

FOOD DEFENSE MANAGEMENT PRACTICES IN PRIVATE COUNTRY CLUBS

by

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M.S., Iowa State University, Ames, Iowa, 2004

AN ABSTRACT OF A DISSERTATION

submitted in partial fulfillment of the requirements for the degree

DOCTOR OF PHILOSOPHY

Department of Hospitality Management and Dietetics  
College of Human Ecology

KANSAS STATE UNIVERSITY  
Manhattan, Kansas

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## **Abstract**

The purpose of this study was to survey country club professionals' importance perceptions of food defense and the frequency with which preventive practices were implemented in their clubs to prevent bioterrorism. Gaps between importance perceptions and practice frequency were compared with concern of food terrorism and practice frequency implementation. Perceived self-efficacy measures and perceived barriers were compared with motivations to develop a food defense management plan and practice frequency implementation. Importance perceptions and practice frequencies were studied to ascertain if there were differences among operational factors. Club professionals with smaller gaps implemented preventive practices more frequently. Club professionals with higher self-efficacy levels were more motivated to develop food defense management plans and implemented preventive practices more frequently. Club professionals with higher barriers were less motivated to develop food defense management plans and implemented preventive practices less frequently.

The field study component investigated food security practices in private country clubs. Club manager interviews and observations of operational practices were conducted. Most club managers stated that they did not think their clubs were at risk of a bioterrorist attack. Cost and lack of need were identified as barriers towards implementing a food defense management plan. Club employees were perceived to be more likely to initiate a bioterrorism attack than non-employees. Background checks and good employment practices were perceived as effective in increasing food security in clubs. Most clubs did not monitor arrivals and over half did not secure their chemicals. Based on the results of the field study, the researcher recommended several actions that could improve food security in country clubs including installing video surveillance and developing disaster management plans that include food defense. Recommendations for future research included continued examination of club managers' self-efficacy perceptions towards biosecurity and identifying barriers to food defense implementation in other retail foodservice segments.

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Approved by:

Major Professor  
Carol W. Shanklin

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# CHAPTER 1 - Introduction

## Overview of Bioterrorism

The turn of the millennium not only ushered in a new century, but also new concerns about the way we view threats to the safety and security of the food supply in the United States (U.S.). Following the terrorist attacks on New York City and the Pentagon in 2001, funding for counterterrorism was increased and as a result, the safety and security of the food supply received increased attention and priority (Rasco & Bledsoe, 2005). Historically, food safety in the U.S. has focused primarily on unintentional and accidental contamination of food and water. The food and water supply can be threatened in several ways: (1) food safety and sanitation, (2) food ingredients (imported food, genetically modified organisms, allergenic foods) or (3) disasters. Food ingredient issues are monitored and well-controlled by government agencies. Food safety and sanitation within foodservice operations are also regulated and inspected by governmental officials. Unfortunately, foodservice operators, the foodservice industry, and the U.S. government are not thoroughly prepared for threats in the form of disasters. These disasters can be classified as natural (such as fire, flood, tornado, earthquake, hurricane, or volcanic activity) or intentional (such as terrorism) (Bryant, McEntire, & Newsome, 2005; Hollingsworth, 2002; Rasco & Bledsoe, 2005) .

The United States Department of Agriculture (USDA) defines *bioterrorism* as the “intentional use of biological or chemical agents for the purpose of causing harm” (United States Department of Agriculture Food and Nutrition Service, 2004). *Food biosecurity* is defined by the USDA as the “protection of food from bioterrorism” (United States Department of Agriculture Food and Nutrition Service, 2004). *Security* in restaurants and other foodservice operations previously meant keeping customers safe from violent or criminal acts (National Restaurant Association Educational Foundation, 2003). However, in the national context of heightened awareness of terrorist activity in the U.S., *food security* is now defined by the National Restaurant Association (NRA) as “preventing or eliminating the deliberate contamination of food” (National Restaurant Association Educational Foundation, 2003). Furthermore, the term “food biosecurity” may also be referred to as “food security” by some governmental agencies (United States Department of Agriculture Food and Nutrition Service, 2004). It is also important

to make the distinction between *food safety* and food security. Food safety refers to food that may be accidentally contaminated, whereas food security addresses the purposeful contamination of food intended to harm people and disrupt society (National Restaurant Association Educational Foundation, 2003).

Opportunities for bioterrorist activities exist along the food supply chain, from agricultural production to consumption of food, commonly referred as “farm to fork” or “farm to table” (Dictionary.com's 21st Century Lexicon, 2010). Examples of food biosecurity research include: food production and processing (Bledsoe & Rasco, 2002; Bledsoe & Rasco, 2003; Brandt, Sanderson, DeGroot, Thomson, & Hollis, 2008), modeling of the food supply (Wein & Liu, 2005), (Arnon et al., 2001), threats to U.S. agriculture (Crutchley, 2007; Franz, 2005; Sanderson & Gnad, 2002), law enforcement (Knowles et al., 2005), and school and hospital foodservice (Yoon & Shanklin, 2007a; Yoon & Shanklin, 2007b; Yoon & Shanklin, 2007c).

Food security threats may affect any portion of the food supply chain and may be centered upon certain foods, production processes, or businesses producing food products (National Restaurant Association Educational Foundation, 2003). Individuals who intentionally commit criminal acts by contaminating or harming food products may be referred to as *aggressors* (AIB International, 2006). Aggressors can be: *protestors* (those who bring attention to their causes), *subversives* (saboteurs and spies), *disgruntled insiders* (unhappy employees), *criminals* (individuals purposely causing harm), and terrorists (well-organized groups with political or other agendas) (AIB International, 2006). For the purposes of this study, aggressors will be referred to as terrorists, bioterrorists, or food bioterrorists. Bioterrorists who may knowingly contaminate food may also include: business competitors, people posing as customers, vendors, “copycat” individuals, and anyone with an agenda or cause (National Restaurant Association Educational Foundation, 2003). Motivations of terrorists can include: political/ideological, creating chaos, revenge/retribution, financial benefit, thrill-seeking, notoriety, attention/publicity, humor/prank, and obtaining a competitive advantage (AIB International, 2006).

There has been significant bioterrorism research conducted of the production and transportation of food, but research regarding the preparedness of the commercial foodservice segment is minimal at best (Yoon & Shanklin, 2007c). Food bioterrorism research within the foodservice industry must not be ignored. Governmental agencies, such as the Centers for

Disease Control and Prevention (CDC), the Federal Bureau of Investigation (FBI), and the Food and Drug Administration (FDA), have recommended foodservice professionals monitor the security of the food supply from production to consumption (farm to fork) (Peregrin, 2002).

