy risk perceptions and food allergy risk communication behaviors.

### **Justification**

The previous research has suggested that establishing proper communication between and among customers and foodservice staff was one of the major challenges in the restaurant industry (Leftwich et al., 2011). Risk perception and communication play an important role in controlling and preventing negative consequences (McComas, 2006; Parrott, 2004) such as food allergy reactions in restaurants.

However, limited research has investigated how restaurant staff perceives and communicates food allergy risk. The limited understanding about restaurant staff's risk perception and communication when serving customers with food allergies is concerning, considering the fact that 33% of fatal food allergy reaction cases from 2001 to 2006 occurred in restaurants (Bock et al., 2001; 2007), and in many of these cases, customers failed to inform the restaurant staff about their special needs (Mandabach et al., 2005).

Even though completely eliminating food allergy risks is unachievable (Kroes et al., 2000), reducing such risks may be attainable through training that focuses on risk management when serving customers with food allergies. To establish such training protocols to enhance food allergy risk communication and management, identifying the current status of food allergy risk perception and communication of restaurant staff may be one of the most important steps in preventing food allergy reactions in restaurants.

### **Purpose**

Therefore, the purpose of this study was to explore the perceived risks and risk communication related behaviors of restaurant staff when serving customers with food allergies in the U.S. A mixed method including a qualitative study (i.e., individual interviews) and a quantitative study (i.e., self-administered online survey) were utilized to accomplish the overall purpose of this study.

### **Objectives**

The specific objectives of the individual interviews were:

- 1) to identify restaurant managers' or operators' beliefs and perceptions about food allergy risks in their restaurants and



- 2) to explore risk communication procedures or protocols when serving customers with food allergies.

The specific objectives of the self-administered online survey were:

- 1) to examine perceived risks of restaurant servers when serving customers with food allergies,
- 2) to identify ways in which restaurant servers communicate risks,
- 3) to explore factors affecting restaurant servers' risk reduction and communication related behaviors when serving customers with food allergies, and
- 4) to recommend food allergy risk communication strategies and training needs for the restaurant industry.

### **Significance of the Study**

Existing literature has confirmed that communication is critical in preventing food allergy reactions in restaurants, yet customers with food allergies often experience challenges when communicating their special needs to restaurant staff (Kwon & Lee, 2012; Leftwich et al., 2011). As the first step in identifying strategies to improve risk communication related to food allergies, investigating the current risk perceptions and communication behaviors of restaurant staff is of great importance.

Risk communication theories have been widely applied in food safety risk communication literature and practice (Cope, Frewer, Houghton, Rowe, Fischer, & De Jonge, 2010; Lofstedt, 2006; Yeung & Morris, 2001). However, an in-depth review of the literature did not reveal any research related to food allergy risk communication in the restaurant industry. In applying risk communication theories, results of this study contributed to the current literature by providing restaurant staff's food allergy risk perceptions and risk communication related

behaviors. Relating to available literature about dining experiences of customers with food allergies, findings of this study provided insight into the gap in risk perception and communication between restaurant staff and customers with food allergies.

### **Practical Implications**

Findings of this study had several practical implications for foodservice educators, food allergy advocates, policy makers, and the restaurant industry in the U.S. This study provides foodservice educators and food allergy advocates with directions when developing food allergy risk communication training for the restaurant industry. Findings may also provide policy makers with suggestions when developing food allergy related legislations and training guidelines. Factors identified that impacted servers' risk reduction and communication behaviors may help restaurateurs identify ways to improve risk communication and servers' behaviors. In addition, the risk communication strategies identified in this study may further provide the restaurant industry with recommendations and suggestions for preventing food allergy reactions.

### **Limitations and Future Research**

There are several limitations identified in this proposed study. For the qualitative study, even though a purposive sampling method was used to provide a variety of opinions and operational suggestions from different types of restaurants in different geographical locations throughout the U.S., the convenience sampling presented limited the generalizability of the results.

In the quantitative study, an online survey instrument was developed and sent out by an online survey research company. The online survey distribution protocol may have excluded the population that did not use computers or the Internet. Even for the population that had access to computers and the Internet, this sampling method may have excluded those who were not

familiar with completing internet-based surveys (Stern, Adams, & Elsasser, 2009). In addition, this study only examined self-reported food allergy risk perceptions and risk communication related behaviors. Such self-reported data might be impacted by the social desirability bias and must be interpreted with caution. Future research may use other methods to investigate the risk communication behavior of restaurant staff to overcome such biases. Direct observation provides access to an understanding of foodservice staff behaviors. Another approach may be using mystery shoppers, which allows direct interaction with and evaluation of foodservice staff.

Lastly, this study was conducted in the U.S. only. Therefore, results from this study may not be generalized to other countries. Future research is encouraged to explore the food allergy risk perception and risk communication behavior of restaurant staff in other countries.

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## **Chapter 2 - Literature Review**

The purpose of this study was to explore the perceived risks and risk communication behaviors of restaurant employees when serving customers with food allergies in the United States (U.S.). This chapter consists of five sections. The first section is an overview of facts, statistics, and literature relating to food allergies in the U.S. The second section explains the legal environment in regards to food allergies in the U.S. The third section discusses the dining experience of customers with food allergies, and the fourth section outlines the operation issues that pertain to the management of food allergies in the restaurant industry. The fifth section summarizes the risk communication theories that relate to the proposed methods of this study.

### **Food Allergies in the United States**

#### ***Food Allergy***

Adverse reactions to food consist of a variety of abnormal responses that result from the ingestion of food. They are usually caused by a toxin, a pharmacological effect, a metabolic disorder, or an immunological response (Sicherer & Teuber, 2004). In particular, a food allergy is defined as “an adverse health effect arising from a specific immune response that occurs reproducibly on exposure to a given food” (Boyce et al., 2010, p. S8).

Food allergy reactions range from mild to severe, and they can be life threatening. Symptoms of food allergy reactions usually appear within the first two hours, if not sooner, after the ingestion of allergens (Chafen et al., 2010). Although it is rare, symptoms may appear several hours after eating the allergenic foods (Chafen et al.). Common symptoms of food allergy reactions include abdominal pain, nausea, diarrhea, vomiting, stomach cramps, itching, rash, hives, and difficulty swallowing (Boyce et al., 2010). One of the most severe food allergy



responses is anaphylaxis, which can result in circulatory collapse, coma, and even death (Mandell, Curtis, Gold, & Hardy, 2005).

Another common adverse reaction to food is food intolerance. Even though both food allergy and food intolerance are common types of adverse reactions to food, they are different in several ways. Food allergy is mediated by Immunoglobulin E (IgE), while food intolerance is a non-immunological adverse reaction to food caused by an enzyme defect (Boyce et al., 2010). IgE is a unique class of immunoglobulin that is produced by the immune system and which triggers food allergy reactions (Boyce et al.; Food Allergy Research and Education [FARE], 2015a). Furthermore, food allergy can be distinguished from food intolerance based on the cause, symptom, and even the severity of the reaction as shown in Table 2.1 (Assa'ad, 2014).

**Table 2.1 Differences between Food Allergy and Food Intolerance**

	<b>Food allergy</b>	<b>Food intolerance</b>
<b>Body system affected</b>	Immune system	Digest system
<b>Cause</b>	Abnormal immune responses from ingestion of food	Inability to properly break down the food
<b>Common symptoms</b>	Nausea, diarrhea, vomiting, rash, hives, itchy skin, chest pain, trouble swallowing, etc.	Nausea, diarrhea, vomiting, cramps, bloating, heartburn, headaches, irritability, etc.
<b>Timing of symptoms</b>	Usually comes on suddenly	Usually comes on gradually
<b>Frequency of symptoms</b>	Every time food is eaten	May not happen every time
	Small amount of food can trigger allergy reaction	Small amounts of food may not cause problem
<b>Severity of reactions</b>	Can be life-threatening	Is not life-threatening

Food allergens are food items with proteins or chemicals recognized by specific immune cells, which further elicit immunological reactions (Boyce et al., 2010). Nearly all foods can become food allergens to the affected persons and result in food allergy reactions (FARE, 2015a), and more than 200 food items have been shown to provoke allergic reactions (Schlosser, 2001). However, recent research has focused on the 170 most common food allergens which have caused food allergy reactions mediated by IgE (Boyce et al.).

Common food allergens and the prevalence of food allergies vary in countries throughout the world (Table 2.2) (Sampson, 2004). Even though it is still unclear what exactly leads to food allergies, infant feeding habits, environmental factors, foods eaten on a regular basis, food preparation methods, and genetics have been found to influence the prevalence of food allergies in different countries (Sampson; West, 2011). Among these factors, the foods consumed on a regular basis (i.e., staple foods) tend to be a strong influence for different geographical locations (West).

**Table 2.2 Common Food Allergens in Different Countries**

<b>Country</b>	<b>Common Food Allergens</b>
United States	Milk, egg, wheat, soy, peanut, tree nuts, fish, and shellfish (Food Allergen Labeling and Consumer Protection Act [FALCPA], 2004).
Canada	Peanut, tree nuts, mustard, sesame, milk, egg, seafood, soy, wheat, and sulphites (Canadian Food Inspection Agency [CFIA], 2012).
United Kingdom	Cereals containing gluten, crustaceans, molluscs, eggs, fish, peanuts, nuts, soybeans, milk, celery, mustard, sesame, lupin and sulphur dioxide at levels above 10 mg/kg, or 10 mg/litre, expressed as SO <sub>2</sub> (Food Standards Agency [FSA], 2014).
China	Egg, milk, shellfish, peanuts, and buckwheat (Poel, Chen, & Penagos, 2009).
Japan	Egg, milk, wheat, buckwheat, peanut, crab, and shrimp/prawn (Akiyama, Imai, & Ebisawa, 2011).

### ***Prevalence of Food Allergies***

Food allergies are becoming more common in the U.S. as the number of individuals with food allergies has increased steadily (De Blok et al., 2007). It is estimated that there are 15 million Americans with food allergies (Branum & Lukacs, 2008; FARE, 2015a). Of these, about 9 million adults (4%) and nearly 6 million children (8%) have food allergies (Centers for Disease Control and Prevention [CDC], 2011; FARE, 2015a; Gupta et al., 2011; Liu et al., 2010).

In addition to the prevalence of food allergies in the U.S., the frequency of anaphylaxis that is associated with food allergies appears to be increasing (CDC, 2011). Food allergy reactions account for nearly 200,000 emergency room visits every year; approximately one every

three minutes. (Clark, Espinola, Rudders, Banerji, & Camargo, 2011). Between 150 and 200 deaths each year are due to severe food allergy reactions (Sampson, 2003).

In 2013, the CDC reported a 50% increase in food allergy diagnoses for children from 1997 to 2011 (Jackson et al., 2013). Approximately 40% of the 6 million children with food allergies have experienced severe food allergy reactions (Gupta et al., 2011; Gupta, Holdford, Bilaver, Dyer, & Meltzer, 2013; Liu et al., 2010).

For both the U.S. health care system and the family with children that suffer from food allergies, the total annual economic costs associated with food allergies was estimated to be \$24.8 billion (Gupta et al., 2011). In particular, the annual direct medical costs (i.e., clinician visits, emergency room visits, and hospitalization) was about \$4.3 billion, while the annual overall estimated costs (i.e., lost productivity, out-of-pocket expenses, opportunity costs) were nearly \$20.5 billion (Gupta et al., 2011).

Even though many food scientists and biologists around the world have been working on developing medicines and therapies to cure food allergies, as of 2015, no treatment has proved to be effective (FARE, 2015a). Because a small amount of food allergen exposure can cause a severe reaction, strict avoidance of food allergens and early recognition of reaction symptoms are very important for individuals with food allergies (FARE, 2015a; Food and Drug Administration [FDA], 2010; Sicherer & Teuber, 2004).

The “Big 8” allergens including eggs, fish, milk, peanuts, soy, shellfish (e.g., crab, crayfish, lobster, shrimp), tree nuts (e.g., walnuts, cashews, almonds, pecans, pistachios, hazelnuts, macadamia nuts), and wheat trigger more than 90% of the food allergy reactions in the U.S. (Sicherer, Muñoz-Furlong, Godbold, & Sampson, 2010). Milk allergy is very common in infants and children under the age of three years. However, approximately 20% of these children

will outgrow their milk allergy by the age of four, while about 80% of them will have outgrown it by the time they are 16 years old. (American College of Allergy, Asthma, & Immunology [ACAAI], 2010). Peanut allergy is also prevalent in the U.S., affecting between 0.6% and 1.3% of the population (Boyce et al., 2010). The number of children with peanut allergies has tripled from 1997 to 2008 (Sicherer et al., 2010). Among the “Big 8” food allergens, peanuts, tree nuts, and shellfish are most likely to cause anaphylaxis (Abbot, Byrd-Bredbenner, & Grasso, 2007).

Although most food allergies in the U.S. result from the “Big 8” allergens (Sicherer et al., 2010), nearly 170 foods have been identified as a cause of food allergy reactions mediated by IgE (Boyce et al., 2010). Uncommon food allergens in the U.S. include, but are not limited to, corn, gelatin, meat (e.g., beef, chicken, mutton, and pork), seeds (e.g., sesame, sunflower, poppy), spices (e.g., caraway, coriander, garlic, mustard), fruits (e.g., avocados, bananas, kiwifruit), and chocolate (Collins, 2013; FARE, 2015b).

## **The Legal Environment as Related to Food Allergy**

Several forms of federal legislation have been established to regulate the management of food allergies and allergens in different industries including the foodservice industry. In addition, state and city level legislation related to the management of food allergies in foodservice operations is on the rise.

### ***Federal Legislation and Regulatory Guidelines***

For the manufacturing industry, the Food Allergen Labeling and Consumer Protection Act (FALCPA) of 2004 requires that all foods regulated by the FDA must be clearly labeled to indicate any ingredients or proteins derived from the major eight food allergens. Even with legislation, undeclared allergens, transfer of allergens result from cross-contact during the food manufacturing process, and mislabeling are the leading causes of food recalls in the U.S.

(Stericycle Expert Solutions, 2014). By analyzing the FDA food recalls for the fiscal year of 1999, Vierk, Falci, Wolynial, and Klontz (2002) identified three principal factors leading to the presence of undeclared food allergens in recalled food products. Omissions and errors in the ingredient statements accounted for nearly 51% of recalls, cross-contact in manufacturing equipment caused about 40% of recalls, and error of manufacturing employees or ingredient suppliers resulted in approximately 5% of recalls (Vierk et al.).

For the education settings, the Food Allergy and Anaphylaxis Management Act (FAAMA) of 2011 mandated that the U.S. Department of Health and Human Services develop guidelines for managing food allergies in schools. In response to FAAMA and the 2011 FDA Food Safety Modernization Act, the CDC published the first national *Voluntary Guidelines for Managing Food Allergies in Schools and Early Care and Education Programs* (CDC, 2013). The guidelines include recommendations for each of the five priority areas: “ensure the daily management of food allergies in individual children,” “prepare for food allergy emergencies,” “provide professional development on food allergies for staff members,” “educate children and family members about food allergies,” and “create and maintain a healthy and safe educational environment” (CDC, 2013, p.15). Meanwhile, FAAMA (2011) provides incentive grants to encourage and support local educational agencies in implementing the food allergy management guidelines. Moreover, according to Section 504 of the Rehabilitation Act of 1973, public schools are required to provide accommodations for disabled students. Based on their physician’s diagnosis, students with severe food allergies may be qualified as disabled under Section 504 (Rehabilitation Act, 1973).

For the restaurant industry, the FDA Food Code is the only federal level legislation related to the management of food allergies in restaurants. The 2009 Food Code states that the

person in charge in restaurants should have knowledge about major food allergens, cross-contact, and symptoms of food allergy reactions (FDA, 2009). The code also mandates all restaurants to “ensure that employees are properly trained in food safety, including food allergy awareness as it relates to their assigned duties” (FDA, p. 30). These statements in U.S. Food Code, however, lack practical guidelines for operations to follow in order to prevent food allergy reactions.

### ***State- and City-Level Legislation***

In contrast to federal legislation, food allergy legislation for foodservice operations varies with each state (Table 2.1). Massachusetts was the first state to establish state-level legislation for management of food allergies in restaurants (Massachusetts Food Allergy Awareness Act [MFAAA], 2009). In 2013, Rhode Island also passed its food allergy awareness bill, and became the second state to implement state-wide legislation for management of food allergies and the prevention of food allergy reactions (FARE, 2015c). In addition, food allergy awareness bills were signed into law in Michigan and Virginia in 2015 (FARE, 2015c). The city councils of New York City and St. Paul, Minnesota had approved proposals to require food allergy posters to be placed in food production areas (FARE, 2015c). Moreover, learning from the protocols in Massachusetts, food allergy advocates and state restaurant associations in other states, such as Maryland, have been working to pass food allergy legislation (Table 2.3).

**Table 2.3 Food Allergy Legislations among U.S. States and Cities**

<b>States/Cities</b>	<b>Food allergy legislation</b>
Massachusetts (State)	Massachusetts Food Allergy Awareness Act (Section 6B) mandates restaurants to: <ul style="list-style-type: none"> <li>• display a food allergy awareness poster (shall include information regarding risk of an allergy reaction and shall be developed by the Massachusetts Restaurant Association and FARE) in the staff area;</li> <li>• include a notice on all menu that it’s the customers’ obligation to inform servers about their food allergies; and</li> <li>• designate a certified food production manager, who has been trained about food allergies and have knowledge with regards</li> </ul>

	to the relevant issues concerning food allergies as they relate to food preparation.
Michigan (State)	<p>Michigan’s Public Act 516 (2014) requires foodservice establishments to:</p> <ul style="list-style-type: none"> <li>• include a notice on all menu that it’s the customers’ obligation to inform servers about their food allergies; and</li> <li>• display a poster relative to food allergy awareness that includes information relating to the risk of an allergic reaction in the staff area.</li> </ul> <p>And requires certified food safety managers in most restaurants to:</p> <ul style="list-style-type: none"> <li>• view a video or complete another training program concerning food allergies.</li> </ul>
Rhode Island (State)	<p>State of Rhode Island General Assembly (Chapter 20.12) - Food Allergy Awareness in Foodservice Establishments requires all foodservice establishments to:</p> <ul style="list-style-type: none"> <li>• display a poster (shall include information regarding risk of an allergy reaction and shall be developed by the Rhode Island Hospitality Association) relative to food allergy awareness in the staff area;</li> <li>• include on all menus a notice to customers of the customer’s obligation to inform the server about any food allergies; and</li> <li>• designate a manager who shall be knowledgeable with regard to the relevant issues concerning food allergies as they relate to food preparation.</li> </ul> <p>And the director of health or his or her duly appointed agents to:</p> <ul style="list-style-type: none"> <li>• develop a program for food-service establishments to be designated as “Food Allergy Friendly” and shall maintain a listing of food-service establishments receiving such designation on the department of health’s website.</li> </ul>
Virginia (State)	<p>HB 2090 (amending §§ 35.1-14 and 35.1-15 of the state code) requires:</p> <ul style="list-style-type: none"> <li>• the state Board of Health to include training standards that address food allergy awareness in restaurants; and</li> <li>• the Commissioner of Health to provide materials to provide food allergy awareness related training materials for restaurant training personnel.</li> </ul>
New York City, NY (City)	<p>New York City Council requires all restaurants to:</p> <ul style="list-style-type: none"> <li>• display food allergy awareness poster (developed by FARE) in employee area.</li> </ul>
St. Paul, MN (City)	<p>St. Paul City Council requires all restaurants to:</p> <ul style="list-style-type: none"> <li>• display food allergy awareness poster (developed by FARE) in employee area.</li> </ul>
Maryland (State) - proposal	<p>A Food Allergy Awareness Bill is proposed to require all restaurants to:</p> <ul style="list-style-type: none"> <li>• designate one employee who had been trained about food</li> </ul>

	<p>allergies on the premise;</p> <ul style="list-style-type: none"> <li>• request customers with food allergies to inform restaurant staff about their food allergies or provide a clearly written note on menu; and</li> <li>• display a food allergy awareness poster.</li> </ul>
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## **Dining Experiences of Customers with Food Allergies**

### *Dining Out with Food Allergies*

Customers with food allergies often experience difficulties when eating out because restaurant employees are not always aware of food allergies and the severity of food allergy reactions (Abbot et al., 2007). Customers with food allergies or children with food allergies have reported anxiety or fear when dining in restaurants, especially when going to a restaurant for the first time (Kwon, Sauer, Wen, Bisges, & Myers, 2013). They perceived difficulty in avoiding food allergens because of the lack of control in food preparation and service processes in restaurants (Leftwich et al., 2011).

By interviewing 25 customers with food allergies, Kwon et al. (2013) found that most participants in the study preferred large, food allergy-friendly chain restaurants to independent restaurants. Customers with food allergies considered the availability of food ingredient and allergen information online, consistency of food, and well-trained foodservice employees when selecting restaurants (Kwon et al.). When customers were asked to compare their dining experience in chain restaurants and independent restaurants, they mentioned both positive and negative perceptions toward both types of establishments described in Table 2.4 (Kwon et al.).



**Table 2.4 Perceptions about Chain and Independent Restaurants Regarding Accommodations for Customers with Food Allergies**

	<b>Chain Restaurants</b>	<b>Independent Restaurants</b>
<b>Positive</b>	More consistent food ingredients	More ready to check ingredients
	Allergen information available online	More willing to accommodate special requests
	More food allergy training	Better relationships between staff and customers
	Greater awareness about food allergies	Appeared to be more concerned customers' special needs
	Allergy-friendly policies and practices	
<b>Negative</b>	Unwilling to accommodate special requests	Allergen information usually not available
	Taking special orders less seriously	Less consistent ingredients
	Unwilling to accommodate	Lack of food allergy trainings
	Avoid serving customers with food allergies due to liability concerns	

*Note.* Adapted from “Dining experiences of customers with food allergies,” by J. Kwon, K. L. Sauer, H. Wen, E. Bisges, and L. Myers, 2013, *Journal of the Academy of Nutrition and Dietetics*, 113(9), p. A57. Copyright 2013 by the Academy of Nutrition and Dietetics.

### ***Perceived Causes of Food Allergy Reactions***

The miscommunication between and among restaurant employees and customers with food allergies has been recognized as a major challenge that leads to food allergy reactions (Furlong, DeSimone, & Sicherer, 2001). Customers felt that front-of-house employees sometimes did not communicate with back-of-house employees (Kwon & Lee, 2012). In addition, customers were concerned about the consistency in communications because usually there were different restaurant employees who placed the order, prepared the food, and delivered the food (Kwon & Lee). Language barrier was another concern, and customers sometimes lacked confidence as to whether servers understood their allergen-free requests (Leftwich et al., 2011).

Customers with food allergies sought a balance between communication with restaurant employees and the potential social embarrassment aroused by disclosing their food allergy status (Leftwich et al., 2011). To avoid embarrassment, customers were somewhat reluctant to communicate their allergies with restaurant employees (Leftwich et al.). Another reason why

customers were reluctant to disclose their food allergies was that they feared restaurant employees would be risk adverse, and thus further restrict their already limited food choices (Leftwich et al.).

Cross-contact occurs when food containing allergens comes in contact with food that does not contain allergens. Cross-contact has been identified by customers with food allergies as another major cause of food allergy reactions in restaurants (Kwon & Lee, 2012). Cross-contact is likely to happen when allergen-free food items are placed very close to food that contains the allergen, when the utensils and cooking equipment are shared for both regular and allergen-free food items, and when a food handler accidentally transfers the food allergens from one food item to another (Kwon & Lee). Specific to peanut and tree nut allergies, about 22% of reported food allergen exposures in commercial foodservice operations were due to cross-contacts from shared cooking equipment or service supplies (Furlong et al., 2001).

Another major cause of food allergy reaction is hidden or undeclared food allergens. Uncommon food ingredients in some sauces or dressings are difficult to notice or identify. When analyzing 156 episodes of peanut and tree nut food allergy reactions in the U.S., Furlong et al. (2001) found that nearly 50% of reported incidents were caused by hidden food allergens in sauces, dressings, and complex food items such as egg rolls. Even though the FDA requires that the “Big 8” food allergens be clearly identified on food labels (FALCPA, 2004), the undeclared food allergen has been a major cause of food recalls in recent years (Stericycle Expert Solutions, 2014). Inconsistent food labels and inconsistent ingredient lists on menus have also been perceived by customers as causes for food allergy reactions (Kwon & Lee, 2012).

### *Prevention Strategies*

Strict avoidance of food allergens is extremely important for customers with food allergies because as of 2015 there's no cure for food allergies (FARE, 2015a). In general, restaurant employees do not know about food allergies, do not understand special requests, and are not aware of the severity of food allergy reactions (Kwon & Lee, 2012; Kwon et al., 2013). Moreover, the food items provided in the same restaurant or chain restaurants are sometimes inconsistent due to changes in ingredients. Therefore, customers with food allergies have reported that they usually take various prevention strategies before and during dining out so as to avoid food allergy reactions (Kwon et al., 2013).

As preventative measures, customers with food allergies reported going out to restaurants where they were familiar with and were known by the staff (Kwon et al., 2013; Leftwich et al., 2011). They considered seeking familiarity as a key strategy to reducing the fear, anxiety, and uncertainty that have arisen from eating out in unfamiliar places (Leftwich et al.). When traveling in other countries, customers with nut allergies sought out foods that were simple, recognizable, and familiar (Leftwich et al.).

Customers also tended to avoid some high-risk establishments and foods (Kwon et al., 2013). Usually, Asian, Mexican, and buffet restaurants were perceived as high risk establishments, due to potential hidden ingredients in sauces and cross-contact with food allergens (Muñoz-Furlong, 2003). Specifically, customers with nut allergies considered Thai, Chinese, and Indian restaurants as high-risk restaurants, dessert as a high-risk course, and chocolate, sauces, and curries as high-risk foods (Furlong et al., 2001; Leftwich et al., 2011).

Most customers with food allergies would check online menus, ingredients, and allergen information before dining out (Kwon et al., 2013). Some reported even calling the restaurant before visiting and communicating their special needs to restaurant employees in order to

minimize the potential of allergen exposure (Kwon et al.). In addition, the availability of medical care has been taken into account when customers with food allergies are traveling in other countries (Leftwich et al., 2011).

Despite various prevention strategies, dining out may pose serious health risks to customers with food allergies (FARE, 2015b). Researchers found that a significant percentage of customers with food allergies had experienced food allergy reactions after dining in restaurants (Bock, Muñoz-Furlong, & Sampson, 2001, 2007; Wanich, Weiss, Furlong, & Sicherer, 2008). In most cases, the food allergy reactions occurred when customers believed that the food they were eating was safe (Sampson, Mendelson, & Rosen, 1992).

### **Food Allergies in the Restaurant Industry**

As the population with food allergies appears to be increasing in the U.S., it is important for restaurant employees to be fully informed about food allergies and the negative impacts of food allergy reactions (Mandabach, Ellsworth, Vanleeuwen, Blanch, & Waters, 2005). Even though serving customers with food allergies will bring many benefits to the restaurants, it will also pose challenges when considering the variety of food allergens.

### ***Benefits of Serving Customers with Food Allergies***

There are both tangible and intangible benefits related to serving customers with food allergies. Intangible benefits include customer appreciation and loyalty. Appreciative customers with food allergies will tend to return with their families to an allergy-friendly establishment. Customers with food allergies also tend to go back to those restaurants where they have had safe experiences (Kwon et al., 2013). For example, to accommodate customers with food allergies, Chef Ming Tsai, the owner of the Blue Ginger and Blue Dragon restaurants in Boston and Wellesley, Massachusetts, respectively, developed a master ingredient list to disclose all

ingredients and food allergens in each food item (Tsai, 2013). After doing so, Ming's restaurants have been recognized as allergy-friendly establishments with many returning customers (Tsai).

In addition to earning customer loyalty, food allergy-friendly restaurants may also enjoy tangible benefits, including profit and reputation from allergen-free orders ("Consumer Trends", 2012). Given that most people dine out with friends or families, the power of "veto vote" has usually been underestimated (Antico, 2011). Usually, if a person in a party has food allergies, the entire party will go to the restaurant that can accommodate the special request of that person (Antico). In other words, the person with food allergies will "veto" those restaurants that don't accommodate allergen-free orders (Antico). Considering the fact that there are 15 million Americans with food allergies (Branum & Lukacs, 2008), the potential business and profits brought by customer groups that include individuals with food allergies may be significant. By developing a computer program to filter menu items, and using separate plates and cookware for customers with food allergies or food intolerance, P.F. Chang's China Bistro, the largest casual-dining Chinese restaurant chain in the U.S. has increased their profit significantly with allergen-free or gluten-free orders (Moomjian, 2013).

### ***Risk Involved in Serving Customers with Food Allergies***

Due to the increasing number of individuals with food allergies and the variety of food allergens, providing allergen-free foods has been a challenge for restaurateurs (Abbot et al., 2007; Ahuja & Sicherer, 2007; Kronenberg, 2012). Despite the benefits mentioned above, from a restaurants' perspective there are risks in facilitating and accommodating customers with food allergies (Abbot et al.).

Researchers found that restaurant employees lacked awareness regarding food allergens in the menu, ways to prevent cross-contact with allergens, and the severe effects of food allergy

reactions (Abbot et al., 2007). By studying 62 foodservice operations in the United Kingdom, researchers found that about 21% of the peanut-free meals that were prepared right after peanut-containing meals were contaminated with peanut or peanut protein (Leith, Walker, & Davey, 2005). In addition, restaurant servers were usually confused about the difference between cross-contact and cross-contamination (Abbot et al.). Cross-contact refers to “the transfer of an allergen from a food containing an allergen to a food that does not contain the allergen”, while cross-contamination “occurs when microorganisms are transferred from one food or surface to another (ServSafe, 2012, p. 6-2). Understanding the differences between cross-contact and cross-contamination is one of the key elements in preventing food allergy reactions in food preparation and service areas. For example, cooking does not reduce or eliminate the food allergens when cross-contact occurs even though proper cooking may reduce or eliminate the chance of foodborne illness if foods are cross-contaminated by microorganisms (FARE, 2015d).

Researchers also found that restaurant employees’ confidence level was high while the knowledge level about serving customers with food allergies was not adequate (Ahuja & Sicherer, 2007). Specifically, 70% of respondents in this study felt that they could guarantee a safe meal; while 35% of respondents thought that fryer heat can destroy allergens, 25% thought that it is safe to remove allergens from a finished meal, and 58% participating in this study had not received any food allergy training. If servers lack knowledge and awareness about food allergies, they may not be able to give customers with food allergies clear and easily understood responses (Kronenberg, 2012). In addition, servers may incorrectly assume that an item is allergen free if they’re not aware of the hidden ingredients that are not disclosed in recipes (Mandabach et al., 2005). Meanwhile, food handlers in kitchens may not use standard operating

procedures to minimize the risk of cross-contact if they don't understand the severity of food allergy reactions (Kronenberg).

Serving customers with food allergies is not as easy as removing cheese from a burger for a milk-allergy customer or removing nuts from a salad for a tree nut-allergy customer (Ahuja & Sicherer, 2007; Kronenberg, 2012). To correctly address questions and concerns from consumers with food allergies, all restaurant employees should fully know and understand the ingredients on menus, the food preparation procedures, and the food delivery and storage procedures (Abbot et al., 2007).

In addition, food allergy reactions may cause a restaurant litigation and financial hardship. For example, in the case of *DeCoite v. Grape Leaves Restaurant*, a woman with a peanut allergy died after eating the lamb chops at the restaurant that was marinated with peanut butter (DeCoite v. Grape Leaves Restaurant, Riverside County Superior Court Action no. RIC340932, 2003). It cost the restaurant \$954,447 to settle the lawsuit because the restaurant failed to disclose the peanut butter being used to marinate the lamb chop even though the woman notified the restaurant server that she was allergic to peanuts.

### ***Food Allergy Training***

The risks involved in providing allergen-free foods and the severity of food allergy reactions highlight the importance of implementing food allergy training and education programs in the restaurant industry (Abbot et al., 2007). Food allergy training is essential for restaurant employees to manage food items that are or contain food allergens, and to recognize the signs of allergic reactions (Bailey et al., 2011). Food allergy training commonly includes both formal training (e.g., in-class training) and informal training, such as posting food allergy awareness posters (Choi & Rajagopal, 2013).

Even though the 2009 Food Code (FDA, 2009) requires all restaurants to “ensure that employees are properly trained in food safety, including food allergy awareness, as it relates to their assigned duties” (p. 30), researchers found that most foodservice employees did not receive training relating to food allergies (Choi & Rajagopal, 2013). Most restaurateurs did not provide food allergy training to their employees because of perceived barriers, such as the high cost of training, high labor-turnover rate, time constraints, language barriers, and even the lack of interest in implementing food allergy training (Abbot et al., 2007; Mandabach et al., 2005). In a recently published study, researchers found that the biggest barrier that prevented restaurant managers from providing food allergy training was the lack of commitment from employees (Lee & Xu, 2014). Compared with operators or managers in independent restaurants, chain-restaurant operators or managers were more likely to include food allergy topics into training and were more aware of the food allergy issues (Mandabach et al.).

Currently, there are a few food allergy training programs available for the restaurant industry, including the ServSafe® food allergen training program developed collaboratively by FARE and the National Restaurant Association (NRA) and *Welcoming Guests with Food Allergies*, developed by FARE (2015b). Most food allergy training programs target delivering food allergy knowledge, but few focus on improving the risk perceptions and risk communication behaviors of restaurant employees when serving customers with food allergies. In addition, topics of food allergies are only briefly discussed in food safety courses for students majoring in hospitality and restaurant management (Mandabach et al., 2005). Further, researchers found that operators or managers of restaurants tend to provide food allergy training with regard to the identification of food allergens and the avoidance of cross-contact, but very few of them focused on the proper communication between the front-of-house and back-of-house



employees, or restaurant employees and customers (Lee & Xu, 2014). Considering one of the major causes of food allergy reaction is the lack of proper communication between and among restaurant employees and customers with food allergies (Furlong et al., 2001; Kwon & Lee, 2012; Leftwich et al., 2011), research may be needed to address risk and interpersonal communications among restaurant staff and customers.

## **Risk Communication**

### ***Risk Perception***

Technically, a risk is defined as the combination of the probability or frequency of occurrence of a defined hazard with the degree to which the consequence would occur (Yeung & Morris, 2001). The decisions, if there are certain risks, are found to be highly related to the options people have, the outcomes that people value, the beliefs about the potential outcomes, and the uncertainties triggered by the risk decisions (Fischhoff & Kadvany, 2011). Researchers also have found that the way individuals define a specific risk depends on how they value the outcomes or the chance of losing something of value (Fischhoff & Kadvany).

Risk perception refers to an individual's views toward the risk involved in a particular situation (Schroeder, Tonsor, Pennings, & Mintert, 2007). Risk perception can be influenced by a variety of factors in either positive or negative ways. Factors affecting perceived risks include voluntariness, controllability, familiarity, equity, benefits, reversibility, uncertainty, ethical/moral nature, ethnicity, socio-economic or gender distinctions, level of trust, and understanding of the risk (Corman, Trethewey, & Goodall, 2008; Covello, Peters, Wojtecki, & Hyde, 2001; Frewer, 2000).

Risk perception has been found to influence risk behavior in that, if a person perceives greater risk in terms of probability and consequence, he or she is more likely to take action to

reduce the risk (Yeung & Morris, 2001). Specifically, evoking negative emotions (e.g., anger, sadness, fright, anxiety) can help improve the risk perceptions of the general public (Janoske, Liu, & Sheppard, 2012). For example, if a risk causes people to lose their loved ones, the general public's negative emotional responses would be evoked (Janoske et al.).

The relationship between risk perceptions and health behaviors is an undecided issue in health psychology, even though majority of the research found that risk perceptions are positively associated with health behaviors (Brewer, Chapman, Gibbons, Gerrard, McCaul, & Weinstein, 2007). Risk perceptions, as part of the health behavior theories, include different dimensions or determinants, such as perceived probability or likelihood, perceived susceptibility, and perceived severity (Brewer et al.; Janmaimool & Watanabe, 2014). Perceived probability refers to an individual's likelihood in being harmed by a hazard under certain conditions (Brewer et al.). Perceived susceptibility refers to an individual's subjective perception of the risk of contracting to a hazard (Janz & Becker, 1984). Perceived severity refers to an individual's feeling regarding the seriousness of contracting a hazard and reflects the extent of harm a hazard would cause (Brewer et al.; Janz & Becker). Risk perceptions may also be influenced by different contribution of "cues", both internal and external (Janz & Becker).

### ***Risk Communication***

Risk communication is defined as the "process of exchanging information among interested parties about the nature, magnitude, significance, or control of a risk" (Covello, 1992, p. 359). There are different ways to communicate the risk. One-way risk communication focuses on message delivery (Fischhoff, 1999; Weinstein, 2000), and two-way communication focuses on feedback, inputs, and understandings from both sides of the communication. In general,

there's a consensus that effective risk communication involves two-way communications between communicators and risk message recipients (Sheppard, Janoske, & Liu, 2012).

The potential goals of risk communication can be simplified as “share information”, “change belief”, and “change behavior” (Figure 2.1) (Fischhoff, Brewer, & Downs, 2012, p. 4). The first goal, information sharing, is to make risk information available and understandable to target audiences (Fischhoff et al.). Beyond making people understand the risk information, risk communication has the second goal: to change people's beliefs (Fischhoff et al.). In this stage, risk communication can help people to make their own informed decisions by evaluating the risks and benefits (Braddock, Edwards, Hasenberg, Laidley, & Levinson, 1999; Fischhoff et al.). The ultimate and primary goal of risk communication is to change people's behavior, even though risk communication may or may not be the best way to accomplish this goal (Brewer et al., 2007; Fischhoff et al.). Therefore, choosing an appropriate goal for risk communication is extremely important and highly related to the expectation of results (Fischhoff et al.).

**Figure 2.1 Three Potential Goals of Risk Communication (Fischhoff et al., 2012).**



Risk communication researchers have focused on the mental model of cognitive mechanism (Fischhoff, 1999; Weinstein, 2000), confusion and misinformation issues (Weinstein), counseling and tailoring (Rimer, Glanz, & Rasband, 2001), and intensive, calibrated, and directed communication (Rimer et al.) at the individual level. The cognitive

mechanism describes how individuals are exposed to and perceive the risk, how they interpret and relate the risk to themselves, and whether and how they change their behavior based on the risk they have perceived (Glanz & Yang, 1996; Weinstein).

Communication researchers found that there are several factors accounting for the changes in people's knowledge, attitudes, and even behaviors in regard to risk communication (Fischhoff et al., 2012). For example, different communication channels (e.g., oral communication, written material, internet, TV, social media) can influence the effectiveness of risk message deliveries (Fischhoff et al.). Furthermore, both physical and social environmental factors can influence how people understand and respond to the risk messages (Fischhoff et al.).

“Optimistic bias” means that most people feel relatively invulnerable and see themselves “better than average” at avoiding risks when they have a sense of control (Fischhoff & Kadvany, 2011, p. 90). Therefore, using numeric likelihood can help people understand the risks and benefits of their decisions (Fischhoff et al., 2012). Rather than describing risk using words, the numeric likelihoods of risks and benefits can increase the risk perceptions of the target audiences through risk messages (Fischhoff et al.). It is more effective to provide risk likelihood messages than to provide risk prevention messages, and people tend to remember those high-proximity events more than low-proximity events (Janoske et al., 2012).

In order to evaluate whether risk communication is effective, a formal evaluation is necessary (Fischhoff et al., 2012; Robinson, Patrick, Eng, & Gustafson, 1998). There are different ways to evaluate different areas of risk communication (Fischhoff et al.). Specifically, the formative evaluation focuses on identifying the format, content, and the delivering channels of the risk message; the process evaluation focuses on measuring the delivery, outreach, consistency, and the implementation of risk communication; and the outcome evaluation focuses

on evaluating and assessing the overall goal achievement process (Davidson, 2005; Fischhoff et al.). To decide whether a risk communication meets its goal or not, researchers need to determine whether the risk communication includes the information needed for users, whether the risk communication is user friendly with easily accessible information, and whether the risk message is understandable and easily comprehensible (Fischhoff et al.).

Risk communication, as a strategic communication, is important because it can lead to positive effects, such as adding social value (Palenchar & Heath, 2007). Communication plays a critical role in the risk information delivery process, in that people usually exaggerate how well others understand them or how well they understand others, which means that without either side realizing it, risk communication may fail (Fischhoff & Kadvany, 2011). Therefore, two-way communication is necessary for people to understand each other (Fischhoff & Kadvany).

When communicating the risk, communicators and policy-makers need to keep in mind that different groups have different perceptions of the same risk (Janoske et al., 2012). It is important to identify who needs to be informed about the risk, and what the barriers are in risk communication and involvement for the target population (Paton, Parkes, Daly, & Smith, 2008).

### ***Food Safety Risk Communication***

There are three interrelated steps involved in the food safety risk-based decision-making process: risk assessment, risk management, and risk communication (Figure 2.2) (Cope et al., 2010). Risk assessment is the process that describes how consumers identify the uncertainties and the likelihood of potential negative effects (Cope et al.). Risk management refers to the process when consumers weigh the results of risk assessment and seek other relevant alternatives (Cope et al.). The last step, risk communication, describes how information and opinions are exchanged during the process of risk analysis (Cope et al.; Fischhoff et al., 2012).

**Figure 2.2 Three Steps in Risk Decision-Making Process (Cope et al., 2010).**



Food safety risk communication should be developed based on consumers' risk perceptions and concerns (Cope et al., 2010). Information delivered in risk messages should address how to protect consumers at the institution level, how to prevent risk mitigation activities, and how to effectively enforce the communication systems by risk communicators (Cope et al.; Fischhoff et al., 2012). Food safety risk communication also needs to take into account the cultural differences of consumers, and so come up with differentiated communication strategies (Cope et al.; Jackson et al., 2008).

A hazard is an event that triggers negative consequences and provides a source of risk to the receiving population (Yeung & Morris, 2001). Most food risk communication researchers have focused on the microbiological hazards (i.e., hazards caused by bacteria), chemical hazards (i.e., hazards associated with the use of chemical additives), and technological hazards (i.e., hazards caused by technology advancement in food production) (Lofstedt, 2006; Yeung & Morris).

Risk communication is a special concern in the context of food safety, as it circulates the process of how individuals or groups perceive, process, and act based on their understanding of risk (Glanz, Rimer, & Viswanath, 2008). How the risk or danger is being described, assessed, and managed is related highly to the prevention of negative outcomes (McComas, 2006; Parrott,

2004) such as foodborne illnesses and food allergy reactions. Different types of methods have been identified and shown by researchers to communicate food safety risks. For example, using the food safety information sheets as a communication intervention, researchers found that foodservice employees' safe food handling behaviors, especially the hand washing attempts and prevention of cross-contaminations, could be improved (Chapman, Eversley, Fillion, MacLaurin, & Powell, 2010).

Meanwhile, researchers in food safety risk communication have identified many factors influencing the risk perceptions and risk communication behaviors. Renn (1991) found that the interaction with social, psychological, and institutional environments would influence individuals' risk perceptions and risk behavior. Communicating uncertainty would raise consumers' level of trust in authorities and further help them make informed decisions (Graham, 2002). By modeling risk perception and trust into the Theory of Planned Behavior, researchers in the United Kingdom found that trust in food safety information provided by media and some independent authorities would increase risk perception (Lobb, Mazzocchi, & Traill, 2007). Risk perception can further negatively influences attitudes and indirectly affects the behavior intention of food purchasing (Lobb et al.). Consumers usually perceive higher risk if the circumstances are controlled by others and they are not well informed about their rights of decisions (Yeung & Morris, 2001). As a result, people may perceive greater risk when they eat in restaurants than eating at home, because they perceive a lower level of control when eating out (Yeung & Morris).

### ***Food Allergy Risk Communication***

The food allergy is one of the food safety risks that have been widely discussed throughout food and foodservice industries as well as related advocacy groups. Before discussing

the risk of food allergies in foodservice establishment, scholars contended that zero risk is not realistic or attainable (Madsen, Hattersley, Allen et al., 2012; Kroes et al., 2000). Moreover, it is difficult to evaluate and quantify the tolerance level of risk associated with food allergies (Madsen Hattersley, Buck et al., 2009; Madsen, Hattersley, Allen et al.). By investigating how the general public perceives the food allergy risks, researchers in Canada found that food allergy risk perceptions are highly related to an individual's attitude toward risk tolerance (Harrington, Elliott, Clarke, Ben-Shoshan, & Godefroy, 2012). Gender, age, educational background, income level, immigrant status, and direct experience (e.g., having multiple food allergies in the household) were identified as determinants of food allergy risk perceptions (Harrington et al.).

Van Kleef et al. (2006) used focus groups of experts to investigate the responsibilities of parties involved in managing food allergy risks. The majority of consumers with food allergies thought that it was their personal responsibilities to prevent the potential risk of food allergy reactions, because they could control the exposure to food allergens (Van Kleef et al.). Most groups emphasized the importance of self-responsibility on the part of consumers with food allergies in making proper food choices and avoiding potential risks, especially in regard to food risk information and education. However, experts placed greater weight on the control agencies, such as the food industry or foodservice establishments (Van Kleef et al.). Researchers found an inverse relationship between the level of control perceived by consumers and the tendency of relying on the risk management of the establishments (Van Kleef et al.).

From research conducted by Mandabach et al. (2005), 42.9% of restaurant employees thought that food allergy reactions in restaurants were due to customers with food allergies, while 39.3% of respondents believed that restaurant employees caused the negative results. Researchers, however, argued that both restaurant employees and customers with food allergies



were responsible for preventing food allergy reactions in restaurants (Abbot et al., 2007; Choi & Rajagopal, 2013). Customers should be responsible for clearly communicating their needs and providing as much information as possible to restaurant employees, while restaurant employees should be responsible for communicating with customers about whether or not their operation can accommodate allergen-free orders (Abbot et al.).

There is a lack of legislation or training guidelines focusing on the risk management of food allergies (Madsen et al., 2009). Yet most food handlers perceive the foodservice industry as a low-risk business, which negatively affects their safe food-handling behaviors (Clayton, Griffith, Price, & Peters, 2002). Therefore, food allergy risk management is important for restaurants, so that they may utilize the opportunity to serve customers with food allergies and help reduce the chance of food allergy reactions caused by restaurant staff mistakes (Kronenberg, 2012).

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## **Chapter 3 - Methodology**

The purpose of this study was to explore the perceived risks and risk communication related behaviors of restaurant service staff when serving customers with food allergies in the U.S. Specific objectives were to examine perceived risks of restaurant staff when serving customers with food allergies, to identify ways in which restaurant service staff communicate the risks, to explore factors affecting restaurant servers' risk reduction and communication related behaviors in restaurants, and to explore food allergy risk communication strategies and training needs for the restaurant industry.

To achieve the research objectives, a qualitative study using individual interviews was conducted to develop a quantitative research survey instrument, which was administered as an online survey. The target population of this study was restaurant service staff from full service restaurants in the U.S. This chapter describes the methodology used, which includes the sample selection, instrument development, data collection, and data analysis processes for both qualitative and quantitative studies. The Institutional Review Board at Kansas State University reviewed and approved the research protocol prior to data collection (see Appendix A).

### **Qualitative Study: Individual Interviews**

Because this was the first study investigating food allergy risk communication in restaurants, individual interviews were employed to gain understanding of how restaurant managers perceive risks involved in serving customers with food allergies (Morgan, Fischhoff, Bostrom, & Atman, 2002). Individual interviews allowed researchers to identify the underlying constructs and phenomena being studied, and to further investigate the causal relationships between these constructs (Walsh, 2003). The purpose of the interviews in this study was to identify current food allergy risk communication and management issues in restaurants.

### ***Sample Selection***

Restaurant managers were recruited for interviews to identify their beliefs and perceptions about food allergies and to assess the overall operation and risk communication procedures or protocols when serving customers with food allergies. When conducting risk communication interviews, Maharik and Fischhoff (1993) found that new concepts arose rapidly from the first 10 to 15 interviews. Therefore, the sample size of individual interviews was set at 15 or when data reached saturation using the convenience sampling method.

Through professional networks, operators or general managers of 16 restaurants in the U.S. were invited to participate in individual interviews. It was important to recruit a diverse sample in order to obtain different opinions when conducting risk communication interviews (Morgan et al., 2002). Therefore, to achieve the maximum variation among the sample, a purposive sampling method was used to include restaurant managers from different types of restaurants (i.e., independent vs. chain).

### ***Instrument Development***

Questions for the individual interviews were developed based on literature review, and followed both the mental model risk communication interview guidelines suggested by Morgan et al. (2002) and the qualitative interview guidelines suggested by Patton (2002). The goal of the mental model interview was to let interviewees express their opinions so that researchers can gather as much information as they need (Morgan et al.).

According to the individual interview guidelines suggested by Patton (2002), different types of questions were included. First, background questions were used to identify participants' demographic characteristics. Experience questions were asked to identify how participants communicate the risk when serving customers with food allergies and training needs in the

restaurant industry about food allergy risk communication. In addition, opinion questions were included to explore participants' food allergy risk perceptions and suggestions of risk communication strategies. Complete interview questions are presented in Appendix B.

Based on the mental model interview guidelines of Morgan et al. (2002), questions were developed and consisted of three stages (Table 3.2). The purpose of the Stage I was to understand interviewees' general beliefs and risk perceptions about serving customers with food allergies. A simple opening question gave interviewees the freedom to express their opinions and ideas, followed by more focused and specific questions about risk perceptions. Stage II directed interviewees to the main body of questions and explored how interviewees communicate and manage the risks when serving customers with food allergies. In Stage III, the interviewer explored how significant the interviewees felt that food allergy risks were compared to other food safety risks, whether interviewees can relate the risks to themselves, and the training needs regarding food allergy risk communication in the restaurant industry.

**Table 3.1 Interview Questions**

Stage	Questions
Opening	1. Can you tell me something about your restaurant? <ul style="list-style-type: none"> <li>• What type of services do you provide?</li> <li>• How many employees do you have in your restaurant?</li> <li>• Is your restaurant independently owned, chain affiliated, or franchised?</li> </ul>
Stage I – general beliefs and risk perceptions	2. Can you tell me what you know about food allergy reactions? <ul style="list-style-type: none"> <li>• How severe do you believe these reactions are? Why?</li> <li>• How likely do you believe these reactions would occur? Why?</li> <li>• How do you know if anyone has food allergies?</li> </ul>
	3. Does your restaurant provide accommodations for customers with food allergies? Or Does your restaurant provide accommodations for special requests made by customers with food allergies? <ul style="list-style-type: none"> <li>• If yes, please describe what happens when serving customers with food allergies?</li> <li>• If no, can you explain the reason why you don't provide accommodations for customers with food allergies?</li> </ul>
	4. What are some risks involved in serving customers with food allergies? <ul style="list-style-type: none"> <li>• How confident are you in preventing food allergy reactions in your operation?</li> </ul>

Stage II – risk communication and risk management	5. What, if any, information do you provide to your potential customers with food allergies? <ul style="list-style-type: none"> <li>• How would your customers find out about this information?</li> </ul>
	6. Recall that when your restaurant receives an allergen-free order. Can you describe the process of preparing and serving this allergen-free order?
	7. Have you been trained on risk management plans or protocols related to serving customers with food allergies? <ul style="list-style-type: none"> <li>• (If Yes) Please describe in detail.</li> <li>• (If No) Do you have any risk management plans or protocols in place in your restaurant?  <ul style="list-style-type: none"> <li>○ (If Yes) Please describe in detail.</li> <li>○ (If No) Proceed to the next question</li> </ul> </li> </ul>
	8. What, if any, strategies did your restaurant use to prevent the food allergy reactions?
Stage III – risk comparison, personal risk, and training needs	9. Do you believe that food allergy is a significant concern in your operation? Why or why not? Please explain fully. <ul style="list-style-type: none"> <li>• Please explain how food allergy risks are similar to or different from other food safety risks.</li> </ul>
	10. To what extent the risk of serving customers with food allergies relate to yourself?
	11. Do you provide training for your employees on how to communicate when serving customers with food allergies? <ul style="list-style-type: none"> <li>• If yes, please describe your training program specifics.  <ul style="list-style-type: none"> <li>○ How long is the training?</li> <li>○ What topics do you include in your training?</li> <li>○ Where do you get the training materials?</li> <li>○ How often do you do it?</li> </ul> </li> <li>• If no, can you explain why you don't provide training?</li> </ul>
End	12. Are there any issues related to risk communication when serving customers with food allergies that we didn't have a chance to talk about?