Past examples of food bioterrorism illustrate the need for proactive and preventive food defense practices. In 1984, the Rajneeshee religious cult attempted to alter the results of an Oregon county election. An estimated 751 people were affected when cult members contaminated local restaurants' salad bars with *Salmonella* Typhimurium (AIB International, 2006). In 1996, twelve laboratory employees of a Texas hospital were intentionally infected with pastries containing a rare diarrhea-causing strain of *Shigella dysenteriae*. Although there were no fatalities, four employees required hospitalization and five other employees were treated in the hospital emergency room. A co-worker was identified as the person responsible for intentionally infecting fellow laboratory employees with *Shigella*. This individual was found guilty on five felony assault charges and sentenced to twenty years in prison (Carus, 2002). In January 2003, 148 people in Michigan became ill after consuming ground beef purchased at a supermarket. After a lengthy investigation, it was determined that a disgruntled supermarket employee had intentionally contaminated 200 pounds of ground beef with insecticide (CDC, 2003). In August 2009 at a Mexican restaurant in Lenexa, Kansas, 48 people became ill after consuming salsa that was intentionally contaminated with Methomyl, a highly-toxic pesticide used for fruit, vegetable, and field crops. One current and one former employee (a husband and wife duo) of the restaurant were both charged with conspiracy to tamper with a consumer product, citing revenge against the restaurant owner (a family relative of the couple) as motivation (United States Department of Justice, 2010).

Foodservice operators must be informed of the potential risks and threats posed by bioterrorism as they are the final control point on the food supply chain. Developing a food security management plan that specifies how to implement preventive practices should be the most direct and efficacious method to minimize the threat of bioterrorism to a foodservice operation (Bledsoe & Rasco, 2002; United States Department of Agriculture Food and Nutrition Service, 2004).



## **The Foodservice Industry**

The preparation and consumption of wholesome food, either at home or away from home, is essential to human survival. Forty-nine cents of every food dollar is spent away from home in the U.S, in a restaurant or another establishment serving food (National Restaurant Association, 2010). Professional preparation and service of food and beverages to others (hereafter referred to as foodservice) is an important and vital part of daily life, with the restaurant industry serving an estimated 130 million people daily in 2010 (National Restaurant Association, 2010). The restaurant industry will serve an estimated 70 billion meals and snacks in 2010, employ a projected 12.7 million people (9% of the U.S. workforce), and generate an estimated \$580 billion in revenues (National Restaurant Association, 2010).

Foodservice operations are ubiquitous in the U.S., offering people a place to socialize with one another, to restore their energy levels, and to relax (Walker, 2009). Foodservice operations are commonly classified into two segments: commercial or onsite (noncommercial) foodservices (Spears & Gregoire, 2007). Onsite foodservice operations include: hospitals, schools, child care, senior care, military, correctional, and employee feeding (Spears & Gregoire, 2007). Commercial foodservice includes convenience stores and many types of restaurants, including: fast food, full-service, casual and fine dining, hotel and motel, and airport restaurants. Restaurants may also be located in museums, aboard cruise ships, in zoos and museums, at sporting arenas and events, and in private country clubs.

## **Private Country Clubs**

In 2008, there were about 6,000 private country clubs in North America. These clubs represented extensive financial assets, employed thousands of individuals, and provided an economic impact in the billions of dollars annually (Walker, 2009). Country clubs are exclusive and cater to the affluent, with initiation fees charged to new members as high as \$250,000 (Walker, 2009). All country clubs provide some form of food and beverage service, which is important for creating positive impressions in the minds of club members and their guests (Perdue, 2007). Country clubs employ many foodservice workers and hire seasonal employees to meet peak demands in a club's business, such as the busy summer and holiday seasons. Turnover among foodservice workers can reach approximately 300%, thus background checks are considered cost-prohibitive by many club managers (Aziz, Goldman, & Olsen, 2007). Because

country clubs are often exclusive and cater to wealthy and influential members of society, they could be selected as potential targets by would-be terrorists (Ehrlich & Liu, 2002). A bioterrorist attack upon a country club's food supply could be carried out by a foodservice employee or someone who has access to the operation with the potential to harm hundreds of club members, their families, and their guests.

### **Statement of Problem**

Foodservice professionals need to be aware of the risks of food bioterrorism as they are responsible for managing the final control point in the food supply chain. Most foodservice operations have crisis management plans in place to deal with natural disasters and workplace emergencies. Unfortunately, these crisis management plans do not properly address how to manage intentional contamination of an operation's food or water supply. All foodservice operations are recommended to secure their food supplies, and particularly those that serve high-risk individuals, such as children, seniors, and patients (Yoon & Shanklin, 2007c). Foodservice operators need to update their crisis management plans to protect their customers and employees from the possibility of bioterrorism (Bledsoe & Rasco, 2002; Bruemmer, 2003; United States Department of Agriculture Food and Nutrition Service, 2004; Yoon & Shanklin, 2007a). Developing a food defense management plan that specifies how to implement preventive practices should be the most direct and efficacious method to minimize the threat of bioterrorism to a foodservice operation (Bledsoe & Rasco, 2002; United States Department of Agriculture Food and Nutrition Service, 2004).

U.S. governmental agencies and some foodservice operations (e.g. public school foodservice) are aware of the importance of preventive practices taken against bioterrorism (United States Department of Agriculture Food and Nutrition Service, 2004). Past research has studied bioterrorism perceptions and preventative practices in school foodservice and hospital foodservice operations (Yoon & Shanklin, 2007a; Yoon & Shanklin, 2007b; Yoon & Shanklin, 2007c). However, very little is currently known about club professionals' perceptions of the importance of these preventive practices and the frequency with which these preventive practices are used in country club foodservice operations. Club professionals' perceived self-efficacy is their belief in their own capabilities to plan and implement necessary actions to effectively deal with events in their country club and should be explored. Club professionals' perceived barriers

to implementing a biosecurity plan and implementing preventive practices should also be studied.

## **Purpose and Objectives**

This operational research investigated club professionals' perceptions of the risk of bioterrorism to foodservice in their country clubs and the frequency with which specific practices to prevent bioterrorism were implemented. Perceptions of importance, frequency of practice of specific preventative measures, gaps between perceived importance and specific practice frequencies, perceived self-efficacy to develop a food security management plan, perceived self-efficacy to implement preventive practices, perceived barriers to develop a food security management plan, and perceived barriers to implement preventive practices were measured in county club foodservice establishments.

The primary purpose of this study was to examine country club professionals' importance perceptions of securing their foodservice operations against a food terrorism attack and the perceived preventative practices that could be implemented to counter such an attack. Gaps between importance perceptions and the frequency of perceived preventative practices were examined to determine if there was a relationship with club professionals' concern about food terrorism and how often preventive practices were implemented in their clubs. Perceived self-efficacy measures and perceived barriers were studied to assess if there was a relationship with club professionals' motivation to develop a food defense management plan and the frequency to which preventive practices were implemented in private country clubs. Demographic characteristics were compared with importance perceptions and frequency of practices.

### The specific objectives of this operational research were:

1. to identify club professionals' perceptions of the importance of food defense and food security in their private country clubs;
2. to determine club professionals' self-reported preventative practices used to counter food bioterrorism in their club;
3. to measure the gap between club professionals' perceptions of importance of food defense and food security in their country club and their self-reported preventative practices used to counter food bioterrorism in their club;

4. to observe the frequency of preventive practices used to counter food bioterrorism in selected country clubs;
5. to measure the gap between club professionals' perceptions of importance of food defense and food security in their country club and the observed frequency of preventive measures against food terrorism practiced in country clubs;
6. to assess club professionals' perceived self-efficacy to develop a management plan related to food defense;
7. to assess club professionals' perceived self-efficacy to implement preventive practices in country clubs;
8. to assess club professionals' perceived barriers to develop a management plan related to food defense; and
9. to assess club professionals' perceived barriers to implement preventive practices in country clubs.
10. to compare demographic characteristics and importance and frequency of practices.

### **Research Questions and Propositions**

The research questions guiding this dissertation were as follows:

1. What are club professionals' perceptions of the importance of facility security in their country clubs?
2. What are club professionals' perceptions of the importance of utility security in their country clubs?
3. What are club professionals' perceptions of the importance of employee management in their country clubs?
4. What are club professionals' perceptions of the importance of communication in their country clubs?
5. What are club professionals' perceptions of the importance of food handling in their country clubs?
6. What are club professionals' perceptions of the importance of chemical use and storage in their country clubs?
7. To what frequency are the items mentioned in research questions 1 – 6 practiced in these country clubs as reported by the club professionals?

8. To what frequency are the items mentioned in research questions 1 – 6 practiced in these country clubs as directly observed through an onsite visit in these country clubs?
9. Are club managers' levels of concern about biosecurity in their operations affected by the gaps between importance and the frequency of practice in research questions 1 – 6?
10. What level of perceived self efficacy do club professionals possess to develop a management plan related to food defense?
11. What level of perceived self efficacy do club professionals possess to implement preventive practices to deal with items mentioned in research questions 1 – 6?
12. What perceived barriers exist that could prevent club professionals from developing a food defense management plan?
13. What perceived barriers exist that could prevent club professionals from implementing preventive practices to deal with items mentioned in research questions 1 – 6?
14. What differences among demographic characteristics exist in comparison with importance and frequency of practices?

The gap between the perception of the importance of preventive practices and actual practice frequency was evaluated to see if risk perception was affected by the size of the gap. By using the size of gaps, the study elucidates which preventive measures should receive more attention in training materials or bulletins. When club professionals are more concerned about food bioterrorism and biosecurity, a smaller gap between importance perception and practice frequency should occur because club professionals are then more likely to perform the preventive practices frequently. Gap analysis was used in two prior food biosecurity research studies measuring importance perceptions and practice frequencies (Yoon & Shanklin, 2007a; Yoon & Shanklin, 2007b).

Club professionals' self-efficacy is their belief in their own capabilities to plan and implement necessary actions to effectively deal with events in their country club. Club professionals with higher levels of perceived self-efficacy should be more motivated to develop food defense management plans and implement preventive practices in their country clubs than club professionals with lower levels of perceived self-efficacy. Conversely, club professionals with higher numbers of perceived barriers should be less motivated to develop food defense management plans and implement preventive practices in their country clubs than club professionals with lower numbers of perceived barriers.

Based on this reasoning, six research propositions were investigated:

Proposition 1: Club professionals with smaller gaps between importance perception and practice frequency are more concerned about food terrorism and biosecurity than operators with larger gaps.

Proposition 2: Club professionals with smaller gaps between importance perception and practice frequency implement preventive practices more frequently than operators with larger gaps.

Proposition 3: Club professionals with higher levels of perceived self-efficacy are more motivated to develop a food defense management plan in their country clubs than club professionals with lower levels of perceived self-efficacy.

Proposition 4: Club professionals with higher levels of perceived self-efficacy implement preventive practices more frequently than club professionals with lower levels of perceived self-efficacy.

Proposition 5: Club professionals with higher numbers of perceived barriers are less motivated to develop a food defense management plan in their country clubs than club professionals with lower numbers of perceived barriers.

Proposition 6: Club professionals with higher numbers of perceived barriers implement preventive practices less frequently than club professionals with lower numbers of perceived barriers.

### **Significance of the Study**

Research pertaining to the readiness of foodservice operations to protect themselves against food bioterrorism is limited; previous research focused on food bioterrorism in school and hospital foodservices (Yoon & Shanklin, 2007c). More research in the commercial foodservice segment (including country clubs) is needed to expand the knowledge base and to explore strategies in protecting customers of foodservice establishments.

In 2008, there were over 14,000 private clubs in North America (6,000 of which are country clubs) that employed thousands and had an annual economic impact in the billions of dollars (Walker, 2009). All country clubs serve food and beverages which could potentially be used to deliver biological, chemical, or physical agents and harm club members (Perdue, 2007). An assessment of the perceived risks of food bioterrorism, the practices in place to counter

bioterrorism, and the motivations to establish and implement a food defense management plan within country clubs serves to benefit club members and their families, their guests, and the employees of country clubs.

In addition to building upon the existing body of literature regarding food defense in foodservice operations, country club specific data was gathered. No research was found that investigated bioterrorism in country clubs. Results from this study could be used to help protect patrons of country clubs and to better plan for important club events, where heightened security may be needed. Information gathered can be used to update or modify existing crisis management plans and improve country clubs' ability to respond to traumatic events. Results of this study could be used to recommend bioterrorism-specific items for country clubs to include while revising plans and procedures for communicating with emergency responders and the media. In addition, information can be compared with former food defense research studies in hospitals and school foodservice and analyzed for commonalities that could be generalized to other foodservice operations. Items common in all foodservice operations, such as deliveries, vendors, employee training, facility security, storage, and food production procedures, can all be better studied for universal improvements in food security.

### **Definition of Terms**

**Centers for Disease Control and Prevention (CDC):** The Centers for Disease Control and Prevention is the main agency for managing public health in the U.S. CDC's primary mission is to protect the health of all people through promotion, prevention, and preparedness. CDC also manages terrorism and emergency response preparedness (CDC, 2008b).

**Food Biosecurity (aka Food Defense or Food Security):** Food biosecurity includes all policies, procedures, and activities used to ensure that food is safe from bioterrorism (United States Department of Agriculture Food and Nutrition Service, 2004).

**Bioterrorism:** Bioterrorism involves using dangerous biological agents or chemicals to purposely inflict damage upon society (United States Department of Agriculture Food and Nutrition Service, 2004).

**Food Bioterrorism (aka Food Terrorism):** Food bioterrorism is the use of physical, chemical, radionuclear, or biological substances to deliberately contaminate food to harm people and disrupt communities (WHO, 2002).