In order to make sure the questions were adequately phrased to accomplish the research objectives, experts in food safety and food allergy research, risk communication, and qualitative research reviewed the questions. Revisions were made based on suggestions from the expert panel.

### ***Data Collection***

Potential interview participants were approached through the restaurant associations in Kansas and Texas, alumni groups of the Department of Hospitality Management and Dietetics

(HMD) at Kansas State University (KSU), and through personal connections of researchers and faculty members in HMD. After potential participants were identified, the researcher sent out emails explaining the purpose and the confidential nature of the research, and questioned the potential participant's willingness to participate in the interview (Appendix C). For potential participants who agreed to be interviewed, the researchers followed up via telephone and/or email to schedule an interview. If a selected individual did not agree to participate, another manager or operator of the same type of restaurant was contacted. This procedure continued until 16 interviews were scheduled. In order to encourage participation, we provided a \$20 gift card to each participant.

Interview participants were then contacted by telephone. The average duration of interviews was 17 minutes. A set of questions (Table 3.1) using probing techniques was asked to maximize the information gathered. With the permission from the interview participants, the conversations were audio-recorded for analysis.

### ***Data Analysis***

Audio-recorded interviews were transcribed verbatim and organized. Transcripts were reviewed against the recordings by an assistant, who was not involved in the interviews, to ensure accuracy. Interviews were then coded using thematic analysis (Braun & Clark, 2006) following the six phases (Table 3.2). Investigator triangulation was applied so that the data analyses were conducted by two or more individuals, and the results were compared and revised. A panel of three food allergy and risk communication experts reviewed the coding to ensure the accuracy of data codes. The analyzed data were used to develop the quantitative research instrument.

**Table 3.2 Phases of Thematic Analysis**

Phase	Description of the process
1. Familiarizing with the data	Reading and reviewing the transcribed data and noting down initial ideas.
2. Generating initial codes	Coding data in a systematic fashion across the entire data set, and collating data relevant to each code.
3. Searching for themes	Collating codes into potential themes, and gathering all data relevant to each potential theme.
4. Reviewing themes	Checking in the themes work in relation to the coded extracts (level one <sup>a</sup> ) and the entire data set (level two <sup>b</sup> ), generating a thematic “map” of the analysis.
5. Defining and naming themes	Ongoing analysis to refine each theme and the overall story the analysis tells, and generating clear definitions and names for each theme.
6. Producing the report	Final analysis of selected extracts, relating back of the analysis to the research question and literature, and producing a scholarly report of the analysis.

*Note.* Adapted from “Using thematic analysis in psychology,” by V. Braun, and V. Clarke, 2006, *Qualitative Research in Psychology*, 3(2), p. 35. Copyright 2006 by the University of the West of England.

<sup>a</sup> Level one involves reading all collated extracts for each theme, deciding whether the themes form a coherent pattern, and reorganizing the clean the theme until you satisfy with all themes.

<sup>b</sup> Level two involves a similar process but to the entire data set, and to consider the validity and whether the thematic map reflect the meaning as a whole.

### **Quantitative Study: Online Survey**

While the individual interviews of restaurant operators or managers provided a rich array of beliefs and opinions, the survey of restaurant service staff (e.g., servers) also helped researchers identify and understand risk perceptions and risk communication-related behaviors among the target population (Morgan et al., 2002). Therefore, the purpose of the quantitative study was to assess restaurant servers’ perceived risks regarding food allergies and risk reduction and communication-related behaviors.

#### ***Sample Selection***

The National Restaurant Association (2015) reports that the restaurant industry employs about 14 million individuals in the U.S. Based on the size of the population, a sample size of 246

to 384 was considered adequate to represent the target population with a 95% confidence level (Dillman, Smyth, & Christian, 2014). Therefore, the desired sample size for data analyses in this study was set at 300 usable responses. A survey research firm (i.e., Qualtrics) was hired to distribute the survey to their panel members who were employed as service staff in full-service restaurants in the U.S. The survey research firm sent out survey requests to randomly selected panel members until the desired number of responses was collected.

The online survey focused on gathering data that can be generalizable to the entire target population. Therefore, restaurant servers from chain or independent restaurants were included in the study sample. To ensure the variety of operations and restaurant servers were reflected in the sample, appropriate quotas and filtering questions (Table 3.3) were established and used when collecting responses from the panel.

**Table 3.3 Quotas and Filtering Questions**

Quotas	Filtering Questions
<ul style="list-style-type: none"> <li>• 300 restaurant service staff</li> </ul>	1. Which of the following role do you perform the most in your restaurant? <ul style="list-style-type: none"> <li>○ Managerial or supervisory staff (e.g., manager, supervisor)</li> <li>○ Host or hostess</li> <li>○ <u>Service staff (e.g., wait-staff, server)</u></li> <li>○ Production staff (e.g., chef, cook)</li> <li>○ None of the above</li> </ul>
<ul style="list-style-type: none"> <li>• 150 service staff from chain full-service restaurants</li> <li>• 150 service staff from independent full-service restaurants</li> </ul>	2. Which of the following best describes the restaurant of your employment? <ul style="list-style-type: none"> <li>○ <u>A chain full-service restaurant (e.g., Chilies, Olive Garden)</u></li> <li>○ <u>An independent full-service restaurant</u></li> <li>○ A chain limited-service restaurant (e.g., Subway, McDonald's)</li> <li>○ An independent limited-service restaurant</li> <li>○ None of the above</li> </ul>
<ul style="list-style-type: none"> <li>• Participants with age greater than 18</li> </ul>	3. Please indicate your age in years: <ul style="list-style-type: none"> <li>○ [Dropdown List]</li> </ul>



### ***Measures and Instrument Development***

Individual interviews provided input for the survey instrument. An instrument including the following constructs is presented in Appendix D.

#### ***Demographic Characteristics***

Individual differences such as age, gender, ethnic background, socio-economic status, and specific job-related attributes may result in different levels of risk perception and risk communication practices (Frewer, 2000; Morgan et al., 2002). In order to identify the relationships between restaurant servers' demographic characteristics and their risk perceptions and risk communication related behaviors when serving customers with food allergies, questions about individuals' demographic characteristics were asked at the end of the survey.

Questions were asked about age, gender, and educational background, because these variables have been found to influence risk beliefs and perceptions (Morgan et al., 2002). Participants were also asked to provide what state they are employed in and years of employment as service staff in restaurants.

#### ***Food Allergy Training***

Questions about past experiences with food allergy and risk communication training were asked in order to examine whether food allergy training and/or being involved with previous food allergy reactions would impact restaurant servers' risk perceptions and risk communication behaviors. In addition, respondents were asked about the frequency of food allergy and risk communication training and the format of training materials in order to provide food allergy educators and policy makers with more specific information.

### ***Food Allergy Knowledge***

Knowledge questions can provide researchers with a general understanding about respondents' current knowledge regarding food allergies and were developed based on the ServSafe Coursebook (National Restaurant Association Education Foundation [NRAEF], 2012), the training program, *Welcoming Guests with Food Allergies*, developed and modified by Food Allergy Research & Education (FARE, 2010), and the food allergy education modules developed by Kwon, Sauer, and Wen (2015). Topics of knowledge questions included symptoms of food allergy reactions, major food allergens, label reading, and food allergy legislations, and various formats (e.g., multiple answers, true/false) were used to assess participants' food allergy knowledge.

For true/false questions, we used the five-option scale (Lyberg et al., 1997) (Table 3.4), which allowed researchers to rate respondents' confidence in their knowledge when answering questions. This scale provided more insightful data rather than sorting every response into binary correct or incorrect response categories.

**Table 3.4 Five Option True or False Scale**

<b>Response scale</b>	<b>Explanations</b>
True	To the best of my knowledge, this is true.
Maybe True	I think this might be true.
Don't Know	I don't know if this is true or false.
Maybe False	I think this might be false.
False	To the best of my knowledge, this is false.

*Note.* Adapted from "Risk communication: A mental models approach," by M. G. Morgan, B. Fischhoff, A. Bostrom, & C. J. Atman, 2002. Copyright 1997 by the Cambridge University Press.

### ***Food Allergy Risk Perceptions and Related Factors***

Risk perception refers to an individual's views toward the risk involved in a particular situation (Schroeder, Tonsor, Pennings, & Mintert, 2007). According to a set of risk perception factors identified by Janmaimool and Watanabe (2014), the factors impacting food allergy risk

perception may include, but are not limited to the perceived severity of food allergy reactions. Therefore, a set of questions about factors that influence restaurant employees' food allergy risk perceptions were included in the survey. Specific items in each factor were developed based on results of individual interviews and literature review. Respondents were asked to rate each statement of the factors from 1 (strongly disagree) to 7 (strongly agree).

For the overall risk perceptions about serving customers with food allergies in restaurants, a set of statements was modified from the scale developed by Tonsor, Schroeder, and Pennings (2009) and listed in Table 3.5. Using the seven-point Likert scale, participants were required to rate each risk perception statement from 1 (not at all risky) to 7 (highly risky), 1 (no risk at all) to 7 (very high risk), and 1 (strongly disagree) to 7 (strongly agree)

**Table 3.5 Food Allergy Risk Perception Statements and Responses Scale**

<b>Statements</b>	<b>Response to each statement</b>
1. I consider serving individuals with food allergies in restaurants ...	1 2 3 4 5 6 7 not at all risky highly risky
2. When eating out in restaurants, individuals with food allergies are exposed to ...	1 2 3 4 5 6 7 no risk at all very high risk
3. Eating out in restaurants is risky for individuals with food allergies.	1 2 3 4 5 6 7 Strongly Disagree Strongly Agree

*Note.* Adapted from “Factors impacting food safety risk perceptions” by G. T. Tonsor, T. C. Schroeder, and J. W. E. Pennings, 2009, *Journal of Agriculture Economics*, 60, p. 633. Copyright 2009 by the Agriculture Economics Society.

### ***Risk Communication Behaviors***

Questions about participants' risk communication related behaviors when serving customers with food allergies were developed from the risk communication literature and the results of the qualitative study. Based on the literature review, the following constructs needed to be taken into account when evaluating risk communication behaviors.

First, there are three potential goals of risk communication: to “share information”, “change beliefs”, and “change behavior” (Fischhoff, Brewer, & Downs, 2012, p. 4). The first

goal, sharing information, involves making risk information available and understandable to target audiences. For example, the menu of a foodservice operation serves as a communication channel for information sharing. In addition, the service staff is usually responsible for sharing the ingredients and food allergen information when taking allergen-free orders (Abbot, Byrd-Bredbenner, & Grasso, 2007).

There are two different types of risk communication. One-way risk communication focuses on message delivery (Fischhoff, 1999; Weinstein, 2000), while two-way risk communication focuses on inputs, feedback, and understandings from employees and customers. In this study, we examined the delivery channels of food allergy risk messages, as well as the types of risk communication. For example, if the service staff queries customers about their special dietary needs, it is a two-way communication.

Further, there are different methods to evaluate the effectiveness of risk communication. Formative risk communication evaluation focuses on identifying the format, content, and the delivery channels of risk message. The process evaluation focuses on measuring the delivery, outreach, consistency, and implementation of risk communication. The outcome evaluation focuses on evaluating and assessing the overall goal achievement process (Fischhoff & Kadvany, 2011). To determine whether a risk communication meets its goal, we needed to check whether the risk communication includes the information needed for users. Therefore, questions evaluating the risk communication related behaviors were included, but were not limited to, information sharing, food allergy risk message delivery channels, and types of risk communication.

### ***Food Allergy Risk Communication Strategies***

Questions about communication strategies utilized by participants and the restaurants they worked for were developed based on results of the elicitation study. Other than asking which strategy respondents utilized in their operations, this study asked respondents to rate the perceived effectiveness of the strategies by using a seven-point Likert scale, ranging from 1 (not effective at all) to 7 (very effective). Moreover, open-ended questions were included to identify strategies that are not covered in the survey questions in order to explore more strategies and provide better recommendations to the restaurant industry.

### ***Validation of the Instrument***

Once questions were developed, a panel of food allergy and risk communication educators reviewed the survey questions to ensure content validity and the clarity of directions. Based on the feedback provided by the expert panel, the questionnaire was revised and converted to a self-administered online survey instrument. The survey was uploaded onto the Qualtrics survey system for a pilot test and tested using different devices and platforms (i.e., web page, smartphone, tablet) to make sure that survey participants could access the survey.

### ***Data Collection***

Prior to data collection, a pilot test was conducted. A link to an online survey using Qualtrics was sent out through the survey research firm to 30 randomly selected restaurant servers in the member panels. The Qualtrics survey system recorded the total time it took for a respondent to complete the survey. The average time for each respondent provided information about the interpretation and appropriateness of questions and the length of the questionnaire. In addition, participants were asked to provide their thoughts and opinions about the overall appropriateness of questions at the end of the survey using multiple choice and open-ended

questions. The inter-item reliability was evaluated using Cronbach's  $\alpha$  ( $\alpha > 0.70$ ). Results and suggestions from the pilot test were used to modify and refine the survey questions.

The final survey was sent out through the online survey research firm to restaurant servers in the member panels. The benefit of hiring the online survey research firm is that surveys can be administered to the desired number of each subgroup, making the overall sample better represent the target population. However, the challenge of sending out surveys through such research firms is ensuring the reliability of the data. Therefore, appropriate quotas were established to ensure adequate numbers of participants representing different restaurant types, along with screening and filtering questions to select desirable and qualified participants.

Statements about the purpose of the study and the confidentiality and anonymity of survey responses, along with a question about respondents' willingness to participate in this study, were included in the survey instructions. In order to protect the human subjects involved in the research, questions related to identifiable personal information were not included in the survey. Furthermore, contact information for the IRB and the researchers was provided for participants in the survey instructions. An instructional manipulation check was conducted to detect and disqualify participants who respond without reading questions or instructions (Oppenheimer, Meyvis, & Davidenkothe, 2009). One week after the first email, a follow-up email was sent out as a reminder. Up to two reminders were sent to ensure 300 completed questionnaires are received.

### ***Data Analysis***

The Statistical Package for the Social Sciences (SPSS, Version 20.0) was used to analyze the survey data. Descriptive statistics (e.g., frequencies, means, standard deviations) were calculated to summarize the data. Dummy coding was used to recode several variables (e.g.,

knowledge questions answers, previous food allergy training experience) into “1” (e.g., correct knowledge question answers) and “0” (e.g., incorrect knowledge question answers). Cronbach’s  $\alpha$  ( $\alpha > 0.70$ ) was used to determine the construct reliability and the internal consistency of measurement items.

Overall, independent variables included the food allergy risk perception factors (i.e., perceived severity), food allergy risk perceptions, cues to action (i.e., media cues, education cues), food allergy knowledge scores, past food allergy training experiences, and demographic characteristics (e.g., gender, age). Dependent variables included the food allergy knowledge scores, overall food allergy risk perceptions, and risk reduction and communication behaviors. Independent sample t-tests and ANOVA with least significant difference (LSD) post hoc analysis were used to examine the differences between and among groups (e.g., restaurant servers with different educational qualifications). Multiple regression analysis was used to explore the relationships between and among independent variables and dependent variables. Statistical significance was determined at  $p < 0.05$ .

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## **Chapter 4 - Exploring Food Allergy Risk Communication and Management Issues in Restaurants**

### **Abstract**

Accommodating customers with food allergies has become a challenge for the restaurant industry as the number of individuals with food allergies continues to increase in the U.S. Sixteen managers from full-service restaurants were interviewed to identify their food allergy risk perceptions and operational issues related to communicating the risk of preparing allergen-free foods to their customers with food allergies. All interviews were audio-recorded, transcribed verbatim, coded, and reviewed by different researchers to ensure the accuracy of data coding and identification of themes. Participants were aware of the severity of food allergy reactions and the importance of avoiding cross-contacts in restaurants as a means of preventing food allergy reactions. As for risk communication, most participants perceived that customers bore more responsibility than servers in communicating their food allergies before placing their orders. Current procedures and messages used by servers when communicating with customers with food allergies were on a one-way basis. Training service staff on topics related to food allergies and risk communication was limited and some managers perceived such training of low significance for restaurant business. Investigating managers' perceptions and operational practices related to food allergy risk communication provided implications for foodservice educators, food allergy advocates, and policy makers.

**Keywords:** Food allergy, restaurant, manager, risk perception, risk communication

## **Introduction**

Food allergies, which are abnormal immune responses to food, are becoming more common in the U.S. as the number of individuals with food allergies continues to increase (Boyce et al., 2010; Food Allergy Research & Education [FARE], 2015a). It is estimated that 15 million Americans have food allergies (Branum & Lukacs, 2008). Considering that the ingestion of a minute amount of food allergen can cause a severe allergic reaction, strict avoidance of food allergens and early recognition and responses to food allergy reactions are extremely important for preventing potential fatalities of individuals with food allergies (FARE, 2015a; Sicherer & Teuber, 2004).

Symptoms of food allergy reactions range from mild to severe and can be life threatening. One of the most severe allergy responses, anaphylaxis, can result in circulatory collapse, coma, and even death (Mandell, Curtis, Gold, & Hardy, 2005). Common food allergens and the prevalence of food allergies vary in different countries (Sampson, 2004). The “Big 8” food allergens—including eggs, fish, milk, peanuts, soy, shellfish, tree nuts, and wheat—are major food allergens in the U.S., triggering more than 90% of food allergy reactions (Sicherer, Muñoz-Furlong, Godbold, & Sampson, 2010).

For the food manufacturing industry, the Food Allergen Labeling and Consumer Protection Act (FALCPA) of 2004 requires that all foods regulated by the U.S. Food and Drug Administration (FDA) that contain ingredients or proteins derived from the major eight food allergens be clearly declared on food labels. Compared with the manufacturing industry, there are limited legislative and regulatory guidelines relating to the management of food allergies in the restaurant industry. At the federal level, only the FDA Food Code states that the person in charge in restaurants should have knowledge about major food allergens, cross-contacts, and symptoms of food allergy reactions (FDA, 2009; 2013). At the state and city level, food allergy

legislation varies greatly. As of 2015, Massachusetts, Michigan, Rhode Island, and Virginia are the four states with established legislation for improving restaurant staff's awareness of food allergies. Several cities, including New York and St. Paul, MN, require all restaurants to display food allergy posters in staff areas (FARE, 2015a).

Despite the various prevention strategies taken by customers with food allergies, customers have experienced difficulty when dining out because some restaurant staff did not know about food allergies, did not understand special requests, and were not aware of the severity of food allergy reactions (Kwon & Lee, 2012; Kwon, Sauer, Wen, Bisges, & Myers, 2013). Researchers found that 33% of the fatal food allergy reactions that occurred in the U.S. from 2001 to 2006 were triggered by foods prepared away from home (Bock, Muñoz-Furlong, & Sampson, 2001; 2007). Further, in one study, researchers found that 34% of customers with food allergies had experienced food allergy reactions in restaurants (Wanich, Weiss, Furlong, and Sicherer, 2008).

Miscommunication between and among restaurant staff and customers with food allergies, unexpected or hidden food allergens, and cross-contacts in food preparation areas have been recognized by customers with food allergies as major causes of food allergy reactions in restaurants (Furlong, DeSimone, & Sicherer, 2001; Kwon & Lee, 2012; Leftwich et al., 2011). Of these, establishing proper communication between and among customers and foodservice employees may be one of the most important steps in preventing food allergy reactions in restaurants (Leftwich et al., 2011) as it increases restaurant service and kitchen staff's attention. In fact, in many food allergy reaction cases occurring in restaurants, customers failed to inform restaurant staff about their food allergies (Mandabach, Ellsworth, Vanleeuwen, Blanch, &

Waters, 2005). Most food allergy reactions occurred when customers believed that the foods they were eating were safe (Sampson, Mendelson, & Rosen, 1992).

Risk perception, which refers to an individual's views toward the risk involved in a particular situation, is highly relevant to the food safety context and is related to the safe food handling behavior of foodservice employees (Schroeder, Tonsor, Pennings, & Mintert, 2007). Risk perception has been found to influence risk behavior in that, if a person perceives greater risk in terms of probability and consequence, he or she is more likely to take actions to reduce the risk (Yeung & Morris, 2001). Risk communication, which is the "process of exchanging information among interested parties about the nature, magnitude, significance, or control of a risk" (Covello, 1992, p. 359), is a special concern in the food safety context because understanding risks influences how individuals or groups perceive, process, and act upon specific risks (Glanz, Rimer, & Viswanath, 2008). How the risk or danger is described, assessed, and managed may help prevent negative outcomes (McComas, 2006) such as foodborne illnesses and food allergy reactions. Food allergy risk communication and management, as a part of food safety risk management, is important for restaurants in reducing the chance of food allergy reactions when serving customers with food allergies (Kronenberg, 2012).

Therefore, the purpose of this research was to identify current food allergy risk communication and related operational practices in restaurants. The specific objectives were to identify restaurant managers' beliefs and perceptions about food allergy risks in their restaurants, to explore risk communication procedures or protocols when serving customers with food allergies, and to identify food allergy risk communication training needs in the restaurant industry.

## **Methods**

### ***Target Population and Study Sample Selection***

Restaurant managers from full-service restaurants in the U.S. were interviewed individually to collect data for this study. To achieve variation among the sample, purposive sampling method was employed to recruit managers from different types of restaurants such as chain-operated or independently-owned restaurants. Maharik and Fischhoff (1993) found that new concepts arose rapidly from the first 10 to 15 interviews when conducting risk communication interviews. Therefore the target sample size of restaurant manager interviews was determined to be 15. Contact information of potential participants was obtained through faculty and alumni groups from two major universities and local restaurant associations in large metropolitan areas. Upon completion of the interview, each participant was offered a \$20 gift card as a token of appreciation for his or her time and efforts.

### ***Development of Interview Questions***

Interview questions were developed based on the literature review following the mental model risk communication interview guidelines suggested by Morgan et al. (2002) and the qualitative interview guidelines suggested by Patton (2002). The goal of the mental model interview was to let interviewees express their opinions so that researchers could gather as much information as they need. According to the mental model interview guidelines, questions were developed and consisted of three stages (Figure 4.1). The purpose of questions in Stage I was to understand interviewees' general beliefs and risk perceptions about serving customers with food allergies. Stage II directed interviewees to the main body of questions and explored how interviewees communicated and managed the food allergy risk. In Stage III, the researcher explored the relative significance of food allergy risks perceived by the interviewees compared

to other food safety risks. In addition, each participant was asked how much training was needed regarding food allergy risk communication in the restaurant industry. As suggested by Patton, questions about background, experience, and opinions questions were included to gather information from different perspectives. Prior to data collection, four food allergy, foodservice management, and risk communication experts reviewed the questionnaire and provided feedback to make sure that questions were accurately phrased and designed to achieve the research objectives.

[INSERT FIGURE 4.1 HERE]

### ***Data Collection and Analysis***

Once identified, invitation emails were sent out to potential participants in January 2015 with explanations of the purpose and the confidential nature of the data collection. For those managers who indicated their willingness to participate, the researcher followed up with consent forms and scheduled telephone interviews. The procedure continued until data saturation was reached. Sixteen telephone interviews were conducted in February 2015 and audio-recorded. The average duration of the interviews was 17 minutes.

The telephone interviews were transcribed verbatim by professionals from a transcription service company (i.e., CabbageTreeSolutions.com). The transcripts were verified by the researcher against the audio recordings before data coding and analysis. Thematic analysis method suggested by Braun and Clark (2006) was employed to identify, review, and refine the themes of transcribed interview data. In order to ensure the accuracy of extracted themes and data coding, triangulation was applied, and the interview data was coded and analyzed by different researchers. Results were then compared and revised, and major themes and subthemes were identified as shown in Table 4.1.

[INSERT TABLE 4.1 HERE]

## **Results & Discussion**

A total of 16 managers from 16 full-service restaurants participated in individual telephone interviews. All restaurants were located in the states of Kansas and Texas; nine restaurants were independently-owned, and seven were chain restaurants. Five independent restaurants were located in chain hotels, and three restaurants were located in country clubs. The majority (n=12) of the restaurants had more than 30 employees, and all participants (n=16) stated that their restaurants would accommodate allergen-free orders upon customers' requests.

[INSERT TABLE 4.2 HERE]

When asked if food allergy reactions had occurred in their restaurants, two participants indicated that they had seen customers experience food allergy reactions. One participant described the sudden onset of an allergic reaction to peanuts and stated "*it happened within not even five minutes [after service]*" (8-I), implying that the peanut allergy reaction occurred shortly after the service. Another participant observed an allergic reaction to shellfish for one of customers who did not have such an allergy before that moment. The manager described, "*when a shrimp tail touched his arm and he immediately broke out and passed out immediately on the floor*" (15-C-H). These incidents revealed that food allergy reactions could happen shortly after service and through mere contact, and it could be the very first time the customer experienced the food allergy reaction.