**Food Biosecurity Management Plan (aka Food Defense Management Plan or Food Security Management Plan):** A food biosecurity management plan helps foodservice operators strategize to counter the threat of food bioterrorism to their operation. It contains the written policies and procedures that help to decrease the risk of contaminated food served in a foodservice operation harming others (United States Department of Agriculture Food and Nutrition Service, 2004).

**Biological Agents (used in Bioterrorism):** Examples of biological agents that could be used in bioterrorism include: Anthrax, Bubonic Plague, Cholera, *Salmonella*, Typhoid, *Shigella*, *Listeria*, Botulism, *Staphylococcus*, Smallpox, Ricin, Aflatoxins. Bacteria, toxins, viruses, parasites, etc. are examples of biological agents that can be delivered in the form of liquids, aerosols, or solids (Rasco & Bledsoe, 2005).

**Chemical Agents (used in Bioterrorism):** Examples of chemical agents that could be used in bioterrorism include: chemical warfare agents (nerve, blister, blood, and choking agents) and toxic industrial chemicals (pesticides, rodenticides, and heavy metals). These can be delivered as airborne droplets, liquids, aerosols, or solids (Rasco & Bledsoe, 2005).

**Physical Agents (used in Bioterrorism):** Physical materials that could cause harm if ingested such as bone slivers, glass fragments, and metal filings (Rasco & Bledsoe, 2005).

**Radiological Agents (used in Bioterrorism):** Radioactive elements that can be delivered in liquid or solid form (Rasco & Bledsoe, 2005).

**General Manager (GM) of a Private Club:** A GM of a private club is hired by a club's board of directors and is in charge of club operations and upholding policies established by the board. In addition, the GM is responsible for the financial health of the club and for ensuring quality control in providing services and facilities to club members. The GM also prepare the club's annual budget, oversees all club renovations, and supervises all department heads and club professionals (Perdue, 2007).

**Private Club:** A private club is an exclusive organization comprised of selected individuals (club members) with some kind of common bond (backgrounds, experiences, professions, interests, etc.). Furthermore, a private club also refers to the physical location in which the club members gather to socialize or enjoy recreational activities. Typically, an individual must be approved for membership to a private club and upon approval, an initiation fee is required. Although there are many types of private clubs, food and beverage service is



almost certainly offered at all private clubs. Once approved, members usually pay monthly membership dues and/or must meet monthly spending requirements (usually on food and beverages). Private clubs cater to affluent and influential individuals, their families, and their guests. A private club may be viewed as an exclusive group of wealthy and powerful individuals and thus may attract unwanted attention from non-members (Perdue, 2007).

**Self-Efficacy:** Self-efficacy is an individual's belief in their own abilities to plan and carry out necessary actions to effectively deal with events as they occur (Bandura, 1995).

**Operations Research:** Operations (or operational) research is also known as management science and uses quantitative methods to find solutions to difficult problems. For this study, operational research will be used to examine bioterrorism risks to country club operations and the systems in place to defend those operations against bioterrorism (Wikipedia, 2009b).

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## **CHAPTER 2 - Literature Review**

### **Food Terrorism, Food Biosecurity, and Bioterrorism**

Although it is difficult to pinpoint exactly when terrorism started, terrorism is believed to have originated around 2,000 years ago. The main driving force behind historical terrorism was religion, which began in the first century A.D. and has continued to some degree into the modern day (Center for Defense Information, 2003). The word “terrorism” itself was derived from the French word “terrorisme” during the Reign of Terror (regime de la terreur) in the French Revolution from 1793-1794 (Center for Defense Information, 2003; Harper, November, 2001). Approximately 40,000 people were executed by guillotine while the regime de la terreur was used as an official instrument of the state to protect and consolidate the powers of the newly-formed French government. However, this led to backlash and further bloodshed, and the word “terrorize” (to coerce or deter by terror) took on a negative meaning when it was first recorded as such in English in 1823. Acts which could be regarded as terrorist activities were first recorded in the United States during the Civil War. In addition, Anarchist-related terrorism was active throughout the 1880s in the U.S. and continued into the 20<sup>th</sup> Century with organized groups such as the Ku Klux Klan (Center for Defense Information, 2003; Harper, November, 2001).

Modern terrorism generally employs the use of weapons, with (in descending popularity) the use of such items as bombs, guns, knives and other bladed weapons, remote control bombs, fire, chemical and biological weapons, and unknown or unspecified weapons (Bogen & Jones, 2006). Worldwide terrorism resulted in 86,568 casualties and 25,408 deaths from 1968 to 2004 in 19,828 documented terrorist events and 7,401 adverse events. Bogen and Jones (2006) projected that these numbers will increase in the future, with an upward trend in the number of deaths, injuries, and terrorist events.

The Federal Emergency Management Agency (FEMA) defines terrorism as “the use of force or violence against persons or property in violation of the criminal laws of the United States for purposes of intimidation, coercion, or ransom” (FEMA, 2006). According to FEMA (2006), terrorists use threats to strike fear into society, attempt to convince citizens that the government is unable to control terrorism, and draw attention to terrorists’ causes. Types of

terrorist acts may include bombings and bomb scares; the use of biological, chemical, nuclear and radiological weapons; cyber attacks; kidnappings; hijackings; assassinations and terrorist threats (FEMA, 2006). Targets at-risk for terrorist attacks include airports, military facilities, high-profile landmarks, water and food supplies, corporate centers, utilities, and large cities. In addition, terrorists may choose to send chemical or biological materials as well as explosives through mail delivery systems, creating fear and uncertainty in the process (FEMA, 2006).

Bombs and explosive devices are the most commonly used weapons by terrorists (Bogen & Jones, 2006; FEMA, 2006). With information readily available in books and from other sources, coupled with easy access to materials commonly found in hardware and variety stores, explosive devices can be easily constructed. Furthermore, explosive devices are portable and may be transported using a variety of vehicles, including human beings. The ease of detonation from remote control or by suicide bombers is appealing to terrorists. The damage from these explosive devices can effectively destroy social, political, religious, and financial institutions. In addition to buildings, terrorist attacks have occurred on city streets and in public places, which has resulted in thousands of people killed or injured worldwide (FEMA, 2006).

The Al-Qaeda terrorist attacks against high-profile U.S. landmarks on September 11, 2001 were witnessed by a worldwide television audience. These attacks used commercial passenger jets as explosive devices, and grimly demonstrated how terrorism could effectively strike fear within society. The attacks upon the World Trade Center in New York City, the Pentagon in Washington D.C., and the hijacked American Airlines Flight 77 claimed 3,056 lives, with a combined 100% fatality rate (Bogen & Jones, 2006). Following September 11<sup>th</sup>, letters containing anthrax spores were mailed to multiple news media offices and two U.S. Senators. This resulted in 17 Americans becoming ill and five died, becoming the worst case of biological terrorism in U.S. history (FBI, 2008). Despite these acts of bioterrorism being limited to a few selected targets, millions of U.S. citizens became uneasy with the simple act of opening the mail, a potentially dangerous undertaking (Hall, Norwood, Ursano, & Fullerton, 2003).

Since 2001, governmental agencies and international organizations have substantially increased their efforts to address bioterrorism. According to the World Health Organization, governments and companies cannot ignore the potential for biological attacks upon their organizations (WHO, 2002). Taking intelligent precautions, along with effective surveillance and

response capability, are the best first lines of defense to counter bioterrorism and food safety emergencies (WHO, 2002).

### ***Motivation of Terrorists***

Individuals using food as a vehicle for terrorist activities likely have multiple motivations for doing so. Intentional contamination of the food chain could potentially have significant social, political, economic, and public health consequences (Crutchley, 2007). Perpetrators of food terrorism may come from groups that initially have some degree of support from the public. However, trends indicate that terrorists generally come from disenfranchised groups and they may not perceive facts as important in dissuading their terrorist activities (Rasco & Bledsoe, 2005). Terrorists' motivation can be political, economic, or malicious mischief. Many individuals initiating food terrorism may have initially been good-intentioned activists whose actions have gone bad from various causes, such as environmental, consumer protection, animal rights movements, or political anarchists (Rasco & Bledsoe, 2005).

Other motivations of activists include those who fear social progress, innovation, or technology. Mainstream activist groups dedicated to peaceful and reasonable means of operation may unknowingly (or anonymously) harbor members who unofficially form “spin-off” terrorist cells. Religious groups may also spawn loosely-organized, anonymous networks in order to promote various political causes. The main and common issue with the aforementioned groups is money. What appear to be normal operating funds coming from legitimate organizations may be diverted for the purposes of undertaking terrorist/extremist activities (Rasco & Bledsoe, 2005).

According to Stern (1999), conflicting ideologies between civilizations provides the primary reason for people to join organizations such as Al-Qaeda. Rasco and Bledsoe (2005) argue that those in the U.S. are unfortunately “naïve in assuming that all rational people share beliefs regarding the relative importance of rights and responsibilities between citizens and the state, the extent of governmental liberty and scope of governmental authority, and the equality of individuals regardless of gender, race, ethnic origin, or religious belief.” Terrorist groups driven by religious motivations have become more prevalent and threaten Western society by using more sophisticated methods, which may include biological and chemical agents (Stern, 1999). Rasco and Bledsoe (2005) noted that the terrorist threat against food production, processing, and research is increasing.



Terrorists in the U.S. may also be motivated to some extent by the free society in which they operate (Franz, 2005). The ease of carrying out a terrorist attack upon the food chain itself may also be a motivation. Ranching and farming in the United States are typified by open access to expanses of land lacking security (Franz, 2005). An agroterrorist attack upon the United States' unprotected heartland, a "soft" target so called for the ease of carrying out an attack, could significantly affect many elements of American life (Schmitt, 2007). Furthermore, large numbers of animals contained within a feedlot where security is minimal may also be a motivating factor for potential bioterrorists (Brandt et al., 2008).

### ***Repercussions from Bioterrorism Attacks***

To understand the potential impacts of intentionally contaminated food, one can observe the effects of unintentional foodborne illness upon the public due to poor food safety practices, both domestically and internationally. Between 1973 and 1999 in the U.S., a reported total of 15,831 foodborne illness outbreaks resulted in 447,483 cases of foodborne illness, 20,119 hospitalizations, and 457 fatalities (United States General Accounting Office, 2003). In 2008, 40,000 infants became ill and 13,000 infants were hospitalized with kidney problems from melamine-contaminated dairy products in China (FoodHACCP.com, 2008). In 1994, 224,000 people were infected with *Salmonella* Enteritidis from consuming tainted ice cream in the U.S. In 1991, nearly 300,000 people in China suffered an outbreak of hepatitis A due to contaminated clams; this may be the largest foodborne illness event in history (WHO, 2002). The Centers for Disease Control and Prevention (CDC) estimated that foodborne illnesses cause "approximately 76 million illnesses, 325,000 hospitalizations, and 5,000 deaths in the United States each year. Known pathogens account for an estimated 14 million illnesses, 60,000 hospitalizations, and 1,800 deaths...while unknown agents account for the remaining 62 million illnesses, 265,000 hospitalizations, and 3,200 deaths" (Mead et al., 1999).

The effect of foodborne illness upon public health services can be taxing, whether unintentional or not. Many countries simply do not have the resources to address the consequences during or after large-scale emergencies. Furthermore, a lack of readiness, coupled with potential difficulties in identifying uncommon pathogens, could yield inaccurate diagnoses. This would have a significant and adverse effect upon a public health organization to effectively respond to a large food sabotage event (WHO, 2002).

Terrorists may use bioterrorism to destabilize society and may have many motives for doing so. The goal of terrorism for the purpose of social and political disruption is to create an atmosphere of public fear and anxiety. This, in turn, may lead to a decreased confidence in the government, which may or may not result in political destabilization. If used in conjunction with attacks upon economic interests, the political effects can be magnified, especially during food shortages (WHO, 2002).

Prior to September 11<sup>th</sup> and the anthrax attacks, public health leaders and government agencies had not incorporated mental health management strategies as components of terrorism response plans (Becker, 2001; Hall, 2002). Since that time, predicting and understanding the behavioral and psychological repercussions from a terrorist attack has become an important task involving the U.S. healthcare system and government leaders (Hall et al., 2003).

### ***Biological and Chemical Agents used in Bioterrorism***

Bioterrorism as defined by the USDA is “the intentional use of biological and chemical agents for the purpose of causing harm” (United States Department of Agriculture Food and Nutrition Service, 2004). Bioterrorism utilizes biological or etiological toxins, agents, and diseases in the process of carrying out a terrorist act. The Federal Bureau of Investigation (FBI) has indicated that common household items can be utilized to create weapons that could contaminate food with biological or chemical agents. The manufacture of ricin, cyanide, and the cultivation of cultures such as *Salmonella* sp. and *Clostridium botulinum* toxin is possible by individuals with limited skill or training (CDC, 2008a; Rasco & Bledsoe, 2005).

According to Rasco and Bledsoe (2005), the ability to effectively contaminate food using biological and chemical agents depends upon several factors, including:

1. The potential impact upon plant, animal, or human health,
2. The type of the food material to be contaminated,
3. The ease of detection of contamination when discernable changes in flavor, appearance, or odor of the given food have occurred,
4. The entry point when contamination is introduced into a given food supply,
5. The opportunity for widespread contamination, and
6. The level of fear that people perceive in relation to the toxic agent or food itself (Rasco & Bledsoe, 2005).