### ***Food Allergy Awareness***

When asked what they know about food allergies, most participants explained the symptoms of food allergy reactions and the severity of food allergy reactions. Most participants were aware that the food allergy reaction ranges from mild reactions such as "*rashes,*" "*hives,*"



“swelling of the throat,” and “stomach discomfort” to severe reactions such as “passing out” and “death.” Participants also indicated that the severity level of food allergy reactions vary among individuals. Some participants recognized that customers with severe food allergies might even experience food allergy reactions from airborne food allergens (Table 4.3).

[INSERT TABLE 4.3 HERE]

However, a lot of participants did not recognize the differences between food allergy and food intolerance. Some participants even considered “gluten” as one of the major food allergens. Even though both food allergy and food intolerance are common types of adverse reactions to food, they are different in regards to the causes, symptoms, and the severity of the reactions (Assa’ad, 2014). For example, the symptoms of food allergy reactions usually come on suddenly and can be life-threatening while the symptoms of food intolerances usually come on gradually and are not life-threatening (Assa’ad). Understanding the differences between food allergy and food intolerance may help restaurant managers to be more proactive about developing strategies for emergencies.

Interview participants frequently used the word “cross-contamination” when they described the situation that is actually a “cross-contact.” This result was consistent with the previous researchers who found that restaurant staff were not aware of the differences between cross-contact and cross-contamination (Abbot et al., 2007). Cross-contact refers to “the transfer of an allergen from a food containing an allergen to a food that does not contain the allergen,” while cross-contamination “occurs when microorganisms are transferred from one food or surface to another” (ServSafe, 2012, p. 6-2). Understanding the meaning of cross-contact may be one of the key elements in preventing food allergy reactions in food preparation and service areas in foodservice establishments. For example, proper cooking may reduce or eliminate the

chance of foodborne illness even if food was cross-contaminated by microorganisms during preparation or storage (FARE, 2015b). However, cooking does not reduce or eliminate the food allergens when cross-contact occurs (FARE).

### ***Food Allergy Training***

When asked about types of food allergy training, most restaurant managers stated that they received and provided food allergy training for their service staff. Food allergy training is essential for restaurant employees to manage food items that are or contain food allergens and to recognize the signs of allergic reactions (Bailey et al., 2011). Managers of chain restaurants or independent restaurants located in chain hotels had received more training about food allergies and had access to more food allergy related training materials than managers in independent restaurants. These findings were consistent with previous studies that chain-restaurant managers were more likely to include food allergy topics as part of training and were more aware of the food allergy issues (Mandabach et al., 2005).

In addition, managers with a degree in hospitality management or a culinary background had more food allergy knowledge that they had learned from the ServSafe® certification course or other food safety-related courses. Common topics of food allergy training included “*major food allergens*,” “*cross contamination* [cross-contact],” and “*how to handle allergy reaction*.” Specifically, one restaurant required all managers to be certified for cardiopulmonary resuscitation (CPR) and to learn about food allergies through CPR trainings. While most participants had been trained or had learned about food allergies, two participants indicated that they had never been exposed to any training related to food allergies.

Most managers indicated that they have included topics related to food allergies in their employee training sessions. Common training topics provided to restaurant service staff included

“[identifying] *ingredients of menu items*” and “*notify[ing] a manager*” when customers request allergen-free orders. In previous studies, researchers found that the high cost of training, high labor-turnover rate, time constraints, language barriers, and the lack of interest in implementing food allergy training were barriers that prevented managers from providing their employees with food allergy training (Abbot et al., 2007; Mandabach et al., 2005). In this study, few managers had provided their staff with a specific and separate training session about food allergies because “*food allergy just hasn’t impacted our business enough that it necessitates a full-blow training course*” (10-I).

Typical food allergy training topics related to communication with customers with food allergies are listed in Table 4.5. Some of the key points include the following: (a) getting management involved if servers are not entirely comfortable with handling the allergen-free requests; (b) maintaining clear and open communication; (c) asking a lot of questions; (d) listening to cue words implying food allergies; and (e) being willing to listen.

[INSERT TABLE 4.4 HERE]

Very few managers have been trained or have trained their staff on specifics related to food allergy risk communication and risk management strategies. There is also a lack of training guidelines focusing on food allergy risk management available for restaurateurs (Madsen et al., 2009). Our findings were also consistent with previous research as very few restaurant managers had provided training focusing on proper communication between the front-of-house and back-of-house staff, or restaurant staff and customers with food allergies (Lee and Xu, 2014). For those managers who included topics related to communication, most of them trained their staff to hand over the allergen-free requests to managers rather than empower their servers to make proactive decisions. This is alarming because improper communication between and among

restaurant staff and customers with food allergies was recognized by customers with food allergies as one of the major causes of food allergy reactions in restaurants (Furlong et al., 2001; Kwon & Lee, 2012; Leftwich et al., 2011). Merely handing over responsibility to the manager may not properly equip employees to handle these situations.

In addition, most restaurants trained employees about food allergies on a “*one-time basis*” (e.g., initial orientation) or “*every once in a while.*” Frequent training may be needed considering the increasing number of customers with food allergies, the variety of food allergens, and high employee turnover in the restaurant industry. Even though food allergy risks cannot be completely eliminated (Kroes et al., 2000), reducing such risks may be attainable through training that focuses on risk management. To establish such training protocols and enhance food allergy risk communication and management, an important step may be identifying the current status of food allergy risk perception and communication behaviors of restaurant staff.

### ***Food Allergy Risk Perceptions***

#### ***General Food Allergy Risk Perception***

Most participants were aware of the prevalence of food allergies in the U.S., and one participant indicated that it “*seems like every day, more and more people telling us that they have an allergy when they come in to the restaurant*” (15-C-H). Some managers were confident in preventing food allergy reactions in their operations because of “*the procedures that we have in place*” (14-C) and the fact that food is prepared in a “*from-scratch kitchen*” (10-I). Participants presented different opinions about whether serving customers with food allergies was a significant concern in their operations. About half of (n=7) the participants viewed food allergies as a significant concern particularly due to the severity of allergic reactions. Participants recognized that it is their responsibility to serve food that is safe for customers with food

allergies. One participant stated that it was the “*establishment’s liability to ensure that the need is met*” (2-I-H), and another stated that “*It’s our responsibility to not only feed people but feed them a dish that is safe*” (8-I). Even though it was difficult for participants to “*make any one of them 100% guaranteed*” because “*there is a slight chance and that’s the risk that I think everyone takes*” (8-I), participants indicated that they would “*do our best to accommodate their (customers with food allergies) needs*” (12-C). These findings were consistent with previous research findings on restaurateurs’ perceptions regarding risks of facilitating and accommodating customers with food allergies (Abbot et al., 2007).

### ***Specific Food Allergy Risk Perceptions***

Participants also expressed their perceptions regarding specific food allergy risks in their restaurants (Table 4.6). A majority of participants (n= 9) indicated that potential cross-contact was a significant risk when preparing allergen-free orders. In the kitchen cross-contacts can happen easily, “*from something as simple as, you know, a cook grilling a piece of fish on a grill and then going to cook a steak for a guest with an allergy on the same grill, not realizing*” (15-C-H). Previous research indicated that customers with food allergies perceived the potential cross-contact in food preparation area as one of the major causes of food allergy reactions in restaurants (Kwon & Lee, 2012). Further, about 22% of reported peanut and /or tree nut allergen exposures in commercial foodservice operations were due to cross-contacts from shared cooking equipment or service supplies (Furlong et al., 2001).

Participants also indicated human errors as one of the contributing factors for potential food allergy reactions. One manager stated, “*there is always a risk because a simple mistake can turn into a serious problem*” and “*we are all humans, we all make mistakes, but it can be life threatening to a person and even severe neglect can cause legal action*” (2-I-H). Several human

errors identified by our participants were improper washing of utensils (e.g., “*a knife accidentally touches something and there is the assumption that it was washed properly*”) and cross-contacts from allergenic food (e.g., “*there is always a risk of some kind of food cross contamination [cross-contact] that happens in the back that no one has ever seen before or wasn’t aware of*” (5-I-H). Risk communication scholars admit that zero risk is not realistic or attainable when managing food allergy risks in foodservice establishments (Madsen et al., 2012; Kroes et al., 2000). Some participants (n=4) recognized the fact that human errors would lead to serious accidents, and therefore, food allergy risk communication training in restaurants may be needed to minimize the possible human errors while serving customers with food allergies.

Even though it is a relatively well-acknowledged food allergy risk, only one participant recognized hidden ingredients as a risk factor. If service staff are not aware of hidden ingredients, they may give a false sense of security to customers with food allergies. Nearly 50% of reported peanut and tree nut food allergy reactions in the U.S. were caused by hidden food allergens in sauces, dressings, and complex food items such as egg rolls (Furlong et al., 2001).

[INSERT TABLE 4.5 HERE]

### ***Food Allergy Risk Communication***

Customers with food allergies perceived miscommunication as one of the major causes of food allergy reactions in commercial restaurants (Furlong et al., 2001). However, participants in this study addressed communication challenges only when they were prompted. The communication procedures between and among restaurant staff is important considering the number of staff involved in typical restaurant operations and the staff’s level of knowledge about food allergies. When prompted, one manager acknowledged the importance of communication stating that “*the way to eliminate the problem is just communication*” and “*it’s*

*definitely better to over-communicate if you [customers] have a food allergy than to risk running into a problem”* (8-I). If customers do not communicate their food allergies with restaurant staff, potential cross-contacts in kitchen and service areas may more likely to happen.

Previous research has identified that a significant percentage of customers do not communicate their food allergies with the restaurant service staff in an attempt to avoid the potential social embarrassments (Leftwich et al., 2011). Restaurant managers and staff would appreciate it if customers with food allergies can, *“actually let us know ahead of time if they have any allergies before they place the order and we always go and double check and make sure with the chef and everybody else who is in charge of producing the food and make sure that whatever they are allergic to does not come in contact with the rest of the food”* (5-I-H).

However, in cases discussed above, it was apparent that some managers solely depended on their customers notifying them instead of restaurant staff asking about any food allergies.

In fact, most participants perceived that it was the customers’ responsibility to communicate their food allergies with restaurant staff. Rather than asking customers if anyone had food allergies, they would wait until customers notified them about their food allergies. Participants indicated that *“we do rely a lot on the customers or the guests to take the responsibility and let us know ahead of time”* (5-I-H) because *“it’s their health obviously and we are liable just as well”* (3-I-H). Previous research found that the majority of customers with food allergies thought that it was their personal responsibilities to prevent food allergy reactions (Van Kleef et al., 2006). However, there’s an inverse relationship between the level of control perceived by customers and the tendency to rely on the establishment’s risk management (Van Kleef et al.). For example, individuals with food allergies may feel a lack of control when dining

out, and they may rely more on the foodservice establishments to manage the risk and prevent food allergy reactions.

Furthermore, some participants emphasized that customers need to provide correct information to restaurants. The words customers used when communicating food allergies can lead to different attention levels from restaurant staff. For example, using the phrase *“I’m allergic to”* would bring more attention than *“I want to avoid”* or *“I don’t like”* (10-I). Considering *“a significant growth in (the number of) gluten free requests in the restaurant,”* restaurant managers raised the concern that *“a lot of the times guests request gluten free dishes and there is a very big difference between a gluten free diet and a gluten intolerance”* (3-I-H). When customers have gluten intolerance, *“the minimal trace of gluten can affect you,”* but if customers are on a gluten free diet for any other reason, *“a trace of gluten in your diet will not affect you”* (3-I-H). Whenever customers *“have stated that it is allergy we have to assume it’s an allergy”* (2-I-H). Participants also found that customers with food allergies sometimes lacked knowledge about their food allergies and were not aware of the foods they needed to avoid. For example, *“certain exotic ingredients that they’re not familiar with may contain whatever it is that they’re allergic to and they might not know that,”* and as a result, customers *“assume that they’re fine and don’t communicate to the server how severe the allergy has been”* (8-I). In regards to customers with food allergies, participants found that *“a lot of times people come in and they don’t say anything”* (8-I).

### ***Information Sharing***

Restaurant managers used different ways to share food allergy-related information with customers who might have food allergies. Some restaurants (n=3) had separate menus or allergen-free menus designed for customers who are allergic to major food allergens (e.g.,



peanut, shellfish). Other restaurant managers (n=3) mentioned that they have listed major ingredients on menus, and they would provide special allergen-free items upon customers' requests. One restaurant had a binder that enclosed all ingredients of menu items, and they would refer to it whenever a customer requested allergen-free items. An example from the industry is the computer system developed and used in one of the largest casual-dining Chinese restaurant chains in the U.S., which filters menu items automatically when entering the allergens (Moomjian, 2013).

### ***Communication Procedures***

Previous research found that customers were concerned about the consistency in communications because often different restaurant staff place the order, prepare the food, and deliver the food (Kwon & Lee, 2012). Therefore, participants were asked to describe their communication procedures for serving customers with food allergies (Figure 4.2). All participants indicated that their servers would wait for the customers to notify them if they had food allergies or they wanted to order allergen-free items. After receiving the request, most participants (n=9) mentioned that their server would notify managers about customers' special requests. After that point, managers would talk to customers about their allergen-free orders and communicate customers' needs to the chef. Four participants said their servers usually communicated orally with chef, and only two participants mentioned that their servers usually wrote down customers' food allergies on the ticket that would be sent to the kitchen. The other two participants explained that their servers would enter customers' allergen-free requests into their point of sales (POS) system. Among the 16 participants, only five participants mentioned that the managers or the chefs would go to the customers' tables to reassure them that their orders would be allergen-free.

[INSERT FIGURE 4.2 HERE]

### ***Food Allergy Risk Communication Strategies***

In addition to describing the communication procedures, participants also explained specific strategies they used when serving customers with food allergies. Some examples provided by participants included reminding customers whenever there were uncommon ingredients in food items, proactively asking questions, explaining food preparation processes to customers, and putting a statement or disclaimer on the menu to encourage customers to notify restaurant servers about their food allergies (Table 4.6). In this study, we found that only four out of 16 restaurants enclosed a statement or disclaimer on their menus, which was different from the restaurants in Massachusetts and Rhode Island where state legislation requires all foodservice establishments to include this information (FARE, 2015a; Massachusetts Food Allergy Awareness Act [MFAAA], 2009). When delivering food allergy related messages to the kitchen, participants also suggested restaurant servers communicate the order requirements both verbally and in writing.

[INSERT TABLE 4.6 HERE]

### ***Food Allergy Risk Management and Comparison***

#### ***Food Allergy Risk Management Plans***

For risk management plans or protocols related to serving customers with food allergies, six participants indicated that they had risk management plans or safety manuals in the restaurants detailing the procedures in case of food allergy reactions or foodborne illnesses. All restaurants with risk management plans were chain restaurants or independent restaurants located in chain hotels. Most stand-alone independent restaurants did not have risk management plans in place. Even though some restaurants had risk management plans, managers may not have been

trained about the risk management procedures. One participant mentioned that “*we know where they are located but we don't really [you know] go over them if something happens*” (1-C). It would be very risky if restaurant managers are not well trained and aware of the procedures to handle food allergy emergencies because food allergy reactions usually happen in a short period of time.

### ***Food Allergy Risk vs. Food Safety Risk***

Participants were asked to compare food allergy risk and food safety risk in their operations. It's important to note that this question was not designed to compare the importance of food allergy risk and food safety risk but rather to elicit participants' perceptions of the food allergy risk in their operations. Some participants considered food allergy risks as more of a concern due to the severity of food allergy reactions. Other participants indicated that food safety risks, such as cross-contamination, improper hand washing, employees not wearing gloves, or keeping foods at wrong temperatures were more a concern because they “*could affect everyone and anyone that walks into our restaurant*” (12-C) while food allergy risk only “*affects a portion or a percentage of the guests that come into the restaurant*” (12-C) and “*there's even a day when not a single person walks in the door with a food allergy*” (10-I). In addition, some participants were confident about their procedures of preparing allergen-free orders and felt that food allergy risk was “*a little bit easier to handle and manage just because we do take all reactions and take it very seriously as well*” (9-C). Even though food allergy risks do not impact as many people as food safety risk, food allergy prevention strategies are necessary in restaurant operations due to the severity of these allergic reactions.

## **Conclusion & Implications**

Accommodating customers with food allergies has become a challenge for the restaurant industry because of the increasing number of individuals with food allergies in the U.S. (Abbot et al., 2007; Ahuja & Sicherer, 2007; Kronenberg, 2012). As one of the perceived major causes of food allergy reactions in restaurants, establishing proper communication between and among customers and foodservice employees might be one of the most important steps in preventing food allergy reactions in restaurants (Leftwich et al., 2011) as it initiates increased attention among restaurant staff. This study explored current food allergy risk communication and related operational issues in full-service restaurants by interviewing 16 restaurant managers in the U.S.

Even though a few participants had identified communication as one of the key elements in preventing food allergy reactions in restaurants, most participants did not train their staff how to communicate food allergy risks. For those managers who included food allergy-related topics in current training programs, most of them only trained their staff to hand over the food allergy requests to managers. It was also found that managers themselves were not trained about proper communication strategies with their customers with food allergies. This may explain why they're not aware of the importance of risk communication related training. In addition, considering the fact that only a comparatively small percentage of customers have food allergies, restaurant managers felt it was unnecessary to provide their staff with a comprehensive training course about food allergies.

Most participants in this study were well aware of the risk involved in serving customers with food allergies and were also very willing to accommodate customers' special dietary requests. However, most participants placed more emphasis on customers' responsibilities to clearly and correctly communicate their food allergies to the restaurant staff in a timely manner. To prevent liability-related issues, management staff in restaurants would not proactively ask

customers about their dietary restriction except to put a statement or disclaimer on the menu to encourage customers to notify the server if anyone in their party has a food allergy. Limited food allergen and ingredient information provided by restaurants is another concern and might become a barrier for customers with food allergies in their dining decision-making process. Examination of communication procedures when serving customers with food allergies revealed that food allergy messages were usually delivered on a one-way basis in restaurants. Considering the number of people involved in the communication process and restaurant staff's knowledge about food allergies, it is critical that staff know the correct process to reassure customers or confirm the allergen-free orders when delivering the food. In addition, as suggested by some participants, implementing different ways (e.g., written, oral) of communication might improve the accuracy of information delivery.

Risk management, an important aspect when serving customers with food allergies, was not taken seriously by some restaurant managers. Most independent stand-alone restaurants did not have systematic risk management plans in place to handle food allergy reactions, but chain restaurants did. However, as disclosed by a manager from a chain restaurant, he wouldn't really go over the plan unless something happened. Given that food allergy reactions can happen very shortly and may be life threatening, risk management training is critical for restaurant managers.

This study's findings provide both theoretical and practical implications for foodservice educators, food allergy advocates, policy makers, and the restaurant industry. For foodservice educators, because the ServSafe® courses only covers basic information about the major food allergens, other topics such as food allergy risk communication and other causes of food allergy reactions must be added to the current education curriculum. For food allergy advocates, it is important to encourage and educate individuals with food allergies to actively disclose their food

allergies and clearly communicate their needs to the restaurant staff when dining out. In addition to orally communicating their food allergies, showing an allergy card that list all allergenic ingredients they need to avoid would communicate their needs more clearly. For policy makers, besides developing legislation that requires food allergy training for restaurant staff, it is critical to communicate food allergy risk and emphasize the importance of two-way communication when developing training guidelines, posters, or legislation.

Previous research findings revealed that customers with food allergies sometimes did not communicate with servers about their food allergies in an attempt to avoid the potential social embarrassment (Leftwich et al., 2011). Restaurateurs should not always rely on customers to communicate their needs. Instead, restaurateurs may need to proactively initiate the communication by asking customers if they have food allergies and sharing potential risks (e.g., cross-contacts in food preparation areas) that may exist. Even though customers with food allergies only constitute a small percentage of the customer base of most restaurants, the severity of food allergy reactions and the increasing number of individuals with food allergies in the U.S. needs to be taken into account. Restaurateurs should be encouraged to implement food allergy training, especially training that includes risk communication.

### **Limitations**

Even though a purposive sampling method has provided a variety of opinions and operational suggestions from different types of restaurants in different geographical locations throughout the U.S., convenience sampling limits the generalizability of the results. However, this research was not intended to gather generalizable data but to explore the in-depth perspectives of restaurant managers regarding risk communication when serving customers with food allergies.

In addition, this study only examines self-reported food allergy risk perceptions and risk communication related procedures and protocols. Such self-reported data might have been impacted by the social desirability bias and must be interpreted with caution. Future research may use other methods to investigate the food allergy risk perception and risk communication behaviors of restaurant managers.

Lastly, this study was conducted in the U.S., and therefore, results might not be generalized in other countries. Future research is encouraged to explore the food allergy risk communication and related operational issues in restaurants in other countries.

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**Table 4.1 Themes Identified in Interviews**

<b>Major Themes</b>	<b>Subthemes</b>
Food allergy awareness	<ul style="list-style-type: none"><li>• Severity of food allergy reactions</li><li>• Food allergy vs. Food intolerance</li><li>• Cross-contact vs. Cross-contamination</li></ul>
Food allergy training	<ul style="list-style-type: none"><li>• Manager training</li><li>• Employee training</li></ul>
Food allergy risk perception	<ul style="list-style-type: none"><li>• General food allergy risk perception</li><li>• Specific food allergy risk perception</li></ul>
Food allergy risk communication	<ul style="list-style-type: none"><li>• Information sharing</li><li>• Communication procedures</li><li>• Food allergy risk communication strategies</li></ul>
Food allergy risk management and comparison	<ul style="list-style-type: none"><li>• Food allergy risk management</li><li>• Food allergy risk vs. Food safety risk</li></ul>

**Table 4.2 Characteristics of Restaurants where Participants Work (n=16)**

<b>Characteristics</b>	<b>Frequency</b>
Location	
Texas	8
Kansas	8
Restaurant classification <sup>a</sup>	
Independently own (I)	9
Chain(C)	7
Total number of employees	
15 or less	0
16-30	4
31-60	7
Greater than 60	5
Experienced food allergy reactions incidents in the restaurants.	
Yes.	2
No.	14
Offered allergen-free menus or gluten-free menus in restaurants.	
Allergen-free menu	1
Gluten-free menu	2

*Note.* <sup>a</sup>Selected quotes of interviewees were labeled throughout this Chapter with “Number of Interviewee – Chain/Independent Restaurant – in a Hotel/Country Club”. For example, “2-I-H” means interviewee No. 2 is an independent restaurant in a Hotel”.