**Table 1: Categorical Definitions and Examples of Bioterrorism Agents and Diseases (A, B, and C) by the Centers for Disease Control and Prevention.**

<b>Category A definition:</b>	<b>Category B definition:</b>	<b>Category C definition:</b>
<p>The U.S. public health system and primary healthcare providers must be prepared to address various biological agents, including pathogens that are rarely seen in the United States. High-priority agents include organisms that pose a risk to national security because they</p> <ul style="list-style-type: none"> <li>• can be easily disseminated or transmitted from person to person;</li> <li>• result in high mortality rates and have the potential for major public health impact;</li> <li>• might cause public panic and social disruption; and</li> <li>• require special action for public health preparedness.</li> </ul> <p><u>Agents/Diseases</u></p> <p>Anthrax (<i>Bacillus anthracis</i>)</p> <p>Botulism (<i>Clostridium botulinum</i> toxin)</p> <p>Plague (<i>Yersinia pestis</i>)</p> <p>Smallpox (<i>Variola major</i>)</p>	<p>Second highest priority agents include those that</p> <ul style="list-style-type: none"> <li>• are moderately easy to disseminate;</li> <li>• result in moderate morbidity rates and low mortality rates; and</li> <li>• require specific enhancements of CDC's diagnostic capacity and enhanced disease surveillance.</li> </ul> <p><u>Agents/Diseases</u></p> <p>Brucellosis (<i>Brucella</i> species)</p> <p>Epsilon toxin of <i>Clostridium perfringens</i></p> <p>Food safety threats (e.g., <i>Salmonella</i> species, <i>Escherichia coli</i> O157:H7, Shigella)</p> <p>Glanders (<i>Burkholderia mallei</i>)</p> <p>Melioidosis (<i>Burkholderia pseudomallei</i>)</p>	<p>Third highest priority agents include emerging pathogens that could be engineered for mass dissemination in the future because of</p> <ul style="list-style-type: none"> <li>• availability;</li> <li>• ease of production and dissemination; and</li> <li>• potential for high morbidity and mortality rates and major health impact.</li> </ul> <p><u>Agents/Diseases</u></p> <p>Emerging infectious diseases such as Nipah virus and hantavirus</p>

<p>Tularemia (<i>Francisella tularensis</i>)</p> <p>Viral hemorrhagic fevers (filoviruses [e.g., Ebola, Marburg] and arenaviruses [e.g., Lassa, Machupo])</p>	<p>Psittacosis (<i>Chlamydia psittaci</i>)</p> <p>Q fever (<i>Coxiella burnetii</i>)</p> <p>Ricin toxin from <i>Ricinus communis</i> (castor beans)</p> <p>Staphylococcal enterotoxin B</p> <p>Typhus fever (<i>Rickettsia prowazekii</i>)</p> <p>Viral encephalitis (alphaviruses [e.g., Venezuelan equine encephalitis, eastern equine encephalitis, western equine encephalitis])</p> <p>Water safety threats (e.g., <i>Vibrio cholerae</i>, <i>Cryptosporidium parvum</i>)</p>	
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Note that the entire content of this table was directly quoted from: <http://www.bt.cdc.gov/agent/agentlist-category.asp>

Biological agents are either living microbes that cause infectious disease or the toxins created by microorganisms. Both microbes and toxins are capable of causing death or serious illness, and are highly specific for their targets (plants, animals, and people) (Rasco & Bledsoe, 2005). Biological agents are susceptible to issues regarding their controllability, including environmental conditions (air flow, temperature, and pH), the viability of each given strain, and secondary transmission of the biological agent to non-desirable targets (collateral damage).

Toxins, similar in nature to chemical agents, are capable of causing severe damage upon delivery. Biological toxins are extremely potent and are capable of death or damage at levels as miniscule as one to ten parts in one quadrillion. Furthermore, certain agents such as *Clostridium botulinum* and *Bacillus anthracis* may undergo sporification (spore formation), making them resistant to destruction and capable of persisting for extended periods of time in a variety of environments (Rasco & Bledsoe, 2005).

Living agents, generally microbes, are slower-acting than biological toxins or chemical agents. Infection occurs when microbes directly produce disease within the targeted host. Intoxication occurs when microbes grow within the targeted host and the toxins produced by the microbes causes debilitation. In both cases, microbes must endure digestion or inhalation and then survive until reaching the desired tissue, growing to numbers capable of causing illness or toxin production. Microbes (e.g. *Staphylococcus aureus*) can also grow within food, producing toxins that, when consumed, cause intoxication (Rasco & Bledsoe, 2005).

Depending upon the microorganism or toxin used, the effects of disease or intoxication can take anywhere from 30 minutes to several weeks to cause infection or intoxication. A delay between administering a biological agent until the first onset of symptoms might actually be desirable to perpetrators, giving them time to flee and confusing investigators of intentional food contamination incidents. In addition, symptoms of foodborne intoxication and infection can be misdiagnosed, especially if an uncommon microbe, fungus, or biological toxin is used or the time of initial contact is unknown or falsely reported (Rasco & Bledsoe, 2005).

Those intent upon spreading disease can use virtually any naturally-occurring pathogens as agents of intentional contamination (Berns, Atlas, Cassell, & Shoemaker, 1998). Bioterrorism agents and diseases have been categorized by the CDC into three categories (A, B, and C), based upon how easily they may be spread and the severity of illness and morbidity of which they cause. Detailed information regarding the three categories is shown in Table 1 (CDC, 2008a).

Of primary concern is the Category A agent, *Clostridium botulinum*, the organism responsible for the most toxic compound produced by a biological system. One pure ounce of *Clostridium botulinum* toxin could potentially kill 200 million people (Fung & Goetsch, 2004). In 1991, the country of Iraq stated that they possessed 19,000 liters of botulinum toxin, which was calculated to be three times the amount needed to kill every human being on earth (Rasco & Bledsoe, 2005).

*Bacillus anthracis*, the microorganism that causes the Anthrax disease, is extremely stable and is 85% lethal if an infective dose (8,000-50,000 spores) is inhaled. Besides inhalation, *Bacillus anthracis* may also be ingested (25%-60% lethal) or transmitted through the skin (20% lethal), which can cause a wide variety of severe symptoms including fever, respiratory failure, lesions, abdominal pain, and meningitis. It has been estimated that in an urban population of 5 million inhabitants, 50 kg of anthrax spores released via aircraft (airborne dispersion) would kill approximately 100,000 people and sicken 250,000 more. If that amount were increased to 100 kg, 130,000 to 3 million deaths would occur, putting it on the same lethality level as that of a hydrogen bomb (Rasco & Bledsoe, 2005).