**Table 4.3 Food Allergy Knowledge**

<b>Food Allergy Knowledge</b>	<b>Selected Quotes</b>
Symptoms of food allergy reactions	<i>“When you really have an allergy reaction, you have rashes, and you have trouble breathing.”</i> <i>“I’ve seen people they get swollen in the face or get very red, they get itchy or their neck swells up. Or some people get it in the stomach, stomach pain.”</i> (1-C)
Severity of food allergy reactions	<i>“There is a bunch of different food allergy reactions I mean ranging from something little as you know little bit like rash, hives, swelling or it could you know even be fatal where you have difficulty breathing.”</i> (5-I-H)
Different severities	<i>“So it’d be different severities, too, from actually the intake to just being the smell and that situation.”</i> (13-I-C)
Airborne food allergy reaction	<i>“If someone is severely, severely allergic as far as you know if they are even in the building with nuts they can react to it.”</i> (4-C)

**Table 4.4 Food Allergy Training Related to Communication**

<b>Topics about communication</b>	<b>Selected quotes</b>
Get manager or supervisor involved	<p><i>“If someone has a food allergy, tell them that we will try to accommodate them as best as possible. First thing they have to do is notify their manager.” (8-I)</i></p> <p><i>“Usually if the employee for some reason is not a 100% comfortable a supervisor or manager steps in with the conversation and as I said once the word allergy is used management is involved as well as the executive chef and the expeditor.” (3-I-H)</i></p>
Establish clear and open communication	<p><i>“I mean I think the biggest thing that we do train them with is asking lot of questions and keeping the you know keeping the lines of communication very clear and open between the guests, the servers, the kitchen and you know everybody who is involved and making sure the food goes out you know how it needs to be.” (5-I-H)</i></p>
Ask questions to chef	<p><i>“It’s a learning process and we don’t all have a full culinary background but they ask a lot of questions, you know, we have a good relationship with the back of house so they can easily go the chef and ask the chef any questions.” (9-C)</i></p>
Listen to cue words	<p><i>“We train them on questions to ask, listening for cue words when people are talking.” (10-I)</i></p>
Be willing to listen	<p><i>“I tell them that we need to be very willing to listen. When somebody gives us any directions about food allergies, we need to pay attention to what they are saying and take as much information on their notepad.” (16-I-C)</i></p> <p><i>“Whatever the information so that when they communicate with me and when I talk to the guest and when we communicate with the kitchen don’t have any mishaps of communication. So we can deliver the food the way it’s supposed to be delivered.” (16-I-C)</i></p>

**Table 4.5 Specific Quotes regarding Food Allergy Risk Identification**

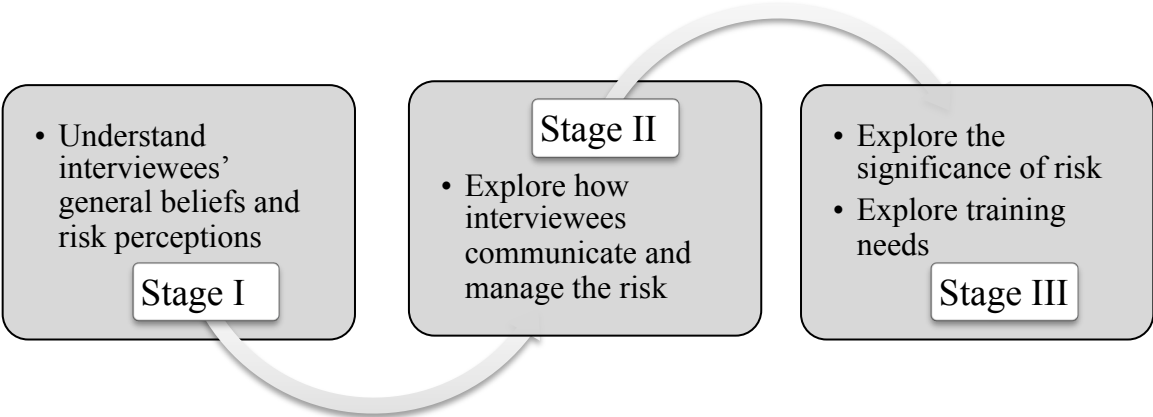
<b>Risk Perceptions</b>	<b>Selected Quotes</b>
Hidden ingredients	<i>“There are some customers who are allergic to fish product and we have a dish that contain oyster, it's either oyster or oyster or something fish in our ingredients which sometimes the servers don't even know.” (1-C)</i>
Potential cross-contact	<i>“So the possibility of a splash from one fryer to another fryer is possible and if you are severely allergic that possibility is there.” (4-C)</i>  <i>“When it comes to food allergy, you have to be a little more specific because you don't want to use something that has been around let's say nuts and then contaminate it with something else that's not supposed to have nuts in it.” (8-I)</i>
Communication	<i>“Because between the servers, you know, bringing in the food to the chef making the entrée, there definitely could be complications. A server could accidentally forget to notify the chef or the chef might not be aware of the allergies.” (9-C)</i>  <i>“There was an instance. And she did not tell us that she was allergic but she also didn't order anything in her item that prompted her to ask for that. But someone next to her ordered the seafood and that did bother her because of how close it was. And there could have been a cross-contamination.” (13-I-C)</i>



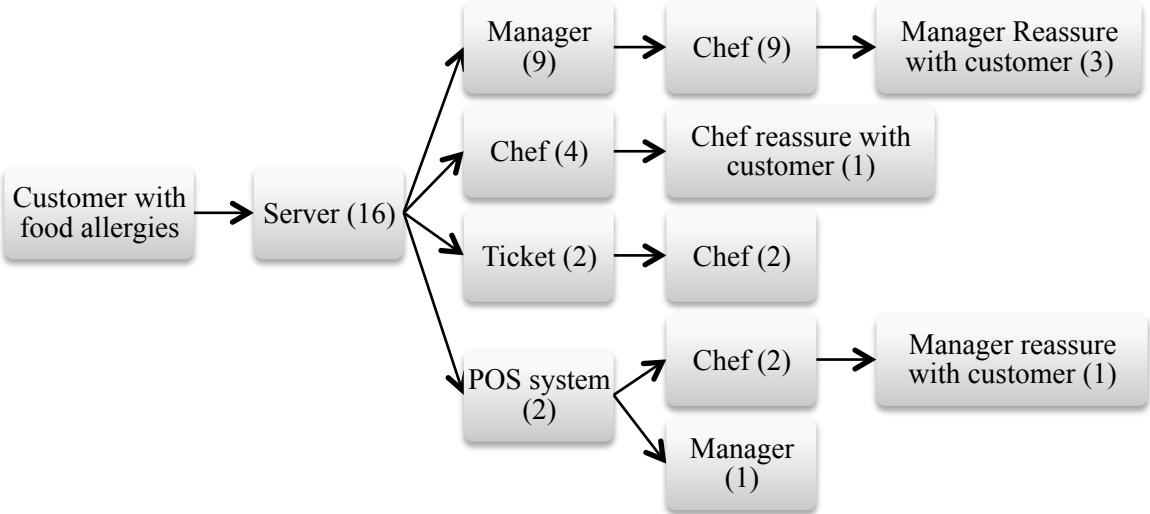
**Table 4.6 Food Allergy Risk Communication Strategies**

<b>Strategies</b>	<b>Selected Quotes</b>
Remind customers of specific ingredients	<i>“We have a lot of pork products that are under you know certain names that people mostly don’t necessarily know that it is pork so we let them know.” (5-I-H)</i>
Read your customers	<i>“You know servers their whole job is to read people. That is all they do and sometimes you will see a server who goes up to a table and can read that there is something wrong and will ask the guest, ‘Is there something that I can do to help you? Is there something you need?’ and at that point a lot of times the guest will say, ‘Well, I have a food borne allergy and I would really love if you can give me some ideas’.” (4-C)</i>
Explain food preparation process	<i>“Making sure that you have a manager go over to them and explain the process and express how much that they matter to the restaurant so that they can feel assured that every measure is being taken to make sure that we are going to do our best to avoid any food allergies.” (4-C)</i>
Suggest proper cooking equipment	<i>“Depending on the dish that they are requiring and the severity of the allergy we communicate with the guest and we give them the best possible option to provide for them. So for instance if the guest is highly allergic to some type of fat and they wanted something that was grilled we would -- we would recommend them having it cooked in a pan because we know that the pan has been washed and cleaned, whereas the grill may still have traces from previous cooking throughout the day.” (3-I-H)</i>
Statement or disclaimer on menu	<i>“We have just kind of a disclaimer: If you have gluten allergies or what have you for any of our foods let us know and we can clean the cooking surfaces and prep our cooked foods that don’t come under contact with different oils or peanuts or what have you.” (7-C-C)</i>
Allergy cards	<i>“What we’ve seen for the truly, you know highly severe reactions that the customers have that, they bring in a piece of paper that tells me what they’re highly allergic to. Which allows me to give it to the chef so they can avoid, utilizing any of those ingredients in the that they order.” (10-I)</i>

**Figure 4.1 Three Stages of Restaurant Manager Interview**



**Figure 4.2 Communication Procedures when Serving Customers with Food Allergies**



## **Chapter 5 – Risk Communication when Serving Customers with Food Allergies in Restaurants**

### **Abstract**

The purpose of this study was to explore the perceived risks and risk communication-related behaviors of restaurant servers when serving customers with food allergies in the U.S. An online survey instrument was developed based on interviews with full service restaurant managers, pilot-tested, and distributed through an online survey research firm. A total of 316 usable responses were collected from full-service restaurant servers. Descriptive statistics, independent samples t-test, ANOVA, and regression analyses were conducted by SPSS and used to summarize and explore potential relationships among variables. A limited number of restaurants shared information about food allergies on printed or online menus, and most restaurants did not provide separate menus of complete lists of food ingredients for customers with food allergies. Meanwhile, most servers lacked knowledge about food allergies and perceived that initiating communication and preventing food allergy reactions were mostly the responsibility of customers with food allergies. Servers' risk reduction and communication behaviors were affected by their perceived severity of food allergy reactions, previous communication training, sources of media exposure, and the perceived responsibilities of preventing food allergy reactions. Restaurateurs and foodservice educators may use these findings to develop training and strategies to prevent food allergy reactions in restaurants.

**Keywords:** Food allergy, restaurant, servers, risk perception, risk communication

## **Introduction**

Food allergy is “an adverse health effect arising from a specific immune response that occurs reproducibly on exposure to a given food” (Boyce et al., 2010, p. S8). Food allergy reactions range from mild to severe and usually appear within the first two hours after the ingestion of allergens (Chafen et al., 2010). Anaphylaxis, one of the most severe food allergy responses, can result in circulatory collapse, coma, and even death (Mandell, Curtis, Gold, & Hardy, 2005).

Food allergies are prevalent in the United States (U.S.) and are affecting about 9 million (4%) adults and nearly 6 million (8%) children (Branum & Lukacs, 2008; De Blok et al., 2007; Food Allergy Research & Education [FARE], 2015). As reported by the Centers for Disease Control and Prevention (CDC) in 2011, the frequency of anaphylaxis that is associated with food allergies appears to be increasing. Food allergy reactions account for nearly 200,000 emergency room visits, approximately one every three minutes (Clark, Espinola, Rudders, Banerji, & Camargo, 2011) and 150 to 200 deaths each year (Sampson, 2003).

The “Big 8” allergens (i.e., eggs, fish, milk, peanuts, soy, shellfish, tree nuts, wheat) have triggered more than 90% of the food allergy reactions in the U.S. (Sicherer, Muñoz-Furlong, Godbold, & Sampson, 2010). For the food manufacturing industry, the Food Allergen Labeling and Consumer Protection Act (FALCPA) of 2004 requires that all foods regulated by the U.S. Food and Drug Administration (FDA) must be clearly labeled to indicate any ingredients or proteins derived from the “Big 8” food allergens.

However, for the restaurant industry, the FDA Food Code is the only federal level legislation related to management of food allergies in restaurants. The Food Code states that the person in charge in restaurants should have knowledge about major food allergens, cross-contacts, and symptoms of food allergy reactions (FDA, 2013). The code also mandates all

restaurants to “ensure that employees are properly trained in food safety, including food allergy awareness as it relates to their assigned duties” (FDA, 2013, p. 31). These statements in the FDA Food Code, however, lack practical guidelines for operations to follow in order to prevent food allergy reactions. On the other hand, state food allergy legislation for foodservice operations varies. In 2015, Massachusetts, Michigan, Rhode Island, and Virginia had state-level legislation for the management of food allergies in restaurants (FARE, 2015b).

Among all the fatal food allergy reactions that occurred in the U.S. from 2001 to 2006, 33% of them were triggered by foods prepared away from home (Bock, Muñoz-Furlong, & Sampson, 2001, 2007; Wanich et al., 2008). Along with hidden allergens and cross-contacts from food allergens, customers with food allergies have recognized the miscommunication between and among restaurant staff and customers with food allergies as one of the major causes of food allergy reactions in restaurants (Furlong, DeSimone, & Sicherer, 2001; Kwon & Lee, 2012; Leftwich et al., 2011).

Communication researchers have found that risk communication plays an important role in controlling and preventing negative consequences (McComas, 2006; Parrott, 2004) such as food allergy reactions in restaurants. Therefore, establishing proper communication between and among customers and foodservice employees may be one of the most important steps in preventing food allergy reactions in restaurants (Leftwich et al., 2011) as it initiates increased attention to food preparation and service staff when serving customers with food allergies. Although there are other food allergy-related publications available, no research has been published regarding food allergy risk communication.

Therefore, the purpose of this study was to explore the perceived risks and risk reduction and communication related behaviors of restaurant service staff when serving customers with food allergies in the U.S. Specific objectives are to:

- 1) examine the perceived risks of restaurant staff when serving consumers with food allergies,
- 2) identify ways in which restaurant service staff communicate food allergy risks,
- 3) explore factors affecting restaurant service staff's risk reduction and communication related behaviors, and
- 4) provide recommendations for food allergy risk communication strategies and training needs for the restaurant industry.

## **Literature Review**

### ***Food Allergies and the Restaurant Industry***

Considering the fact that the population with food allergies is increasing in the U.S., it is important for restaurant staff to be fully informed about food allergies and ways to prevent food allergy reactions (Mandabach, Ellsworth, Vanleeuwen, Blanch, & Waters, 2005). Even though serving consumers with food allergies will bring benefits to the restaurants (e.g., customer appreciation, customer loyalty), it will also pose challenges given the variety of food allergens present at restaurants (Abbot, Byrd-Bredbenner, & Grasso, 2007; Ahuja & Sicherer, 2007; Kronenberg, 2012).

Researchers found that restaurant staff lacked knowledge regarding food allergens in the menu, ways to prevent cross-contacts, and the severity of food allergy reactions (Abbot et al., 2007). One study from United Kingdom revealed that about 21% of the peanut-free meals that were prepared right after peanut-containing meals were contaminated with peanut or peanut

protein (Leith, Walker, & Davey, 2005). Researchers also found that restaurant employees' confidence levels were high while their knowledge levels about serving customers with food allergies were not adequate (Ahuja & Sicherer, 2007). Specifically, 70% of respondents in this study felt that they could guarantee a safe meal while 35% of respondents thought that fryer heat could destroy allergens. In addition, 25% of the participants thought that it was safe to remove allergens from a finished meal, and 58% had not received any food allergy training (Ahuja & Sicherer).

Even with the lack of knowledge about food allergies, most foodservice employees did not receive food allergy training (Choi & Rajagopal, 2013; Mandabach et al., 2005). This training is important for restaurant servers because if servers lack knowledge and awareness about food allergies, they may not be able to give clear and easily understood responses to questions from customers with food allergies (Kronenberg, 2012). In addition, servers may incorrectly assume that an item is allergen free if they're not aware of the hidden ingredients that are not disclosed in recipes (Mandabach et al.). Most restaurateurs did not provide food allergy training to their employees because of perceived barriers such as the high cost of training, high labor-turnover rate, time constraints, language barriers, the lack of interest in implementing food allergy training, and the lack of commitment from employees (Abbot et al., 2007; Lee & Xu, 2014; Mandabach et al.).

### ***Dining Experiences of Customers with Food Allergies***

Strict avoidance of food allergens and early recognition and response to food allergy reactions are extremely important for individuals with food allergies to prevent fatal food allergy reactions because a small amount of food allergen can cause severe reactions (FARE, 2015; Sicherer & Teuber, 2004). To prevent potential food allergy reactions, customers with food



allergies have used various strategies before and during dining out (Kwon & Lee, 2012; Kwon, Sauer, Wen, Bisges, & Myers, 2013). For example, customers reported going out to restaurants which they were familiar with and were known by the staff, avoided establishments and cuisines that are considered high-risk, and checked online menus, ingredients, and allergen information before dining out (Kwon et al.; Leftwich et al., 2011).

Despite these prevention strategies, customers with food allergies have experienced challenges when dining out because some restaurant staff did not know about food allergies, did not understand special requests, and were not aware of the severity of food allergy reactions (Kwon & Lee, 2012; Kwon et al., 2013). Because many customers with food allergies or parents of children with food allergies perceived a lack of control in food preparation and service processes, some of them have reported anxiety or fear when dining in restaurants, especially when going to a restaurant for the first time (Kwon et al.; Leftwich et al., 2011).

A significant number of customers with food allergies had experienced allergic reactions after eating in restaurants (Bock et al., 2001, 2007; Wanich, Weiss, Furlong, & Sicherer, 2008). In many cases, the food allergy reactions occurred when customers believed that the food they were eating was safe (Sampson, Mendelson, & Rosen, 1992), and customers failed to notify restaurant staff about their food allergies (Mandabach et al., 2005).

Further, even though restaurant operators or managers may provide food allergy training with regard to the identification of food allergens and the avoidance of cross-contacts, very few of them focus on the proper communication between the front-of-house and back-of-house employees or between restaurant employees and customers (Lee & Xu, 2014). Considering one of the major causes of food allergy reaction is the lack of proper communication between and among restaurant employees and customers with food allergies (Furlong et al., 2001; Kwon &

Lee, 2012; Leftwich et al., 2011), research may be needed to address risk and interpersonal communications among restaurant staff and customers to identify potential training needs for risk communication.

### ***Food Allergy Risk Perception and Risk Communication***

Risk perception, which refers to an individual's views toward the risk involved in a particular situation (Schroeder, Tonsor, Pennings, & Mintert, 2007), is a special concern in the food safety context. Food allergies pose one of the food safety risks that have been widely discussed lately throughout food and foodservice industries as well as related consumer advocacy groups. When discussing the risk of food allergies in foodservice establishment, scholars contended that zero risk is not realistic or attainable (Kroes et al., 2000; Madsen et al., 2012).

Risk perception, as part of the health behavior theories, includes different dimensions or determinants, such as perceived susceptibility and perceived severity (Brewer et al., 2007; Janmaimool & Watanabe, 2014). Perceived susceptibility refers to an individual's subjective perception of the risk of contracting a hazard (Janz & Becker, 1984). Perceived severity refers to an individual's feelings regarding the seriousness of contracting a hazard and reflects the extent of the harm a hazard would cause (Brewer et al., 2007; Janz & Becker, 1984). Risk perceptions may also be influenced by different contributions of "cues," such as media and education cues (Janz & Becker).

Risk communication, which is the "process of exchanging information among interested parties about the nature, magnitude, significance, or control of a risk" (Covello, 1992, p. 359), is important in the food safety context because understanding risks influences how individuals or groups perceive, process, and act upon specific risks (Glanz, Rimer, & Viswanath, 2008).

Communication researchers found that several factors account for the changes in people's knowledge, attitudes, and even behaviors in regards to risk communication (Fischhoff, Brewer, & Downs, 2012). For example, different communication channels (e.g., oral communication, written material) can influence the effectiveness of risk message delivery (Fischhoff et al.). In addition, there are different ways to communicate the risk. One-way risk communication focuses on message delivery (Fischhoff, 1999; Weinstein, 2000), and two-way communication focuses on inputs, feedback, and understandings from both sides of the communication. In general, there is a consensus that effective risk communication involves two-way communication between communicators and risk message recipients (Sheppard, Janoske, & Liu, 2012).

There is a lack of legislation or training guidelines focusing on the risk management of food allergies (Madsen et al., 2009) and risk communication related issues in restaurants. Yet most food handlers perceive the foodservice industry as a low-risk business, which negatively affects their safe food-handling behaviors (Clayton, Griffith, Price, & Peters, 2002). Therefore, food allergy risk management and communication can be used as a tool for restaurateurs to reduce the chance of food allergy reactions caused by restaurant staff mistakes when serving customers with food allergies (Kronenberg, 2012).

## **Methodology**

Prior to data collection, the research protocol was reviewed and approved by the Institutional Review Board (IRB) in a Midwestern university. In order to protect the human subjects involved in the research, questions related to identifiable personal information were not included in the survey. Furthermore, the contact information of the IRB and the researchers were provided to participants in the survey instructions. The target population in this study was full service restaurant servers in the U.S.

### ***Sample Selection***

In order to recruit participants from the target population, a survey research firm (i.e., Qualtrics) was hired to send out links to the survey to randomly selected restaurant employees from existing panels. Based on the report of the National Restaurant Association (2015), there are about 14 million individuals currently employed in the restaurant industry. As suggested by Dillman, Smyth, and Christian (2014), a sample size of 246 to 384 is considered adequate to represent the target population with a 95% confidence level. Therefore the sample size of this research was set at 300 usable responses. The online survey aimed to gather data that could be generalized to the entire target population. Therefore, restaurant servers from both chain and independent full service restaurants across the U.S. were recruited. Because there were no panels that included only restaurant service staff, filtering questions were used to gather data from those who actually serve customers in full service restaurants.

### ***Instrument Development***

The survey instrument for this study was developed based on a literature review and a preliminary study of phone interviews with restaurant managers (n=16). Food allergy knowledge questions were developed based on the ServSafe<sup>®</sup> Coursebook (National Restaurant Association Education Foundation [NRAEF], 2012), the training program “Welcoming Guests with Food Allergies,” developed and modified by FARE (2010), and the food allergy education modules developed by Kwon, Sauer, and Wen (2015). Past experiences with food allergy and communication-related training were asked in order to examine whether personal experiences and training would impact restaurant service staff’s risk perceptions and risk communication-related behaviors.

Questions about factors (e.g., perceived severity, cues to action) that may impact risk perceptions (Brewer et al., 2007; Janmaimool & Watanabe, 2014; Janz & Becker, 1984) were included in the survey. Based on the literature review (Fischhoff et al., 2012), constructs such as information sharing, risk message delivering channels, and the ways of communication were included to explore the extent to which restaurant servers communicated food allergy risks with customers. Questions about communication strategies utilized by participants and the restaurant managers or owners were developed based on results of the elicitation study. Except for the questions related to strategies that respondents utilized in their operations, a 7-point Likert scale, ranging from 1 (not effective at all) to 7 (very effective) was used to rate the participants' perceptions of effectiveness of strategies. In addition, demographic questions were asked at the end of the survey to explore the relationship between restaurant service staff's demographics, their risk perceptions, and risk communication-related behaviors.

A panel of food allergy and risk communication researchers reviewed the instrument to ensure the content validity and the clarity of directions prior to the pilot test. Based on the feedback provided by the expert panel, the questionnaire was revised and converted to a self-administered online survey instrument using the Qualtrics survey system (Version 2015.09) and tested using different devices and platforms (i.e., web page, smartphone, tablet) to make sure that survey participants could access the survey as suggested by Dillman et al., (2014).

### ***Pilot Study***

A pilot test (n=30) was conducted prior to the data collection. The survey research firm sent a web link to the pilot survey to randomly selected restaurant employees in their member panels. To ensure respondents provided reliable data and met the target population criteria,

several filtering mechanisms were established to remove participants who were not qualified or answered without reading questions.

First, participants who were not employed as service personnel in full service restaurants were eliminated from the sample. Second, the total time taken for each participant to complete the survey was recorded and used as a reference to filter out some responses. Because the median length of time taken to complete the pilot survey was 16.5 minutes among pilot respondents, those responses that were completed in less than one third of the median completion time (i.e., 5.5 minutes) were automatically screened out in the final survey data collection. Finally, instructional manipulation checks were conducted to detect and disqualify participants who responded without reading questions or instructions (Oppenheimer, Meyvis, & Davidenkothe, 2009).

Inter-item reliability was evaluated using Cronbach's  $\alpha$  for each scaled construct in the survey. The acceptable Cronbach's  $\alpha$  was determined at 0.7 or greater as suggested by Nunnally and Bernstein (1994). As shown in Table 5.1, the construct of "perceived susceptibility" did not achieve the target  $\alpha$  level and was deleted from the study. In addition, the  $\alpha$  level for the construct of "perceived severity" increased from 0.773 to 0.909 with the deletion of one statement: "Only a few people with food allergies need to see a doctor due to allergic reactions." Therefore, this statement was removed from the data analysis.

[INSERT TABLE 5.1 HERE]

### ***Data Collection***

The online survey research firm sent out the final survey link to restaurant employees in their member panels. The benefit of hiring the online survey research firm was that the desired number of each subgroup was included in the participant group, making the overall sample a

better representation of the target population. To ensure adequate numbers of participants representing both chain-operated and independently-owned restaurants, a quota (50/50 split) was used at the beginning of the survey. Statements about the purpose of the study, the confidentiality and anonymity of survey responses, along with a question about respondents' willingness to participate in this study, were included in the survey instructions. The survey reminder emails were sent by the online survey research firm according to their protocol, and the survey link was active until the desirable number of participants was reached.

### ***Data Analysis***

The Statistical Package for the Social Sciences (SPSS, Version 20.0) was used to analyze the data. Descriptive statistics (e.g., frequencies, means, and standard deviations) were calculated to summarize the data. Cronbach's  $\alpha$  ( $\alpha > 0.70$ ) was calculated to determine the construct reliability and the internal consistency of measurement items. Several variables (e.g., knowledge questions answers, previous food allergy training experience) were recoded as zero (incorrect knowledge question answers) or one (correct knowledge question answers).

Independent sample t-tests and ANOVA with least significant difference (LSD) post hoc analysis was used to examine the differences between and among groups (e.g., restaurant servers with different educational qualifications). Hierarchical regression analysis was used to explore the relationships between and among independent variables (e.g., previous food allergy training experience, gender, age, education, perceived responsibilities in preventing food allergy reactions in restaurants) and dependent variable (e.g., food allergy knowledge scores, servers' risk reduction and communication behaviors). Statistical significance was determined at  $p < 0.05$ .

## **Results and Discussion**

A total of 1,328 members of the restaurant employee panels of the online survey research company accessed the online survey. Of those, 1,012 were screened out or removed by researchers because they did not meet the qualifications (i.e., service staff in full service restaurants) (n=722), failed to pass the manipulation check (n=118), exceeded quotas (n=95), never finished the survey (n=38), or included irrelevant answers to the open-ended questions (n=4). A total of 316 usable survey responses (23.8%) were included in the final data analyses.

### ***Sample Profile***

Characteristics of participants are summarized in Table 5.2. The majority of participants were between 18 to 29 years old (n=170, 53.8%) and female (n=243, 76.9%). The gender profile is consistent with the Bureau of Labor Statistics of the U.S. that reported 71.8% of servers were female (U.S. Department of Labor, 2014). A fair number of participants (n=41, 13%) have food allergies and over a half of the respondents (n=167, 52.8%) reported that they have families or friends with food allergies. The percentage of participants with food allergies was higher than the national data that reported that nearly 4% of adults in the U.S. have food allergies (Branum & Lukacs, 2008; De Blok et al., 2007; FARE, 2015). This may have been caused because restaurant servers who had food allergies or families or friends with food allergies may have been more likely to participate in the survey research. In addition, the majority of participants (n=175, 55.4%) had a high school diploma or GED, 73 (23.1%) held an associate's degree, and 58 (18.4%) had a bachelor's degree. Because the quota of restaurant type was applied in the screening questions, similar numbers of servers from chain-operated and independently-own restaurants were included in the sample.

[INSERT TABLE 5.2 HERE]



### *Food Allergy Knowledge*

To examine restaurant servers' knowledge about food allergies, true or false confidence questions and multiple answer questions were asked as shown in Table 5.3 and Table 5.4. For multiple answer questions, one point was assigned for each correct answer and zero for each incorrect answer. For true or false confidence questions, one point was assigned for each correct "True" or "False" answer. A partial point (0.5 point) was given to those who chose "Maybe True" or "Maybe False". No points were given for incorrect answers. Of 25 points possible, the mean knowledge score was  $16.77 \pm 3.05$ , ranging from 3 to 23.

[INSERT TABLE 5.3 HERE]

[INSERT TABLE 5.4 HERE]

Among the eight major food allergens, a significant number of participants failed to identify fish (n=161, 50.9%), soy (n=144, 45.6%), and egg (n=120, 38.0%) as one of the major food allergens. Only 21 respondents (6.6%) correctly recognized all eight major food allergens. For symptoms of food allergy reactions, 40 respondents (12.7%) correctly identified all the symptoms listed in the question. Most respondents (n=222, 70.3%) were not aware that asthma can be a possible symptom of food allergy reaction.