Smallpox is a contagious disease caused by the variola virus, with a fatality rate of up to 30%. Symptoms of smallpox disease include body aches, high fever, and vomiting. Rashes develop, which spread and become pus-filled blisters and raised bumps that crust, scab, and flake off in approximately three weeks, causing pitted scars. Just one confirmed case of smallpox is sufficient reason to declare a public health emergency. Smallpox is normally spread from person to person through face to face contact. However, smallpox is quite fragile and when administered via airborne dispersion, 90% of the smallpox die within 24 hours, with an even higher death rate in the presence of ultraviolet light (CDC, 2007b). Although smallpox was declared to be eradicated from the planet in 1980, there is still concern that smallpox may still exist and be able to be used as a bioweapon (CDC, 2002). In 2002, the Advisory Committee on Immunization Practices (ACIP) and the National Vaccine Advisory Committee (NVAC), both of whom advise and give recommendations to the Department of Health and Human Services (DHHS) and the CDC, reviewed recommendations for smallpox vaccinations. As a result of their joint efforts, the U.S. now has enough smallpox vaccine to vaccinate every one of its citizens (CDC, 2007d).

Plague, an infectious disease of humans and animals responsible for the death of millions in Europe during the Middle Ages, is caused by the *Yersinia pestis* bacteria generally transmitted

by fleas, and delivered by rodents (CDC, 2007a). Plague takes three forms: pneumonic, bubonic, and septicemic and has a 50%-90% mortality rate (15% if treated) (CDC, 2005b). Symptoms include high fever, toxemia, respiratory failure, malaise, gangrene, necrosis, and tender lymph nodes (Rasco & Bledsoe, 2005). A World Health Organization (WHO) study in 1970 found that if 50 kg of *Yersinia pestis* were released as an aerosol over a population of 5 million people, 150,000 persons would contract pneumonic plague and 36,000 of those individuals would be expected to die (Inglesby, Dennis, & Henderson, 2000).

Tularemia, caused by the microorganism, *Francisella tularensis*, produces chills, respiratory problems, cough, muscle ache, exhaustion, and swollen glands. During World War II, tularemia was studied by Japanese germ warfare scientists and may have been used in Manchuria as a biological weapon. During the same time period in Eastern Europe, tularemia outbreaks among tens of thousands of German and Soviet soldiers were suggested to be intentional by Ken Alibek, a former biological weapons agent from the Soviet Union (Dennis et al., 2001). Aerosol delivery systems for tularemia were developed in the U.S. during the 1950s and 1960s and were stored with the intention of military use. Although information regarding use of tularemia as a biological weapon in recent times is lacking, the threat cannot be dismissed. Economic estimates of an aerosol attack upon a population of 100,000 people exceed \$5 billion (Rasco & Bledsoe, 2005).

Hemorrhagic viruses are of concern as potential biological agents. These highly infectious viruses can be easily dispersed via aerosols and are highly contagious. In addition, these viruses have very low infective doses with high morbidity and mortality. Perhaps the most well-known of these viruses, Ebola, is 50%-90% lethal if not treated. Other examples of hemorrhagic viruses include filioviruses, Marburg, and arenaviruses such as Lassa and Machupo. The U.S. and the former USSR both developed hemorrhagic biological weapons and North Korea is rumored to have yellow fever-based weapons (Borio et al., 2002; Rasco & Bledsoe, 2005).

CDC Category B definitions represent bioterrorism agents and diseases with relatively lower morbidity and mortality rates which are less easily disseminated from person to person. Of particular notoriety is the ricin toxin, which can be rather simply extracted from the castor bean (*Ricinius communis*), for which there is no antidote. Furthermore, ricin toxin is extremely potent,

**Table 2: Categories of Potential Chemical Agents by the Centers for Disease Control and Prevention.**

<p><b>Biotoxins</b> (poisons that come from plants or animals)</p>	<p>Abrin; Brevetoxin; Colchicine; Digitalis; Nicotine; Ricin; Saxitoxin; Strychnine; Tetrodotoxin; Trichothecene</p>
<p><b>Blister Agents/Vesicants</b> (chemicals that severely blister the eyes, respiratory tract, and skin on contact)</p>	<p>Distilled mustard (HD); Mustard/lewisite (HL); Mustard/T; Nitrogen mustard (HN-1, HN-2, HN-3); Sesqui mustard; Sulfur mustard (H) (mustard gas); Lewisite (L, L-1, L-2, L-3); Mustard/lewisite (HL); Phosgene oxime (CX)</p>
<p><b>Blood Agents</b> (poisons that affect the body by being absorbed into the blood)</p>	<p>Arsine (SA); Carbon Monoxide; Cyanogen chloride (CK); Hydrogen cyanide (AC); Potassium cyanide (KCN); Sodium cyanide (NaCN); Sodium monofluoroacetate (compound 1080)</p>
<p><b>Caustics/Acids</b> (chemicals that burn or corrode people's skin, eyes, and mucus membranes on contact)</p>	<p>Hydrofluoric acid (hydrogen fluoride)</p>
<p><b>Choking/Lung/Pulmonary Agents</b> (chemicals that cause severe irritation or swelling of the respiratory tract [lining of the nose, throat, and lungs])</p>	<p>Ammonia; Bromine (CA); Chlorine (CL); Hydrogen chloride; Methyl bromide; Methyl isocyanate; Osmium tetroxide; Diphosgene (DP); Phosgene (CG); Phosphine; Phosphorus, elemental, white or yellow; Sulfuryl fluoride</p>
<p><b>Incapacitating Agents</b> (drugs that make people unable to think clearly or cause altered state of consciousness/unconsciousness)</p>	<p>BZ; Fentanyls &amp; other opioids</p>



<b>Long-Acting Anticoagulants</b> (poisons that prevent blood from clotting properly, which can lead to uncontrolled bleeding)	Super warfarin
<b>Metals</b> (agents that consist of metallic poisons)	Arsenic; Barium; Mercury; Thallium
<b>Nerve Agents</b> (highly poisonous chemicals that work by preventing the nervous system from working properly)	Sarin (GB); Soman (GD); Tabun (GA); V agents; VX
<b>Organic Solvents</b> (agents that damage the tissues of living things by dissolving fats and oils)	Benzene
<b>Riot Control Agents/Tear Gas</b> (highly irritating agents normally used by law enforcement for crowd control or by individuals for protection [for example, mace])	Bromobenzylcyanide (CA); Chloroacetophenone (CN); Chlorobenzylidenemalononitrile (CS); Chloropicrin (PS); Dibenzoxazepine (CR)
<b>Toxic Alcohols</b> (poisonous alcohols that can damage the heart, kidneys, and nervous system)	Ethylene glycol
<b>Vomiting Agents</b> (chemicals that cause nausea and vomiting)	Adamsite (DM)

Source: Rasco and Bledsoe (2005)

can be inhaled or ingested, and remains stable for several hours, making it a good candidate for bioterrorism (Rasco & Bledsoe, 2005).

CDC Category C definitions represent emerging pathogens that could be used in a bioterrorist attack due to their ease of production, availability, and likelihood of high morbidity and mortality rates. This includes emerging infectious diseases such as Nipah virus and hantavirus.