True or false questions about restaurant servers' knowledge and confidence in food allergy-related statements revealed some significant concerns. Among the nine questions listed in Table 5.2, more than a half of respondents failed to recognize that there is no cure for food allergies (n=172, 54.4%), were not aware of the difference between gluten intolerance and wheat allergy (n=160, 50.6%), thought that gluten intolerance can be extremely life-threatening (n=163, 51.5%), and did not know or were not aware that federal law requires only the eight major food allergens to be listed on food labels (n=211, 66.8%).

The result is consistent with previous research conducted in a university setting that found that food service employees lacked knowledge about the eight major food allergens (Choi & Rajagopal, 2013). The FALCPA of 2004 mandates all foods regulated by FDA to clearly label the presence of the “Big 8” food allergens on food labels. It is alarming that only 6.6% of restaurant servers correctly identified the “Big 8” food allergens and 15.5% confidently recognized that the federal laws require these eight major food allergens to be identified on food labels. These findings suggest that more food allergy training needs to be provided for restaurant employees. It’s essential for restaurateurs to train their service and production staff how to identify food allergens on food labels.

ANOVA with LSD post hoc analyses and independent sample t-tests revealed that the mean food allergy knowledge scores varied based on respondents’ education ( $F=3.884$ ,  $p<0.01$ ). More specifically, respondents with a bachelor’s degree had higher knowledge scores than respondents with a high school diploma, GED, or less (Table 5.5). The results also indicated that respondents who had received food allergy training had higher knowledge scores than those who had not received any type of food allergy training ( $t=3.718$ ,  $p<0.05$ ). In addition, respondents who had families or friends with food allergies had higher food allergy knowledge scores than those who didn’t know people with food allergies ( $t=3.680$ ,  $p<0.05$ ).

[INSERT TABLE 5.5 HERE]

### ***Food Allergy Risk Perception***

#### ***Perceived Severity, Media Cues and Education Cues***

Participants were aware of the severity of food allergy reactions in general. The mean score of perceived severity of food allergy reactions was  $6.51\pm 0.69$  on a 7-point scale, indicating that restaurant servers perceived the food allergy reactions as dangerous and life threatening to

individuals with food allergies (Table 5.6). Compared with previous research which identified that restaurant staff lacked awareness toward the severe effects of food allergy reactions (Abbot et al., 2007), participants in this study had a relatively higher awareness level toward the negative consequences caused by food allergy reactions.

[INSERT TABLE 5.6 HERE]

When asked to identify the sources of media where they learned about food allergies, a majority of respondents indicated that they learned through television news stories (n=210, 66.5%), online news articles (n=203, 64.2%), and online social network postings (n=187, 59.2%). Most participants (n=234, 74.05%) had learned about food allergies through multiple media sources, with an average number of three sources (3.05±2.00).

[INSERT TABLE 5.7 HERE]

Less than half of the participants received some type of food allergy training (n=144, 45.6%). A greater proportion of servers from chain-operated restaurants (n=88 of 157, 56.1%) received training compared with those working for independently-owned restaurants (n=56 of 159, 35.2%). The finding is consistent with previous research that managers in chain-operated restaurants were more likely to include food allergy topics in trainings compared with managers in independently-owned restaurants (Mandabach et al., 2005).

A majority of the respondents received food allergy training through on-the-job training (n=91, 63.2%), ServSafe® training sessions (n=87, 60.4%), and the training sessions provided by the restaurant of current employment (n=77, 53.5%). Most food allergy training was provided in a group training setting (n=103, 71.5%). When asked about the topics included in the food allergy trainings, 124 participants (86.1%) reported that they learned about ways to communicate with customers who have food allergies. Most of them were trained to notify the chef (n=120,

83.3%) or manager (n=98, 68.1%) when a customer requests an allergen-free order and to show the list of ingredients to customers (n=92, 63.9%). However, only 47 respondents (32.6% of those trained) were trained to ask customers if a person in the party has a food allergy when greeting customers.

[INSERT TABLE 5.8 HERE]

The overall food allergy risk perception, which was evaluated by a 7-point Likert scale, is presented in Table 5.9. The mean score of food allergy risk perception was  $5.04 \pm 1.16$ , which indicated that participants considered eating out somewhat risky for individuals with food allergies. Multiple regression analyses failed to reveal factors influencing restaurant servers' food allergy risk perception. Of all factors tested, only gender was found to have an impact on the overall food allergy risk perception. From results of the independent sample t-test, female restaurant servers had a higher level of overall food allergy risk perception than male ( $t=2.123$ ,  $p<0.001$ ). This finding is consistent with previous research that gender is one of the demographic variables that affects individuals' risk perceptions (Corman, Trethewey, & Goodall, 2008; Covello, Peters, Wojtecki, & Hyde, 2001; Frewer, 2000).

[INSERT TABLE 5.9 HERE]

## ***Food Allergy Risk Communication***

### ***Information Sharing***

Information sharing, the first goal of risk communication, is to make risk information available and understandable to target audiences (Fischhoff et al., 2012). Specific to serving customers with food allergies, the menus of restaurants may act as a communication channel for information sharing. In this study, questions related to information sharing were asked to explore to what extent restaurateurs share ingredient and food allergen-related information with

customers. Nearly half of the respondents (n=155, 49.1%) indicated that their restaurant menus listed all or most of the ingredients. However, 169 restaurants (53.5%) did not specify any information related to food allergens on their menus.

In addition, only 27 (8.5%) participants reported that their restaurants had separate menus for customers with food allergies while 52 participants (16.5%) reported that they provided gluten-free menus for customers with gluten intolerance. Customers with food allergies often check menus online before dining out as one of the prevention strategies (Kwon et al., 2013). While a majority of the participants of this study (n=236, 74.7%) reported that their menus are posted online, only 89 (28.2%) indicated that they included food allergy information online.

[INSERT TABLE 5.10 HERE]

### ***Food Allergy Risk Messages and Communication Strategies***

As for written communication on menus, 116 participants (36.7%) reported that their restaurant menus included a statement or disclaimer about food allergies and provided such statements on the questionnaire. For the 101 clearly written statements or disclaimers, qualitative content analysis was conducted to categorize them into different groups (Table 5.11). A majority (n=68) of the statements requested that customers notify the server if they have food allergies. Some statements (n=24) claimed that food items might contain some food allergens (e.g., peanuts), or foods were prepared near common food allergens. Six disclaimers indicated that the restaurant could not guarantee that foods would be entirely free of food allergens. A few (n=3) restaurants stated that allergen-free or gluten-free menus were available upon customers' requests.

As for initiating oral communication, however, the majority of restaurant servers (n=204, 64.6%) stated that they never or rarely asked customers if anyone in their party had a food

allergy. Unlike written statements on the menus, proactively asking customers about their food allergies may initiate communication regarding their food allergies.

[INSERT TABLE 5.11 HERE]

In addition, 121 participants (38.3%) indicated that they always reassured customers about the allergen-free order when delivering the food. The reassuring behavior, a form of two-way communication, is recommended because it focuses on the inputs, feedback, and understanding from both sides of the communication (Fischhoff, 1999; Weinstein, 2000). Considering the number of individuals who may be involved in preparing and delivering the allergen-free orders, making sure that there is clear communication among staff and reassuring customers about their food order may be an important component of food allergy risk communication.

A list of communication strategies was provided for participants to identify what they had used in their restaurants and to rate the effectiveness of each strategy. Participants were also asked to write down other communication strategies that were not listed in the questionnaire (Table 5.12). Participants perceived that informing customers when the food preparer is unable to provide allergen-free meals ( $5.76 \pm 1.39$ ), including a statement on the menu to advise customers to notify the server if anyone has a food allergy ( $5.58 \pm 1.44$ ), and having a written protocol with standard procedures for serving customers with food allergies in place ( $5.52 \pm 1.42$ ) were the three most effective communication strategies.

Specifically, even though restaurant servers in this research perceived the written protocol as the third most effective communication strategy, only 81 (25.6%) participants indicated that the restaurants of their current employment have a written protocol in place. To ensure the consistency of communication and the accuracy of information delivery, restaurateurs

are recommended to establish a standard written procedures and communication protocol when serving customers with food allergies.

[INSERT TABLE 5.12 HERE]

### ***Perceived Responsibilities***

In order to explore restaurant servers' perceived responsibilities for specific actions when serving customers with food allergies, participants were asked to indicate how much they agree with multiple statements by using a 7-point Likert scale. As shown in Table 5.13, participants perceived that the customers are the most responsible party to prevent food allergy reactions in restaurants ( $5.31 \pm 1.49$ ) and to initiate communication with restaurant staff if they have food allergies ( $6.3 \pm 1.16$ ) while restaurant service staff is the most responsible party to handle food allergen requests ( $5.4 \pm 1.44$ ).

[INSERT TABLE 5.13 HERE]

Additionally, as presented in Table 5.14, participants ranked different parties' responsibilities in preventing food allergy reactions, with 3 being most responsible and 0 being not responsible at all. Participants perceived that customers with food allergies were the most responsible party when preventing allergic reactions (weighted average ranking = 2.43), followed by kitchen staff (1.31) and service staff themselves (1.30). Management staff was identified as the least responsible party (0.96).

[INSERT TABLE 5.14 HERE]

Results from the ratings were consistent with ranking that customers with food allergies were considered as the most responsible party in preventing food allergy reactions when dining out. This result is consistent with findings from previous research (Mandabach et al., 2005),

which found that 42.9% of restaurant employees thought food allergy reactions in restaurants were due to customers with food allergies.

Restaurant servers tended to perceive kitchen staff as more responsible than themselves. Considering the importance of communication, training restaurant servers about their role in preventing food allergy reactions might be vital. As contended by previous researchers, both restaurant staff and customers with food allergies should share the responsibility for safe, allergen-free foods (Abbot et al., 2007; Choi & Rajagopal, 2013).

### ***Servers' Risk Reduction and Communication Behaviors***

Table 5.13 presents the frequencies of performing risk reduction and communication behaviors when serving customers with food allergies. Participants frequently checked with chef (5.31±1.922) or managers (4.97±1.956) to identify food items that did not contain specific allergens before advising customers, placed a special note indicating customers' food allergies on the ticket to kitchen staff (5.06±2.261), and reassured with customers about their allergen-free order when delivering the food (5.10±2.042). However, participants reported a lower frequency of asking customers if anyone in their party has a food allergy before placing orders (2.54±1.798). Specifically, 123 participants (38.9%) never asked and 80 participants (25.3%) rarely asked whether any customers had food allergies.

Independent t-test results showed that servers from chain-operated restaurants performed the risk reduction and communication behaviors more frequently than servers from independently-owned restaurants ( $t=2.805$ ,  $p<0.01$ ). In addition, more participants from chain-operated restaurants ( $n=79$ , 50.3%) had received training about communication when serving customers with food allergies than participants from independently-owned restaurants ( $n=45$ ,



28.3%). This disparity in receiving training on communication suggests an increased need for food allergy, especially risk communication, training in independently-owned restaurants.

[INSERT TABLE 5.15 HERE]

Hierarchical multiple regression analyses showed significant relationships between proposed constructs (i.e., independent variables such as previous food allergy training experience, food allergy knowledge) and restaurant servers' risk reduction and communication behaviors (i.e., dependent variable) (Table 5.14). The  $R^2$  for Model 1 is 0.236, with  $p < 0.001$ . In Model 2, the  $R^2$  was improved to 0.367 ( $p < 0.001$ ), and this increase in  $R^2$  indicated that Model 2 predicts risk reduction and communication behaviors better than Model 1.

Perceived severity of food allergy reactions ( $\beta = 0.133$ ,  $p < 0.001$ ), previous training about communication with customers ( $\beta = 0.260$ ,  $p < 0.01$ ), sources of media cues about food allergies ( $\beta = 0.176$ ,  $p < 0.001$ ), and perceived responsibilities in communicating with customers and preventing food allergy reactions ( $\beta = 0.363$ ,  $p < 0.001$ ) were significant predictors of restaurant servers' risk reduction and communication behaviors. However, contrary to our initial thoughts, the overall food allergy risk perception, food allergy knowledge, and whether participants or families/friends had food allergies were not significant factors predicting servers' risk reduction and communication behaviors.

As indicated in the FDA Food Code, all restaurateurs should "ensure that employees are properly trained in food safety, including food allergy awareness, as it relates to their assigned duties" (FDA, 2013, p. 31). The results of this research suggested that restaurant servers' awareness of the severity of food allergy reactions could positively predict their behaviors when serving customers with food allergies. In addition, training servers about ways to communicate, using different types of media to instill information about food allergies to servers, and

reinforcing servers' responsibilities in preventing food allergy reactions may help restaurateurs to reduce the potential risks when accommodating customers with food allergies.

However, this research did not find any relationships between restaurant servers' overall food allergy risk perception and their risk reduction and communication behaviors. As discussed by risk communication researchers, the relationship between risk perceptions and health behaviors is an undecided issue in health psychology even though many researchers found that risk perceptions were positively associated with health behaviors (Brewer et al., 2007). Our finding related to the service staff's perceived lack of responsibility for preventing food allergy reactions may explain the lack of relationships between risk perceptions and servers' risk reduction and communication behaviors.

Food safety researchers found that food safety training improved the knowledge of foodservice employees, but knowledge alone did not improve foodservice employees' safe food handling behaviors (Roberts, Barrett, Howells, Shanklin, Pilling, & Brannon, 2008). In this study we found the general knowledge about food allergies could not improve servers' communication behaviors with customers. However, specific training topics about proper communication may improve servers' risk reduction and communication behaviors.

[INSERT TABLE 5.16 HERE]

### **Conclusion and Implications**

This study explored perceived risks and risk reduction and communication behaviors of restaurant service staff when serving customers with food allergies in the U.S. Results indicated that restaurant servers lacked knowledge about common food allergens, differences between food allergies and food intolerances, and government regulations related to food allergy

prevention and management in the U.S. In addition, our results showed that food allergy training can improve restaurant servers' knowledge related to food allergies.

The results of this study revealed that limited food allergy information was provided on printed or online menus. A few restaurants had separate menus or complete ingredient lists for customers with food allergies. Additionally, very few restaurant servers would initiate conversations with customers about their food allergies or dietary restrictions. Most restaurant servers also perceived that initiating communication and preventing food allergy reactions were mostly the responsibility of customers with food allergies. These findings support the need for increased communication between restaurant staff and customers with food allergies.

Furthermore, we found that restaurant servers' risk reduction and communication behaviors can be predicted by their perceived severity of food allergy reactions, previous communication training, sources of media exposure, and the perceived responsibilities of preventing food allergy reactions. These findings provided directions for restaurateurs and food safety and food allergy educators when developing training programs and food allergy risk management plans.

Restaurateurs are recommended to include communication with customers with food allergies in their training agenda, given the influence of training in servers' behaviors. In addition, emphasizing servers' responsibility for preventing food allergy reactions in restaurants may be needed. In regards to risk communication, restaurateurs are encouraged to share more information about ingredients and food allergens with potential customers with food allergies to facilitate their food choice decision-making. Training employees reassure customers about their allergen-free orders, a form of a two-way communication, can increase the effectiveness of risk communication. As identified by participants in this research, a written protocol detailing the

procedures of communication when serving customers with food allergies can be an effective strategy in preventing food allergy reactions.

Food safety and food allergy educators can use these results when developing training or education modules related to food allergies. Given that one of the major causes of food allergy reaction is the lack of proper communication between and among restaurant employees and customers with food allergies (Furlong et al., 2001; Kwon & Lee, 2012; Leftwich et al., 2011), risk communication training may need to be emphasized for both restaurant managers and employees.

### **Limitations and Future Research**

There are several limitations in this study. The online survey distribution protocol may have excluded some population that does not use computers or the Internet. Even for the population that has access to computers and the Internet, this sampling method might have excluded those who were not familiar with completing internet-based surveys or may not have allowed them to be included in survey panels (Stern, Adams, & Elsasser, 2009).

In addition, this study only examined self-reported food allergy risk perceptions and risk communication related behaviors. Such self-reported data are often impacted by the social desirability bias. To overcome such bias, future research may need to use other methods to investigate the risk communication related behaviors of restaurant staff, such as direct observation or the use of mystery shoppers, which allows direct interaction with and evaluation of restaurant staff.

According to risk communication literature, in order to evaluate whether a risk message is effective, researchers need to determine if it (a) includes the information needed for users, (b) is user friendly with easily accessible information, and (c) is understandable and easily

comprehensible (Fischhoff et al., 2012). Specific to food allergy risk messages, customers with food allergies may be the best individuals to evaluate whether the message is understandable and easily comprehensible. Future research is recommended to explore customers' perceptions toward different types of statements or disclaimers on food menus.

Lastly, this research was conducted in the U.S. and only targeted full service restaurant servers. Therefore results may not be generalized in other countries or other types of restaurants. Future research may need to explore the food allergy risk perceptions and communication-related behaviors of other types of foodservice employees (i.e., onsite foodservice operations), other types of employees (i.e., production staff or managers), and employees outside the U.S.

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**Table 5.1 Reliability of Measurement (n=30)**

<b>Construct</b>	<b>Number of items</b>	<b>Cronbach's <math>\alpha</math></b>
Perceived severity	3	0.909
Perceived susceptibility	6	0.433
Overall risk perception	3	0.850
Risk reduction and communication behavior	5	0.849

**Table 5.2 Characteristics of Participants (n=316)**

<b>Characteristic</b>	<b>n</b>	<b>%</b>
<b><i>Age</i></b>		
18 – 29 years	170	53.8
30 – 39 years	59	18.7
40 – 49 years	31	9.8
50 – 59 years	46	14.6
60 years or older	10	3.2
<b><i>Gender</i></b>		
Female	243	76.9
Male	71	22.5
Decline to answer	2	0.6
<b><i>Food Allergies</i></b>		
Yes	41	13
No	275	87
<b><i>Friends or families with food allergies</i></b>		
Yes	167	52.8
No	149	47.2
<b><i>Education</i></b>		
Less than high school degree	4	1.3
High school diploma or GED	175	55.4
Associate’s Degree	73	23.1
Bachelor’s Degree	58	18.4
Graduate Degree	6	1.9
<b><i>Years in the restaurant industry</i></b>		
3 or less	100	31.6
4 – 10 years	108	34.2
11 - 15 years	33	10.4
16 - 25 years	45	14.2
25 years or more	30	9.5
<b><i>Years in present employer</i></b>		
3 or less	195	61.7
4 – 10 years	82	25.9
11-15 years	17	5.4
16-25 years	17	5.4
25 years or more	5	1.6
<b><i>Food safety certification<sup>a</sup></i></b>		
ServSafe Certification	122	38.6
ServSafe Allergens Certification	18	5.7
State Sponsored food handler certificate	80	25.3
Without any food safety certification	138	43.7
Others	7	2.2
<b><i>Employer type</i></b>		
Chain full service restaurant	157	49.7
Independent full service restaurant	159	50.3

Note. <sup>a</sup>The total number of responses exceeds (n=316) due to multiple responses.

**Table 5.3 Respondents' Knowledge about Common Food Allergens and Symptoms (n=316)**

<b>Questions</b>	<b>Number of Correct Responses (%)</b>
<b><i>Identification of the Big 8 food allergens</i></b>	
Peanut	312 (98.7)
Shellfish	295 (93.4)
Milk	267 (84.5)
Tree nuts	241 (76.3)
Wheat	228 (72.2)
Eggs	196 (62.0)
Soy	172 (54.4)
Fish	155 (49.1)
<b><i>Identification of food allergy reaction symptoms</i></b>	
Swelling of throat	308 (97.5)
Hives/rashes	301 (95.3)
Facial swelling	297 (94.0)
Shortness of breath	262 (83.0)
Tingling sensation in or around the mouth	262 (83.0)
Anaphylaxis	236 (74.7)
Vomiting	235 (74.4)
Asthma	94 (29.7)

**Table 5.4 Frequencies of Food Allergy Knowledge Responses to True or False Confidence Questions (n=316)**

<i>Statements</i>	<i>False</i>	<i>Maybe False</i>	<i>Don't Know</i>	<i>Maybe True</i>	<i>True</i>
	<b>Number of Responses (%)</b>				
Food allergy reactions happen when the body's immune system reacts negatively to a food.	10 (3.2)	5 (1.6)	44 (13.9)	81 (25.6)	176 <sup>a</sup> (55.7)
Food allergy reactions can only be triggered when customers consume (eat) allergenic foods.	138 <sup>a</sup> (43.7)	47 (14.9)	29 (9.2)	45 (14.2)	57 (18.0)
A person can die from a food allergy reaction.	1 (0.3)	3 (0.9)	10 (3.2)	28 (8.9)	274 <sup>a</sup> (86.7)
Modern medicine can cure food allergies.	87 <sup>a</sup> (27.5)	57 (18.0)	77 (24.4)	74 (23.4)	21 (6.6)
Gluten intolerance is the same as wheat allergy.	108 <sup>a</sup> (34.2)	48 (15.2)	79 (25.0)	48 (15.2)	33 (10.4)
Gluten intolerance can be extremely life threatening.	20 <sup>a</sup> (6.3)	54 (17.1)	79 (25.0)	74 (23.4)	89 (28.2)
If a person has a milk allergy, removing cheese from an already-assembled deli sandwich will prevent a food allergy reaction.	162 <sup>a</sup> (51.3)	61 (19.3)	36 (11.4)	38 (12.0)	19 (6.0)
Cooking food to the right internal temperature can kill food allergens.	185 <sup>a</sup> (58.5)	47 (14.9)	44 (13.9)	27 (8.5)	13 (4.1)
Federal law requires only the eight major food allergens to be listed on the food labels.	41 (13.0)	15 (4.7)	155 (49.1)	56 (17.7)	49 <sup>a</sup> (15.5)

<sup>a</sup> Correct answers

**Table 5.5 ANOVA with Post Hoc Analyses of Respondents' Food Allergy Knowledge Scores Based on Educational Level**

<b>Educational Level</b>	<b>Mean ± SD</b>	<b>F</b>	<b>Sig.</b>
Less than high school degree	12.37 ± 2.49 <sup>x</sup>	3.884	0.004
High school diploma or GED	16.47 ± 2.94 <sup>y</sup>		
Associate's Degree	17.29 ± 2.79 <sup>yz</sup>		
Bachelor's Degree	17.39 ± 3.41 <sup>z</sup>		
Graduate Degree	15.91 ± 3.02 <sup>xyz</sup>		

*Note.* <sup>x,y,z</sup> Means with different superscripts differ significantly by LSD's post doc test (p<0.05).

**Table 5.6 Respondents' Perceived Severity of Food Allergy Reactions (n=316)**

<b>Measure items</b>	<b>Mean±SD</b>
Food allergy reactions can be dangerous to an individual with food allergies.	6.71±0.76
Food allergy reactions can be life threatening.	6.63±0.77
The severity of food allergy reactions varies among individuals with food allergies.	6.19±0.93

*Note.* Seven-point scale from 1 “Strongly Disagree” to 7 “Strongly Agree” was used.



**Table 5.7 Media Cues about Food Allergies**

<b>Sources of media exposure about food allergies</b>	<b>n</b>	<b>%</b>
Television news stories	210	66.5
Online news articles	203	64.2
Online social network postings	187	59.2
Newspaper articles	147	46.5
Magazine articles	129	40.8
Radio news stories	88	27.8

**Table 5.8 Respondents' Previous Food Allergy Training (n=316)**

<b>Characteristics</b>	<b>n</b>	<b>%</b>
<b><i>Method of food allergy training</i></b>		
On-the-job training (e.g., in-house training)	91	63.2
ServSafe® training sessions	87	60.4
Training sessions provided by the restaurant of current employment	77	53.5
Employee orientation	63	43.8
Employee handbook provided by the restaurant	62	43.1
Courses provided in school or college	27	18.8
Training sessions provided by state/local health departments	24	16.7
Daily line-up	23	16.0
CPR (Cardiopulmonary Resuscitation) training	23	16.0
Professional organizations	2	1.4
Other ways	10	6.9
<b><i>Format of food allergy training</i></b>		
Group training	103	71.5
Through self-training modules	64	44.4
Individual	54	37.5
Others	2	1.4
<b><i>Food allergy training topics</i></b>		
Ways to prevent cross contacts	132	91.7
Ways to communicate with customers who have food allergies	124	86.1
Ingredients and food allergens included in the menu items	123	85.4
Major food allergens	110	76.4
Identifying symptoms of food allergy reactions	89	61.8
Instructions for using auto-epinephrine injector (e.g., EpiPen®)	37	25.7
Others	1	0.7
<b><i>Procedures trained about communication with customers</i></b>		
Notify the chef when a customer requests an allergen-free order	120	83.3
Notify managers when a customer requests an allergen-free order	98	68.1
Show the list of ingredients, if available	92	63.9
Never make any promises about food allergy accommodations on our own	56	38.9
Ask customers if any person in the party has a food allergy when you greet them	47	32.6
Point out a sign or statement on the menu regarding food allergy accommodation in your restaurant	46	31.9
Allow management staff to take over the table with special needs	26	18.1
Others	3	2.1

*Note.* The total number of responses exceeds (n=316) due to multiple responses.

**Table 5.9 Overall Food Allergy Risk Perception (n=316)**

<b>Measure items</b>	<b>Mean±SD</b>
I consider serving individuals with food allergies in restaurants (from “1 – not at all risky” to “7 - highly risky”).	5.03±1.47
When eating in restaurants, individuals with food allergies are exposed to (from “1 – no risk at all” to “7 – very high risk”).	4.94±1.27
Eating out in restaurants is risky for individuals with food allergies. (from “1 – Strongly Disagree” to “7 – Strongly Agree”).	5.15±1.38

*Note.* SD = Standard Deviation

**Table 5.10 Information Shared on the Printed Menus**

<b>Characteristics</b>	<b>n</b>	<b>%</b>
<b><i>The menu discloses</i></b>		
All the ingredients	46	14.6
Most ingredients	109	34.5
A few main ingredients	116	36.7
No ingredients	38	12.0
Don't know	7	2.2
<b><i>Each menu item specifies</i></b>		
Common food allergens	51	16.1
A few food allergens	54	17.1
If it is free from certain food allergens	23	7.3
No information about food allergies	169	53.5
Don't know	36	11.4

**Table 5.11 Categories and Examples of Food Allergy Statements or Disclaimers (n=101)**

<b>Categories</b>	<b>Examples</b>	<b>No of Respondents (%)</b>
1. Request customers to notify servers about their food allergies	<i>“Please notify your server if anyone in your party has any food allergies.”</i>	68 (58.6%)
2. Warning that foods may contain allergens or prepared near common allergens	<i>“Items on menu may contain or come in contact with peanuts, shellfish or other ingredients that may cause allergic reaction.”</i>	24 (20.7%)
3. Restaurant cannot guarantee allergen-free or gluten-free items	<i>“We try our best to accommodate food allergies but cannot guarantee that the food will be entirely free of the allergen.”</i>	6 (5.2%)
4. Allergen-free or gluten-free menus are available upon request	<i>“Restaurant have separate menus for customers with food allergies.”</i>	3 (2.6%)

**Table 5.12 Communication Strategies used in Restaurants and Perceived Effectiveness of Communication Strategies**

<b>Items</b>	<b>n</b>	<b>%</b>	<b>Perceived Effectiveness Mean±SD</b>
Customers are informed when the restaurant is unable to provide allergen-free meals.	169	53.5	5.76±1.39
A statement is included on the menu to advise customers to notify the server if anyone has a food allergy.	141	44.6	5.58±1.44
A written protocol is in place specifying the standard procedures for serving customers with food allergies.	81	25.6	5.52±1.42
Customers are informed if there are uncommon ingredients included in menu items.	121	38.3	5.48±1.43
Restaurant staff informs customers about how allergen-free orders were prepared in the kitchen.	133	42.1	5.41±1.39
The servers ask customers about special dietary needs as soon as they are greeted.	57	18.0	5.03±1.86
A sign or poster is displayed in the dining area asking customers to notify the server if anyone has a food allergy.	36	11.4	4.84±1.62
The chef visits the table to provide assurance that the meal is allergen-free.	21	6.6	4.50±1.79

**Table 5.13 Perceived responsibilities (n=316)**

<b>Items</b>	<b>Mean±SD</b>
<b><i>Prevent food allergy reactions is:</i></b>	
the customer's responsibility to prevent food allergy reactions in restaurants.	5.31±1.49
the restaurant kitchen staff's responsibility to prevent food allergy reactions.	5.20±1.65
the restaurant service staff's responsibility to prevent food allergy reactions.	5.04±1.65
the restaurant management staff's responsibility to prevent food allergy reactions.	4.88±1.62
<b><i>Initiate communication is:</i></b>	
the customer's responsibility to initiate communication with restaurant staff if the customer has food allergies.	6.33±1.16
the restaurant service staff's responsibility to initiate communication with customers if the customer has food allergies.	3.65±1.99
<b><i>Handle food allergy requests is:</i></b>	
the restaurant service staff's responsibility to handle allergen-free requests.	5.46±1.44
the restaurant management staff's responsibility to handle allergen-free requests.	4.90±1.73

*Note.* SD = Standard Deviation. Seven-point scale from 1 "Strongly Disagree" to 7 "Strongly Agree" was used.

**Table 5.14 Ranked Responsibilities in Preventing Food Allergy Reactions in Restaurant (n=316)**

<b>Parties</b>	<b>Rank 1 (3 points)</b>	<b>Rank 2 (2 points)</b>	<b>Rank 3 (1 point)</b>	<b>Rank 4 (0 point)</b>	<b>Weighted Average ranking</b>
Customers with food allergies	244	15	7	50	2.43
Restaurant kitchen staff	28	102	125	61	1.31
Restaurant service staff	14	129	110	63	1.30
Restaurant managerial staff	30	70	74	142	0.96



**Table 5.15 Servers' Risk Reduction and Communication Behaviors (n=316)**

<b>Items</b>	<b>Mean±SD</b>
Asked customers if anyone in their party has a food allergy.	2.54±1.80
Checked with the chef which food items did not contain specific allergens before advising the customer with food allergies.	5.31±1.92
Checked with the manager which food items did not contain specific allergens before advising the customer with food allergies.	4.97±1.96
Placed a special note indicating the customer's food allergies on the ticket to kitchen staff.	5.06±2.26
Reassured the customer about the allergen-free order when delivering the food.	5.10±2.04

*Note.* Seven-point frequency scale: 1 – Never, 2 – Rarely (in less than 10% of chances), 3 – Occasionally (in about 30% of chances), 4 – Sometimes (in about 50% of chances), 5 – Frequently (in about 70% of chances), 6 – Usually (in about 90% of chances), 7 – Always.

**Table 5.16 Hierarchical Multiple Regression Analyses Predicting Servers' Risk Reduction and Communication Behavior<sup>a</sup> (n=316)**

<i>Variables</i>	<i>Model 1</i>			<i>Model 2</i>		
	<i>B</i>	<i>SE B</i>	<i>Beta</i>	<i>B</i>	<i>SE B</i>	<i>Beta</i>
Perceived Severity	0.383	0.116	0.166**	0.307	0.110	0.133**
Food Allergy Risk Perception	0.87	0.068	0.064	0.056	0.062	0.041
Communication Training Cues	1.173	0.162	0.363***	0.841	0.156	0.260***
Media Cues	0.175	0.039	0.222***	0.139	0.037	0.176***
Perceived Responsibility				0.466	0.061	0.363***
Personal food allergy issues				0.026	0.223	0.006
Have families or friends with food allergies				0.089	0.152	0.028
Food Allergy Knowledge				0.037	0.026	0.071
<i>R</i> <sup>2</sup>	0.236			0.367		
<i>Adjusted R</i> <sup>2</sup>	0.226			0.350		
<i>F for changes in R</i> <sup>2</sup>	24.025***			22.211***		

<sup>a</sup>Dependent variable, Servers' Risk Reduction and Communication Behavior, was calculated by taking the mean score of frequencies of five behaviors (Table 5.13).

\*\*\*p<0.001; \*\*p<0.01; \*p<0.05

## **Chapter 6 – Summary and Conclusions**

The purpose of this research was to explore the perceived risks and risk communication related behaviors of full-service restaurant service staff when serving customers with food allergies. A qualitative study (i.e., restaurant manager interviews) was conducted in an exploratory manner, followed by a quantitative study (i.e., restaurant server online survey) to achieve the research purpose. This chapter summarizes the major findings of the qualitative and quantitative studies, discusses the theoretical and practical implications, presents the limitations, and provides suggestions for future research.

### **Summary of Research**

Food allergy, “an adverse health effect arising from a specific immune response that occurs reproducibly on exposure to a given food” (Boyce et al., 2010, p. S8), has become a health concern in the U.S. because of the increasing number of individuals with food allergies (Center for Disease Control and Prevention [CDC], 2011; De Blok et al., 2007). Accommodating the increasing number of customers with food allergies has also become a challenge to the restaurant industry (Abbot, Byrd-Bredbenner, & Grasso, 2007; Ahuja & Sicherer, 2007; Kronenberg, 2012).

Researchers found that foods prepared away from home were responsible for every one in three fatal food allergy reactions occurred in the U.S. from 2001 to 2006 (Bock, Muñoz-Furlong, & Sampson, 2001, 2007; Wanich, Weiss, Furlong, & Sicherer, 2008). Most food allergy reactions occurred when consumers believed that the foods they were eating were safe (Sampson, Mendelson, & Rosen, 1992), and when customers failed to notify restaurant staff about their food allergies (Mandabach et al., 2005).

Customers with food allergies perceived that the miscommunication between and among restaurant staff and customers was one of the major causes of food allergy reactions in restaurants (Furlong, DeSimone, & Sicherer, 2001; Kwon & Lee, 2012; Leftwich et al., 2011). Researchers also found that customers with food allergies sometimes do not communicate their food allergies with restaurant staff in an attempt to avoid the potential social embarrassment (Leftwich et al.). Therefore, establishing proper communication between and among consumers and foodservice employees may be one of the most important steps in preventing food allergy reactions in restaurants (Leftwich et al.). In specific, how restaurant staff perceived the risk of serving customers with food allergies and how they communicate the risk with customers might play important roles in preventing food allergy reactions in restaurants.

However, limited research had examined how restaurant staff perceives the food allergy risks and communicates the risk with customers with food allergies. Therefore, the purpose of this study was to explore the perceived risks and risk communication related behaviors of restaurant service staff when serving consumers with food allergies in the U.S by conducting telephone interviews with restaurant managers (n=16) and a self-administered online survey with full service restaurant servers (n=316).

The specific objectives of the restaurant manager interviews were to (1) identify restaurant managers' beliefs and perceptions about food allergy risks in their restaurants and (2) explore risk communication procedures or protocols when serving consumers with food allergies. The specific objectives of the survey of restaurant servers were to: (1) examine perceived risks of restaurant servers when serving consumers with food allergies, (2) identify ways in which restaurant servers communicate the food allergy risks, (3) explore factors affecting restaurant servers' risk reduction and communication related behaviors, and (4) provide

recommendation of food allergy risk communication strategies and training needs for the restaurant industry. Summaries of major findings in the qualitative and quantitative studies were described as follows.

### ***Qualitative Study: Restaurant Manager Interviews***

Telephone interviews were conducted in February 2015 with restaurant managers to explore the operational issues related to food allergy risk communication in their restaurants. Sixteen restaurant managers from both independently-owned and chain-operated full service restaurants were recruited from Kansas and Texas. All participants indicated in the telephone interviews that their restaurants usually accommodate special requests from customers with food allergies. The following section summarizes the major findings of the qualitative study.

#### ***Food Allergy Awareness and Training***

Restaurant managers were well aware of the severity of food allergy reactions and recognized that food allergy reactions range from mild to life threatening. However, some managers mistakenly categorized “gluten” as one of the major food allergens, and use the word “cross-contamination” they were describing the situation of “cross-contact”. Understanding the meaning of cross-contact may be one of the key elements in preventing food allergy reactions in food preparation and service areas in restaurants.

Most restaurant managers had received and provided food allergy related trainings to their employees. Common training topics provided to their service staff included identifying ingredients on menu items and notifying a manager when customers request allergen-free orders. Very few managers had been trained or had trained their staff on specifics related to food allergy risk communication and risk management strategies, and most food allergy trainings were provided on one-time basis.

Most restaurants did not have risk management plans or safety manuals detailing the procedures in case of food allergy reactions or foodborne illnesses. Even for some restaurants with risk management plans, managers might not go over it unless something happens. When comparing food allergy risks and food safety risks, some managers considered food allergy risks as more of a concern due to the severity of food allergy reactions. Other managers indicated that food safety risks could affect all customers while food allergy risk only affects a small percentage of customers.

### ***Food Allergy Risk Perception and Communication***

Restaurant managers presented different opinions when discussing whether serving customers with food allergies was a significant concern in their operations. Most managers recognized that it is the restaurant's responsibility to serve safe foods for customers with food allergies. Most of them considered the potential cross-contact as a significant risk when preparing allergen-free orders, and indicated human errors are one of the contributing factors for potential food allergy reactions. Even though "hidden ingredients" are relatively well-acknowledged food allergy risk, only one participant recognized it as a risk factor.

Communication of food allergy risks was not perceived as a challenge for restaurant managers. Managers solely depended on their customers to notify them of a food allergy instead of letting their service staff initiate the conversation. Different methods were used to disclose food allergy related information to customers, such as providing separate menus or allergen-free menus for customers with food allergies.

Only five managers mentioned that they or the chefs usually reassure with customers about the allergen-free orders. In addition to including a statement or disclaimer on the menu to encourage customers to notify restaurant servers about their food allergies, participants

recognized communicating the allergen-free order requirements both verbally and in written formats to the kitchen staff may help ensure the accuracy of information delivery.

### ***Quantitative Study: Restaurant Service Staff Survey***

A survey research firm (Qualtrics) was hired to send out the online survey requests to randomly selected restaurant service staff in their member panels. A total of 316 usable survey responses (23.8%) were collected and included in the final data analyses, including 157 servers from chain-operated full service restaurants and 159 servers from independently-owned full service restaurants. The majority of participants were between 18 to 29 years old (n=170, 53.8%) and female (n=243, 76.9%). Thirteen percent (n=41) of participants had food allergies, while 52.8% (n=167) reported that they had families or friends with food allergies. Additionally, 55.4% (n=175) participants had high school diploma or GED (General Education Development), an Associate's Degree (n=73, 23.1%), and a Bachelor's Degree (n=58, 18.4%).

A series of research questions and null hypotheses were proposed to address the research purpose and objectives. The major findings of the online survey are summarized in the form of answers to each of research questions.

#### ***Research Question 1: How much are restaurant servers aware of the severity of food allergy reactions?***

Generally speaking, restaurant servers were aware of the severity of food allergy reactions with a mean score of  $6.51 \pm 0.69$  (Mean  $\pm$  Standard Deviation) by using a 7-Point Likert Scale. Specifically, restaurant servers were aware that food allergy reactions could be dangerous to individuals with food allergies ( $6.7 \pm 0.75$ ), food allergy reactions could be life-threatening ( $6.63 \pm 0.77$ ), and the severity of food allergy reactions varies among individuals ( $6.19 \pm 0.93$ ). In

contrast, previous research found that restaurant staff were not aware of the severity of food allergy reactions (Abbot et al., 2007).

For previous food allergy training experience, 45.6% (n=144) of participants indicated that they had received food allergy training, mostly through on-the-job training (n=91, 63.2%), as part of ServSafe training (n=87, 60.4%), and training sessions provided by the restaurant of current employment (n=77, 53.5%).

***H<sub>01</sub>: Food allergy training does not have an effect on food allergy knowledge.***

For questions asking respondents' knowledge about the eight major food allergens, only 6.6% (n=21) of respondents correctly recognized all the eight major food allergens. Specifically, 50.9% (n=161) of participants failed to identify "fish", 45.6% (n=144) of participants failed to identify soy, and 38.0% (n=120) of participants failed to identify "egg" as one of the eight major food allergens. For symptoms of allergic reactions, only 12.7% (n=40) of respondents correctly identified all the symptoms listed in the question. Results revealed that 54.4% (n=172) of respondents thought that modern medicine can cure food allergies, 50.6% (n=160) of respondents were not aware of the difference between gluten intolerance and wheat allergy, 51.5% (n=163) of respondents thought that gluten intolerance can be extremely life-threatening, while 66.8% (n=211) of respondents did not know or were not aware that federal law requires only the eight major food allergens to be listed on food labels. The mean knowledge score was  $16.77 \pm 3.05$  out of the total possible score of 25, ranging from 3 to 23.

The results of independent sample t-tests indicated that respondents who had received food allergy training had significantly higher knowledge scores than those who had not received any type of food allergy training ( $\beta=0.287$ ,  $p<0.05$ ). Therefore  $H_{01}$  is rejected because the results



indicated that previous food allergy training experience had a positive effect on restaurant servers' food allergy knowledge scores.

***H<sub>0</sub>2: Food allergy knowledge does not have an effect on perceived severity.***

Regression analysis was performed to examine the relationships between participants' food allergy knowledge scores and perceived severity of food allergy reactions. Results indicated that restaurant servers with higher food allergy knowledge scores had higher degree of recognition regarding the severity of food allergy reactions ( $p < 0.01$ ). Therefore H<sub>0</sub>2 is rejected as restaurant servers' knowledge about food allergies had a positive effect on their perceptions of the severity of food allergy reactions

***Research Question 2: How do restaurant servers perceive the risk related to serving customers with food allergies?***

***Research Question 3: What are the factors influencing the perceived food allergy risks of restaurant servers?***

Overall, restaurant servers considered that eating out is somewhat risky for customers with food allergies, with a mean score of  $5.04 \pm 1.16$  when asked about their food allergy risk perception using 7-point Likert Scales. Potential factors (i.e., perceived severity, media cues, education cues, demographic characteristics) were measured to identify their potential effects on participants' overall food allergy risk perception. Participants, in general, perceived that the food allergy reactions are dangerous and life threatening to individuals with food allergies ( $6.51 \pm 0.69$ ). For media cues, most participants learned about food allergies through television news stories ( $n=210$ , 66.5%), online news articles ( $n=203$ , 64.2%), and online social network postings ( $n=187$ , 59.2%). In addition, a majority of participants ( $n=234$ , 74.05%) learned about food allergies through an average of three different media sources ( $3.05 \pm 2.00$ ). For education

cues, 45.6% (n=144) of participants had received some type of food allergy training.

Specifically, most of them (n=124, 86.1%) reported that they learned ways to communicate with customers who have food allergies.

***H<sub>0</sub>3a: Cues to action do not have an effect on food allergy risk perceptions.***

***H<sub>0</sub>3b: Perceived severity does not have an effect on food allergy risk perceptions.***

Results of multiple regression analyses indicated that the perceived severity of food allergy reactions, sources of media cues about food allergies, and previous food allergy training experience did not have a significant effect on restaurant servers' overall food allergy risk perception. Therefore both H<sub>0</sub>3a and H<sub>0</sub>3b were supported.

Among the demographic characteristics, gender was the only factor that had an impact on the overall food allergy risk perception. Furthermore, results of the independent sample t-test revealed that female restaurant servers had significantly higher level of overall food allergy risk perception than male (p<0.001).

***Research Question 4: In which ways do restaurants share the information about food allergies with customers?***

To make food allergy related information available to potential customers with food allergies, restaurants were reported to include food ingredients and food allergen information on printed and online menus, prepare separate menus specifically for customers with food allergies, or post their menu online in order to facilitate customers' food choice decision-making. For ingredients, nearly half of the restaurants (n=155, 49.1%) listed all the ingredients or most ingredients on their food menus. Even though 79 (25%) participants answered that their restaurant had separate menus for customers with food allergies, only 27 (8.5%) restaurants identified common food allergens or provided a complete list of ingredients on menus. The other

restaurants (n=52) only provided gluten-free menus, which participants mistakenly categorized as allergen-free menus. In addition, for the 236 restaurants (74.7%) that posted their menu online, only 89 (28.2%) of them included information about food allergens. These results indicated that restaurants provided limited information for potential customers with food allergies.

***Research Question 5: What type of risk communication behaviors do restaurant servers perform when serving customers with food allergies?***

For written communication, 36.7% (n=116) of participants indicated that food menus in their restaurants include a statement or disclaimer about food allergies. Most of the statements (n=68) were requesting customers to notify the server if they have food allergies. For oral communication, restaurant servers never or rarely asked customers if anyone in the party has a food allergy when greeting customers (2.54±1.80). Participants from the qualitative study (restaurant manager interviews) identified implementing both oral and written communications as a strategy to prevent food allergy reactions in restaurants.

After customers requested allergen-free orders, restaurant servers frequently checked with the chef (5.31±1.92) or managers (4.97±1.96) to identify food items that did not contain specific allergens before advising customers, and placed a special note indicating customers' food allergies on the ticket for kitchen staff (5.06±2.26). Even though it would be helpful to reassure customers regarding the allergen-free meals, only 38.3% (n=121) of participants indicated that they always reassured the customer about the allergen-free order when delivering the orders. These results were consistent with findings from the qualitative research that most restaurants staff usually wait for customers to notify them about their special requests and rarely reassure with customers about their allergen-free orders. The reassuring behavior, a form of two-

way communication, is recommended because it focuses on the inputs, understanding, and feedback from both sides of the communication (Fischhoff, 1999; Weinstein, 2000).

***Research Question 6: How do restaurant servers perceive the effectiveness of strategies when communicating with customers with food allergies?***

Restaurant servers perceived that informing customers when the restaurant is unable to provide allergen-free meals ( $5.76 \pm 1.39$ ), including a statement on the menu to advise customers to notify the server if anyone has a food allergy ( $5.58 \pm 1.44$ ), and including a written protocol in place specifying the standard procedures for serving customers with food allergies ( $5.52 \pm 1.42$ ) are the three most important strategies about proper communication to prevent food allergy reactions.

Even though the written protocol was perceived as the third most effective communication strategy, only 81 (25.6%) of restaurants had a written protocol detailing the communication procedures in place. Restaurateurs are recommended to establish standard written procedures and communication protocols to ensure the consistency of communication and the accuracy of information delivery when serving customers with food allergies.

***Research Question 7: What type of messages do restaurants use to communicate food allergy risks with customers?***

Food allergy messages were reported to be included on food menus in a form of statement or disclaimer. Those participants who indicated that the menus of their restaurant of employment included a statement or disclaimer about food allergies ( $n=116$ , 36.7%) provided the statement or disclaimer as they remembered. Qualitative content analyses revealed that the majority ( $n=68$ , 58.6%) of statements requested customers to notify the server if they have food

allergies, while some statements (n=24, 20.7%) claimed that food items might contain some food allergens (e.g., peanut) or foods were prepared near common food allergens.

However, according to risk communication theories, to evaluate whether a risk message is effective, researchers need to determine if it (1) includes the information needed for users, (2) is user-friendly with easily accessible information, and (3) is understandable and easily comprehensible (Fischhoff, Brewer, & Downs, 2012). For food allergy risk messages, customers with food allergies are the best individuals to evaluate whether the message is user-friendly, easily accessible, and understandable. Therefore, this research did not evaluate the effectiveness of food allergy risk messages. Future research can further examine customers' perceptions toward these statements and disclaimers.

***Research Question 8: What are factors influencing restaurant servers' risk reduction and communication behaviors?***

***H<sub>04</sub>: Food allergy risk perceptions do not have an effect on restaurant servers' risk reduction and communication behaviors.***

***H<sub>05</sub>: Perceived responsibilities do not have an effect on the relationship between food allergy risk perceptions and restaurant servers' risk reduction and communication behaviors.***

***H<sub>06</sub>: Policies and procedures related to food allergies do not have an effect on the relationship between food allergy risk perceptions and restaurant servers' risk reduction and communication behaviors.***

Restaurant servers' perceived responsibilities for specific actions when serving customers with food allergies were examined using a 7-point Likert scale. Participants perceived that the customers are the most responsible party to initiate communication with restaurant staff if they have food allergies ( $6.3 \pm 1.16$ ) and to prevent food allergy reactions in restaurants ( $5.31 \pm 1.49$ ),

while restaurant servers are the most responsible party to handle food allergen requests (5.40 ±1.44).

Hierarchical regression analyses were conducted to identify the relationships between and among independent variables (i.e., perceived severity, risk perception, education cues, media cues, perceived responsibilities, personal food allergies issues, families and friends' food allergy issues, food allergy knowledge scores) and dependent variables (i.e., risk perception, risk reduction and communication behaviors). Results indicated that there's no relationship between restaurant servers' food allergy risk perception and their risk reduction and communication behaviors. However, the perceived severity of food allergy reactions ( $\beta=0.133$ ,  $p<0.001$ ), previous training about communication with customers ( $\beta=0.260$ ,  $p<0.01$ ), sources of media cues about food allergies ( $\beta=0.176$ ,  $p<0.001$ ), and perceived responsibilities in communicating with customers and preventing food allergy reactions ( $\beta=0.363$ ,  $p<0.001$ ) had significantly predicted restaurant servers' behaviors.

Therefore, H<sub>04</sub> was supported as food allergy risk perception does not have an effect on servers' risk reduction and communication behaviors. On the other hands, H<sub>05</sub> and H<sub>06</sub> were not supported because no relationship was found between risk perception and server's behaviors.

***Research Question 9: What are the training needs in the restaurant industry regarding food allergy risk communication?***

Examination of the relationship between variables revealed that restaurants servers who had received trainings about ways of communication with customers with food allergies had more frequently performed risk reduction and communication behaviors than those who did not received trainings ( $p<0.01$ ). Therefore, in order to improve restaurant servers' behaviors, including training topics about communication is very important. In specific, restaurateurs are

encouraged to train their servers to (1) proactively ask customers if anyone in the party has a food allergy when greeting customers, (2) take responsibilities to prevent food allergy reactions in restaurants, and (3) reassure with customers about their allergen-free orders when delivering the foods.

In addition, this study found that 56.1% of servers from chain-operated restaurants had received food allergy trainings, while only 35.2% of servers from independently-owned restaurants were exposed to food allergy trainings. More training guidelines are needed to facilitate and encourage restaurateurs of independently-owned restaurants to provide food allergy trainings, especially communication related trainings to restaurant staff.

### **Implications**

Existing literature has revealed that proper communication between and among restaurant staff and customers with food allergies is critical in preventing food allergy reactions in restaurants (Leftwich et al., 2011). However, limited research had investigated how restaurant employees communicate the risks and restaurant staff's risk reduction and communication behaviors when serving customers with food allergies. As the first step in identifying strategies to improve risk communication related to food allergies, results of this research had both theoretical and practical implications.

#### ***Theoretical Implications***

Even though risk communication theories have been widely applied in consumer food safety literature and practice (Cope et al., 2010; Lofstedt, 2006; Yeung & Morris, 2001), an in-depth review of the literature did not reveal any research related to food allergy risk communication in the restaurant industry. Applying risk communication theories, results of this study had contributed to the current literature by providing risk communication issues in the

restaurants and restaurant staff's food allergy risk perceptions and risk reduction and communication related behaviors.

Comparing with available literature about dining experiences of customers with food allergies, findings of this study provided insight into the gap in communication between restaurant staff and customers with food allergies. Previous research on customers with food allergy showed that customers sometimes do not communicate their food allergies with restaurant staff in an attempt to avoid the potential social embarrassment (Leftwich et al., 2011). However, this research found that restaurant staff rarely ask customers if anyone in their group has food allergies, proactively. Instead, servers often wait until customers notify them. In addition, restaurant staff placed more emphasizes on customers' responsibilities to initiate conversation about food allergies and prevent food allergy reactions in restaurants.

As reported by risk communication researchers, there is an inverse relationship between the level of control perceived by consumers and the tendency of relying on the risk management of the establishments (Van Kleef et al., 2006). When dining out, customers with food allergies may feel the lack of control and, therefore, rely more on the risk management of the restaurants (Yeung & Morris, 2001). The gap of communication between restaurant staff and customers with food allergies is concerning, and attentions should be raised from both parties involved in communication.

Even though this study found that restaurant staff were aware of the severity of food allergy reactions, and they felt somewhat risky for customers with food allergies to eat out in restaurants. In addition, restaurant servers' overall food allergy risk perceptions did not have an effect on their risk reduction and communication related behaviors. Health psychology theories have not proved the relationship between individuals' risk perceptions and health behaviors even



though many researchers have found that risk perceptions can positively influence associated health behaviors (Brewer et al., 2007). This research, different from other health behavior research, investigated the relationship between restaurant servers' risk perceptions toward other individuals', the customers', safety and restaurant servers' behaviors. Our finding related to the lack of relationships between risk perceptions and servers' risk reduction and communication behaviors may be explained by the lack of perceived responsibilities of service staff for preventing food allergy reactions.

### ***Practical Implications***

Food safety and food allergy educators can use these results when developing training or education modules related to food allergies. Given that the ServSafe® courses only cover information about the major food allergens, other topics, especially the concept of food allergy risk communication and ways to communicate with customers who have food allergies may need to be included in the current education curriculum. According to risk communication literature, how the risk or danger is being described, assessed, and managed may help prevent negative outcomes (McComas, 2006), such as food allergy reactions in restaurants.

For food allergy advocates, it is important to encourage and educate individuals with food allergies to actively disclose their food allergies and clearly communicate their needs to the restaurant staff when dining out. In addition to verbally communicating their food allergies, showing an allergy cards that list all allergenic ingredients they need to avoid may communicate their needs more clearly.

For policy makers, besides developing legislation that requires food allergy training for restaurant staff, it may be critical to communicate food allergy risk and to emphasize the importance of two-way communication when developing training guidelines, posters, or

legislation. Other than training, mandating all restaurants include a food allergy risk message on food menus may help warn both parties (i.e., customers with food allergies and restaurant staff) about the importance of communication.

As identified in previous research that customers with food allergies sometimes do not communicate with servers about their food allergies in an attempt to avoid the potential social embarrassment (Leftwich et al., 2011), restaurateurs should not always rely on customers to communicate their needs. Instead, restaurateurs may need to proactively initiate the communication by asking customers if anyone in their dining party has food allergies and indicating the potential risks (e.g., cross-contacts in food preparation areas) that may exist if customers do not communicate their needs.

Even though customers with food allergies only constitute a small percentage of customer bases in most restaurants, the severity of food allergy reactions and the increasing number of individuals with food allergies in the U.S. need to be taken into account. Restaurateurs are highly encouraged to implement food allergy training, especially training that includes risk communication and ways to communicate when serving customers with food allergies given the influence of training on servers' behaviors. Additionally, training servers to take the responsibilities and take allergen-free orders seriously may help prevent food allergy reactions in restaurants.

In regards to risk communication, restaurateurs are encouraged to share more information about ingredients and food allergens to potential customers with food allergies in order to facilitate customers' food choice decision-making. Training employees to reassure with customers about their allergen-free orders, in a form of a two-way communication, can increase the effectiveness of communication and ensure the safety of customers. Other strategies, such as

a written protocol detailing the procedures of communication when serving customers with food allergies may be effective when ensuring the consistency of communication.

Some managers did not perceive food allergy risk as a significant concern in their operations and were not aware of the importance of risk management plans. Considering this finding, restaurateurs may first implement motivation strategies to encourage restaurant management to pay more attention on food allergy risk management. For example, criteria that relates to the management of food allergy risks can be added into the management performance appraisal system. This way, the restaurant managerial staff may be motivated to provide food allergy related training and better establish communication protocols when serving customers with food allergies.

### **Limitations and Recommendations for Future Research**

Due to the limited number of respondents from the states with food allergy legislations for the restaurant industry (i.e., Massachusetts, Michigan, Rhode Island, Virginia), this research did not examine the differences of risk perceptions and risk communication related behaviors between servers from states with and without food allergy legislations. Future research is recommended to explore the differences and investigate the effectiveness of food allergy legislation in improving food allergy risk perceptions and risk communication related behaviors of restaurant staff. Additionally, the self-reported data might have been impacted by the social desirability bias and must be interpreted with caution. Future research may use other methods, such as direct observation or use of secret shoppers, to investigate the risk communication related behaviors of restaurant staff.

According to the results of this research, restaurant staff perceived a statement or disclaimer on the menu requesting customers with food allergies to notify the server about their

food allergies as one of the most effective methods of communication. This research also found that restaurants use different statements on the menu. Therefore, future research is encouraged to explore the most effective phrasing of the statement or disclaimer by using other research approaches such as experimental design. In addition, because customers with food allergies are the best individuals to evaluate whether the food allergy risk message is understandable and easily comprehensible, future research may explore customers' perceptions toward different types of statements or risk messages on the printed menus.

Specific to the qualitative study, convenience sampling limits the generalizability of the results even though gathering generalizable data was not the purpose of this study. For the quantitative study, online survey distribution protocol might have excluded the population that did not use computers or the Internet. Even for the population that has access to computers and the Internet, this sampling method might have excluded those who were not familiar with online surveys (Stern, Adams, & Elsasser, 2009). In addition, this study identified gender as a factor that influenced restaurant servers' overall food allergy risk perceptions. Future research can further investigate why female restaurant servers' have higher level of recognitions towards food allergy risks than male restaurant servers.

Lastly, this research was conducted in the U.S. only. Therefore, results from this study may not be generalized to other countries. Future research is encouraged to explore food allergy risk communication issues in other countries.

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## **Appendix A – Kansas State University IRB Approval**

TO: Junehee Kwon  
HMD  
108 Justin

Proposal Number: 7484

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

DATE: 12/25/2014

RE: Approval of Proposal Entitled, "Risk Communication when Serving Consumers with Food Allergies in Restaurants in the United States."

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: 12/25/2014

EXPIRATION DATE: 12/25/2015

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 – Interview Questions**

Stage	Questions
Opening	1. Can you tell me something about your restaurant? <ul style="list-style-type: none"> <li>• What type of services do you provide?</li> <li>• How many employees do you have in your restaurant?</li> <li>• Is your restaurant independently owned, chain affiliated, or franchised?</li> </ul>
Stage I – general beliefs and risk perceptions	2. Can you tell me what you know about food allergy reactions? <ul style="list-style-type: none"> <li>• How severe do you believe these reactions are? Why?</li> <li>• How likely do you believe these reactions would occur? Why?</li> <li>• How do you know if anyone has food allergies?</li> </ul>
	3. Does your restaurant provide accommodations for customers with food allergies? Or Does your restaurant provide accommodations for special requests made by customers with food allergies? <ul style="list-style-type: none"> <li>• If yes, please describe what happens when serving customers with food allergies?</li> <li>• If no, can you explain the reason why you don't provide accommodations for customers with food allergies?</li> </ul>
	4. What are some risks involved in serving customers with food allergies? <ul style="list-style-type: none"> <li>• How confident are you in preventing food allergy reactions in your operation?</li> </ul>
Stage II – risk communication and risk management	5. What, if any, information do you provide to your potential customers with food allergies? <ul style="list-style-type: none"> <li>• How would your customers find out about this information?</li> </ul>
	6. Recall that when your restaurant receives an allergen-free order. Can you describe the process of preparing and serving this allergen-free order?
	7. Have you been trained on risk management plans or protocols related to serving customers with food allergies? <ul style="list-style-type: none"> <li>• (If Yes) Please describe in detail.</li> <li>• (If No) Do you have any risk management plans or protocols in place in your restaurant?               <ul style="list-style-type: none"> <li>○ (If Yes) Please describe in detail.</li> <li>○ (If No) Proceed to the next question</li> </ul> </li> </ul>
	8. What, if any, strategies did your restaurant use to prevent the food allergy reactions?
Stage III – risk comparison, personal risk, and training needs	9. Do you believe that food allergy is a significant concern in your operation? Why or why not? Please explain fully. <ul style="list-style-type: none"> <li>• Please explain how food allergy risks are similar to or different from other food safety risks.</li> </ul>
	10. To what extent the risk of serving customers with food allergies relate to yourself?
	11. Do you provide training for your employees on how to communicate when serving customers with food allergies?

	<ul style="list-style-type: none"> <li>• If yes, please describe your training program specifics. <ul style="list-style-type: none"> <li>○ How long is the training?</li> <li>○ What topics do you include in your training?</li> <li>○ Where do you get the training materials?</li> <li>○ How often do you do it?</li> </ul> </li> <li>• If no, can you explain why you don't provide training?</li> </ul>
End	12. Are there any issues related to risk communication when serving customers with food allergies that we didn't have a chance to talk about?

## **Appendix C – Informed Consent Form of Telephone Interview**

**PROJECT TITLE:** Risk Communication When Serving Consumers with Food Allergies in Restaurants in the United States

**APPROVAL DATE OF PROJECT:** 12/25/2014 **EXPIRATION DATE OF PROJECT:** 12/25/2015

**PRINCIPAL INVESTIGATOR: CO-INVESTIGATOR(S):** Junehee Kwon, PhD, RD, Han Wen, MS

**CONTACT AND PHONE FOR ANY PROBLEMS/QUESTIONS:** 785-532-5369

**IRB CHAIR CONTACT/PHONE INFORMATION:** Rick Scheidt/ 785-532-1483

**SPONSOR OF PROJECT:** N/A

**PURPOSE OF THE RESEARCH:** The purpose of this research is to explore the perceived risks and risk communication behaviors of restaurant staff when serving consumers with food allergies in the United States.

**PROCEDURES OR METHODS TO BE USED:** Individual interviews. Restaurant managers or operators will be recruited through connections of HMD faculty and alumni groups of HMD. Twenty interviews will be conducted individually via phone calls. All interviews will be audio-recorded, transcribed verbatim and coded using thematic analysis. Results of interviews will be used to modify the survey instrument and provide suggestions and recommendations to the restaurant industry. Each participant will be rewarded a \$20 gift card of a national retailer for their time.

**LENGTH OF STUDY:** About 30 minutes for each interview.

**RISKS ANTICIPATED:** Potential loss of confidentiality due to one-on-one interview; uneasiness for participants to reveal their personal attitudes and perceptions toward food allergy risks.

**BENEFITS ANTICIPATED:** Results of the interviews can provide food allergy educators and the restaurant industry with suggestions and recommendations in preventing food allergy reactions in restaurants; each participant will receive a \$20 gift card for their time and effort.

**EXTENT OF CONFIDENTIALITY:** (i) Personal identification information will not be included in the interviews.  
(ii) Contact information of interviewees will be destroyed upon completing the interviews.  
(iii) Transcribed interviews will be kept for 3 years as required and then be destroyed.  
(iv) Individual responses will not be revealed; only summarized results of this study will be reported as a form of a research manuscript.

**TERMS OF PARTICIPATION:** I understand this project is research, and that my participation is completely voluntary. I also understand that if I decide to participate in this study, I may withdraw my consent at any time, and stop participating at any time without explanation, penalty, or loss of benefits, or academic standing to which I may otherwise be entitled.

**I verify that my signature below indicates that I have read and understand this consent form, and willingly agree to participate in this study under the terms described, and that my signature acknowledges that I have received a signed and dated copy of this consent form.**

**(Remember that it is a requirement for the P.I. to maintain a signed and dated copy of the same consent form signed and kept by the participant**

**Participant Name:** \_\_\_\_\_

**Participant Signature:** \_\_\_\_\_

**Date:** \_\_\_\_\_

**Witness to Signature: (project staff)** \_\_\_\_\_

**Date:** \_\_\_\_\_

## **Appendix D – Online Survey**

## Q0

Dear Participant: Thank you for your interest and willingness to participate in our research titled “Risk communications when serving customers with food allergies in the U.S.” Serving customers with food allergies has become a challenge for the restaurant industry, and this study will identify the risk perceptions and risk communication behaviors of restaurant service employees when serving customers with food allergies.

This survey should take 10 -15 minutes to complete. Your confidentiality is guaranteed as we do not ask you to provide any personal information. Identifiable data such as names of establishments which may be revealed in open-ended questions will never be reported.

Should you have any questions about the study, please contact Han Wen at (832) 360-0988 (email: hwen@k-state.edu) or Dr. Junehee Kwon at (785) 532-5369 (email: jkwon@ksu.edu). You participation is voluntary, and if you have any questions about the rights of individuals in this study, please 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.

## Q1

Thank you for your assistance.

For compliance purposes we would like to confirm your willingness to participate in this survey. If you agree to participate in this survey, please select I willingly agree to participate under the terms described above and click Continue.

By this selection, you are providing your informed consent to participate in this survey. You may stop taking this survey at any time.

If you do not agree to participate in this survey, select I prefer not to participate and click Continue.

- I willingly agree to participate under the terms described above. (1)
- I prefer not to participate. (0)

If I prefer not to participate. Is Selected, Then Skip To End of Block



**Q2**

Which of the following role do you perform the most in your restaurant?

- Managerial or supervisory staff (e.g., manager, supervisor) (9)
- Host or hostess (10)
- Service staff (e.g., wait-staff, server) (11)
- Production staff (e.g., chef, cook) (12)
- None of the above (13)

If Service staff (e.g., wait-s... Is Not Selected, Then Skip To End of Block

**Q3**

Which of the following best describes the restaurant that you are employed?

- A chain full-service restaurant (e.g., Chili's, Olive Garden) (1)
- An independent full-service restaurant (e.g., Local sit-down restaurant) (2)
- A chain limited-service restaurant (e.g., Subway, McDonald's) (3)
- An independent limited-service restaurant (4)
- None of the above (5)

If A chain limited-service res... Is Selected, Then Skip To End of Block

If An independent limited-serv... Is Selected, Then Skip To End of Block

If None of the above Is Selected, Then Skip To End of Block

**Q4**

Please indicate in which state your restaurant is located:

**Q5**

Please indicate your age in years:

If Younger than 18 Is Selected, Then Skip To End of Block

**Q6**

Do you have friends or family members with food allergies?

- Yes
- No

Q7 How much do you agree or disagree with the following statements?

	Strongly Disagree	Disagree	Somewhat Disagree	Neither Agree nor Disagree	Somewhat Agree	Agree	Strongly Agree
Food allergy reactions can be dangerous to an individual with food allergies.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The severity of food allergy reactions varies among individuals with food allergies.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Food allergy reactions can be life threatening.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Q8

Please rate the statements below using the 7-point scale provided.

Q9

I consider serving individuals with food allergies in restaurants

	1	2	3	4	5	6	7	
not at all risky	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	highly risky

Q10

When eating in restaurants, individuals with food allergies are exposed to

	1	2	3	4	5	6	7	
no risk at all	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	very high risk

Q11

Eating out in restaurants is risky for individuals with food allergies.

	1	2	3	4	5	6	7	
Strongly Disagree	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Strongly Agree

**Q12**

Have you ever heard about food allergies or incidents of food allergy reactions from the following sources?

	Yes	No
Newspaper articles	<input type="radio"/>	<input type="radio"/>
Magazine articles	<input type="radio"/>	<input type="radio"/>
Television news stories	<input type="radio"/>	<input type="radio"/>
Radio news stories	<input type="radio"/>	<input type="radio"/>
Online news articles	<input type="radio"/>	<input type="radio"/>
Online social network postings	<input type="radio"/>	<input type="radio"/>

**Q13**

Have you ever received training on food allergies?

- Yes  
 No

Answer If Have you ever received training on food allergies? Yes Is Selected

**Q14**

Please indicate how you learned about food allergies. (Please check all that apply.) I learned about food allergies through:

- courses provided in school or college.  
 ServSafe ® training sessions.  
 training sessions provided by state/local health departments.  
 training sessions provided by the restaurant where I work.  
 on-the-job training (e.g., in-house training).  
 daily line-up.  
 employee orientation.  
 employee handbook provided by the restaurant.  
 CPR (Cardiopulmonary Resuscitation) training.  
 professional organizations (please specify the organization): \_\_\_\_\_  
 other ways (please specify): \_\_\_\_\_

Answer If Have you ever received training on food allergies? Yes Is Selected

**Q15**

The format of food allergy training you received was (check all that apply):

- a group training.
- an individual “one-on-one” training.
- through self-training modules.
- Other (Please specify): \_\_\_\_\_

Answer If Have you ever received training on food allergies? Yes Is Selected

**Q16**

What topics did you learn during the food allergy training? (Check all that apply)

- Ingredients and food allergens included in the menu items
- Ways to prevent cross contacts
- Ways to communicate with customers who have food allergies
- Major food allergens
- Identifying symptoms of food allergy reactions
- Instructions for using auto-epinephrine injector (e.g., EpiPen®)
- Others (please specify): \_\_\_\_\_

Answer If You indicated that you learned about how to communication with customers who have food allergies. Please check the specific procedures on which you were trained. (Check all that apply) Notify managers when a customer requests an allergen-free order. Is Selected

**Q17**

You indicated that you learned about how to communicate with customers who have food allergies. Please check the specific procedures on which you were trained. (Check all that apply)

- Ask customers if any person in the party has a food allergy when you greet them.
- Point out a sign or statement on the menu regarding food allergy accommodation in your restaurant.
- Notify managers when a customer requests an allergen-free order.
- Notify the chef when a customer requests an allergen-free order.
- Allow management staff to take over the table with special needs.
- Never make any promises about food allergy accommodations on our own.
- Show the list of ingredients, if available.
- Others (please specify): \_\_\_\_\_

**Q18**

In the restaurant where I work, the menu displays/discloses

- all the ingredients.
- most ingredients.
- a few main ingredients.
- no ingredients.
- I don't know.

**Q19**

In the restaurant where I work, each menu item listing specifies

- Common food allergens (please specify): \_\_\_\_\_
- a few food allergens.
- if it is free from certain allergens (please specify): \_\_\_\_\_
- no information about food allergens.
- I don't know.

**Q20**

Does the menu of your restaurant include a statement/disclaimer that advises customers to notify the server if anyone in the dining party has a food allergy?

- Yes.
- No.
- Not sure.

Answer If Does the menu of your restaurant include a statement/disclaimer to advise customers to notify the server if anyone in the dining party has a food allergy? Yes. Is Selected

**Q21**

Please type in the statement/disclaimer as best you can remember it in text box below:

**Q22**

Does your restaurant have separate menus for customers with food allergies?

- Yes.
- No.

Answer If Does your restaurant have separate menus for customers with food allergies? Yes. Is Selected

**Q23**

Please specify the allergen-free menus your restaurant provides:

**Q24**

Does your restaurant post their menu online?

- Yes.
- No.

Answer If	Does your restaurant post their menu online?	Yes. Is Selected
-----------	--	------------------

**Q25**

Does the online menu include information about food allergens?

- Yes.
- No.

**Q26**

Please answer the following questions based on your experience of serving customers with food allergies. How frequently have you taken the following actions?

- Rarely - in less than 10% of chances you could have
- Occasionally - in about 30% of chances you could have
- Sometimes - in about 50% of chances you could have
- Frequently - in about 70% of chances you could have
- Usually - in about 90% of chances you could have

	Never	Rarely	Occasionally	Sometimes	Frequently	Usually	Always
Asked customers if anyone in their party has a food allergy.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Checked with the chef which food items did not contain specific allergens before advising the customer with food allergies.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Checked with the manager which food items did not contain specific allergens before advising the customer with food allergies.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Placed a special note indicating the customer's food allergies on the ticket to kitchen staff.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Reassured with the customer about the allergen-free order when delivering the food.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

**Q27**

How much do you agree or disagree with the following statement?

	Strongly Disagree	Disagree	Somewhat Disagree	Neither Agree nor Disagree	Somewhat Agree	Agree	Strongly Agree
I'm expected to ask customers if anyone in the dining party has a food allergy.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I'm expected to check with the chef which food items do not contain specific allergens before advising the customer with food allergies.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I'm expected to check with the manager which food items do not contain specific allergens before advising the customer with food allergies.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I'm expected to place a special note indicating the customer's food allergies on the ticket to kitchen staff.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Please choose "Neither Agree nor Disagree" for this question.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I'm expected to reassure with the customer about the allergen-free order when delivering the food.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

If Please choose "Neither Agree... Is Not Selected, Then Skip To End of Block

**Q28**

Which of the following strategies are used in your restaurant when serving customers with food allergies? (Check all that apply).

- A statement is included on the menu to advise customers to notify the server if anyone has a food allergy.
- A sign or poster is displayed in the dining area asking customers to notify the server if anyone has a food allergy.
- The servers ask customers about special dietary needs as soon as they are greeted.
- A written protocol is in place specifying the standard procedures for serving customers with food allergies.
- The chef visits the table to provide assurance that the meal is allergen-free.
- Customers are informed when the restaurant is unable to provide allergen-free meals.
- Customers are informed if there are uncommon ingredients included in menu items.
- Restaurant staff informs customers about how allergen-free orders were prepared in the kitchen.

**Q29**

How effective do you believe are the following strategies in preventing food allergy reactions?

	Very Ineffective	Ineffective	Somewhat Ineffective	Neither Effective nor Ineffective	Somewhat Effective	Effective	Very Effective
A statement is included on the menu to advise customers to notify the server if anyone has a food allergy.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
A sign or poster is displayed in the dining area asking customers to notify the server if anyone has a food allergy.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The servers ask customers about special dietary needs as soon as they are greeted.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
A written protocol is in place specifying the standard procedures for serving customers with food allergies.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The chef visits the table to provide assurance that the meal is allergen-free.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Customers are informed when the restaurant is unable to provide allergen-free meals.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Customers are informed if there are uncommon ingredients included in menu items.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Restaurant staff informs customers about how allergen-free orders were prepared in the kitchen.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>



**Q30**

In addition to the strategies mentioned above, what other strategies are used in your restaurant to prevent food allergy reactions?

**Q31**

How much do you agree or disagree with the following statements?

	Strongly Disagree	Disagree	Somewhat Disagree	Neither Agree nor Disagree	Somewhat Agree	Agree	Strongly Agree
It is the customer's responsibility to prevent food allergy reactions in restaurants.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
It is the restaurant management staff's responsibility to prevent food allergy reactions.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
It is the restaurant service staff's responsibility to prevent food allergy reactions.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
It is the restaurant kitchen staff's responsibility to prevent food allergy reactions.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Please choose "Strongly Disagree" for this question.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
It is the customer's responsibility to initiate communication with restaurant staff if the customer has food allergies.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
It is the restaurant server's responsibility to initiate communication with customers if the customer has food allergies.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
It is the restaurant server's responsibility to handle allergen-free requests.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
It is the restaurant management's responsibility to handle allergen-free requests.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

**Q32**

Of those individuals listed below, rank the following parties from "1" being the most responsible party for preventing food allergy reactions in restaurants to "4" being the least responsible party.

- \_\_\_\_\_ Customers with food allergies
- \_\_\_\_\_ Restaurant managerial staff
- \_\_\_\_\_ Restaurant service staff
- \_\_\_\_\_ Restaurant kitchen staff

**Q33**

Eight major food allergens are responsible for 90% of food allergy reactions in the U.S. From the list on the left, please drag the Big 8 food allergens into the box on the right.

Eight major food allergens	
_____	• Peanut
_____	• Beef
_____	• Corn
_____	• Tree nuts
_____	• Fish
_____	• Gluten
_____	• Milk
_____	• Wheat
_____	• Shellfish
_____	• Soy
_____	• Eggs
_____	• Sesame
_____	• Buckwheat
_____	• Herbs (basil, thyme, chives, rosemary, etc.)
_____	• MSG
_____	• Strawberries

**Q34**

Please select the option that reflects your opinion about each of the following statements.

	False	Maybe false	Don't know	Maybe true	True
Food allergy reactions happen when the body's immune system reacts negatively to a food.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Food allergy reactions can only be triggered when customers consume (eat) allergenic foods.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
A person can die from a food allergy reaction.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Modern medicine can cure food allergies.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Gluten intolerance is the same as wheat allergy.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Gluten intolerance can be extremely life threatening.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
If a person has a milk allergy, removing cheese from an already-assembled deli sandwich will prevent a food allergy reaction.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Cooking food to the right internal temperature can kill food allergens.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Federal law requires only the eight major food allergens to be listed on the food labels.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

**Q35**

Please drag the possible symptoms of food allergy reactions from the list on the left into the box on the right.

Symptoms of food allergy reactions	
_____	• Anaphylaxis
_____	• Asthma
_____	• Bleeding
_____	• Vomiting
_____	• Headaches
_____	• Hives/rashes
_____	• Kidney failure
_____	• Facial swelling
_____	• Swelling of throat
_____	• Tingling sensation in or around the mouth
_____	• Loss of appetite
_____	• Shortness of breath
_____	• Fever

**Q36**

Please indicate your highest level of education you have completed:

- Less than high school degree (1)
- High school diploma or GED (2)
- Associate's Degree (3)
- Bachelor's Degree (4)
- Graduate Degree (5)

**Q37**

Please indicate your gender:

- Male (1)
- Female (2)
- Decline to answer (3)

**Q38**

How many years have you been employed in the restaurant industry?

**Q39**

How many years have you been employed as a service staff in the current restaurant where you work?

**Q40**

Which of the following food safety certification do you currently have? (Check all that apply)

- ServSafe Certification
- ServSafe Allergens Certification
- State-sponsored food handler certificate
- I do not have any food safety certification
- Other (please specify): \_\_\_\_\_

**Q41**

Please indicate the approximate number of seats in your restaurant, if you know.

**Q42**

Do you have a food allergy?

- Yes.
- No.