Another pathogen of concern is the H5N1 strain of the avian influenza A (bird flu) virus, transmitted from birds to humans. Avian influenza is an infectious disease, carried by birds and caused by type A strains of the influenza virus (CDC, 2007c; WHO, 2009). Many wild birds naturally carry the viral strains and normally do not suffer sickness or harm from them, but domestic birds (turkeys, chickens, and ducks) may become very sick after coming into contact with infected wild birds (CDC, 2007c; WHO, 2009). Avian influenza viruses cause two main forms of the disease, one mild form and another one that is rare and highly pathogenic (CDC, 2007c). The avian influenza virus is generally found in birds, but humans can contract the virus after exposure to infected birds, especially in poultry farms and live markets (WHO, 2009). Three strains of the influenza A virus (H7N3, H7N7, and H9N2) are known to infect humans, generally with mild symptoms, but the H5N1 strain is a highly pathogenic form of the influenza A virus, causing severe disease and death (WHO, 2009). Since 2003, the H5N1 strain has been confirmed in 423 human cases causing 233 deaths in 15 countries ranging from Nigeria to Vietnam (WHO, 2009).

Chemical agents can also be utilized for bioterrorist activities with the purpose of causing harm, as shown in Table 2. The use of chemicals with the intent to poison others is an ancient technique, dating back thousands of years. In 331 B.C., following the suspicious deaths of many leading Roman citizens, a slave girl approached the magistrate and, in exchange for immunity from prosecution, revealed that cause of the deaths in question was due to intentional poisoning. As a result, twenty Roman women were put on trial for “brewing noxious concoctions”. When the defendants denied any allegations of wrongdoing and instead claimed to have been creating substances with “curative properties”, the court challenged the women to drink their creations to prove their claim of innocence. The defendants agreed and ingested the substances, which effectively killed them (Bauman, 1992).

Chemicals are “ready-made” and do not need to be cultivated or extracted as do biological toxins (Rasco & Bledsoe, 2005). Hazardous chemicals can be manufactured from easily obtained items, such as household cleaners, and released intentionally in a terrorist attack (CDC, 2005a). Furthermore, some of the chemical agents are not overly-difficult for motivated individuals or groups to manufacture (National Research Council, 2002). Because chemicals are widespread and used throughout society, access to chemical sources should be secured to protect citizens from those who could use them to cause intentional harm (United States Department of Agriculture Food and Nutrition Service, 2004). Periodic review of procedures for access, handling, and storage procedures of hazardous materials in the workplace is recommended. This includes acids, solvents, cleaning materials, pesticides, paints, bases, water treatment and other chemicals (Bledsoe & Rasco, 2002).

There are potentially hundreds of chemical agents that could be used in a bioterrorist attack. Chemical agents have long been used in warfare. For example, chlorine was used as a choking agent in World War I. Chemical weapons were also used by Saddam Hussein in the first Gulf War during the 1990s and in the Iran-Iraq war (Rasco & Bledsoe, 2005). Pertaining to food, however, it is more likely that agricultural or industrial chemicals would be used rather than military-developed chemicals. Steven Musser of the Center for Food Safety and Applied Nutrition, Food and Drug Administration (CFSAN/FDA) has commented that even though the list of hundred of potential chemical agents could be reduced to 12-15, there is no “guarantee” that would-be terrorists would use any of those agents (Bryant et al., 2005).

### ***Quantification and Mitigation of Terrorist Attacks***

The CARVER plus shock method is a tool that can be used in the food sector to proactively determine weaknesses in a food system or an infrastructure to a terrorist attack. It permits the user to assume the attacker’s role through identification of vulnerable and desirable targets (nodes) within the food system to attack. Through undertaking this assessment of the most vulnerable points/nodes in an operation’s infrastructure, managers will be able to realign their resources to protect these vulnerable points (USDA-FSIS, 2007).

CARVER is an acronym for the six attributes used to evaluate the attractiveness of a target given node for attack:

Criticality - measure of public health and economic impacts of an attack

Accessibility – ability to physically access and egress from target

Recuperability – ability of system to recover from an attack

Vulnerability – ease of accomplishing an attack

Effect – amount of direct loss from an attack as measured by loss in production

Recognizability – ease of identifying target.

In addition, the modified CARVER tool can be used to evaluate a seventh attribute, the combined health, economic, and psychological impacts of an attack, or the shock attributes of a target. Each attribute is rating on a scale of 1 – 10 and calculated for an overall rating for each node evaluated. Nodes with the highest ratings have the greatest potential vulnerability and should be the focus for developing preventive measures against bioterrorism (USDA-FSIS, 2007).

Application of the CARVER plus shock tool to conduct vulnerability assessments has been used to assess 36 parts of the agriculture and food industry, including commodities through the Strategic Partnership Program Agroterrorism (SPPA) initiative (Food and Drug Administration, 2009). The SPPA was a program that included agencies from Federal and State government and volunteers from the private sector (U.S. Department of Health & Human Services, 2008). In each assessment, SPPA participants identified areas that were of primary concern in the flow of food through each operation. Measures to protect food and steps to mitigate bioterrorism were identified during each assessment. Strategies to address potential vulnerabilities in food defense were also addressed, including research gaps and needs (FDA, 2008b).

A terrorist attack can severely impact a nation by harmfully interrupting the critical systems of its infrastructure (Hall et al., 2003). More specifically, an attack on the food supply would have significant psychological, economic, political, and physical consequences (Bruemmer, 2003). The impact of unintentional contamination of food can greatly impede recovery of an organization's market share and reputation (Rasco & Bledsoe, 2005). The USDA has estimated foodborne illness to cost the U.S. between \$7 billion and \$37 billion annually, due to unintentional inadequate food safety practices (United States General Accounting Office, 2003). Intentional sabotage of food can put industries (such as foodservice) out of business, while disrupting trade and having long-term economic ramifications (WHO, 2002). Deliberate

cyanide contamination of Chilean grapes in 1989 triggered a recall of Chilean fruits from Canada and the U.S. This incident resulted in many bankruptcies and several hundred million dollars in lost revenues and damages (WHO, 2002). In July 2003, an aggressor laced potato chips and sardines with cyanide in a South African supermarket chain, affecting several people who purchased and later consumed the food items. The aggressor then tried to extort \$500,000 from the supermarket company, creating a sensation in the media and making front-page headlines (AIB International, 2006).

Quantification of the impact of bioterrorism in restaurant/foodservice settings have been conducted using CARVER plus shock evaluations in two of the 36 SPAA assessments: a school central kitchens in North Carolina, and a sports stadium in Manhattan, Kansas (U.S. Department of Health & Human Services, 2008). SPAA assessments of restaurant/foodservice establishments identified weaknesses that could be exploited by the use of contaminated food products, negatively affecting public health and/or resulting in the loss of human life. Although significant economic damage could result from food bioterrorism in these foodservice operations, public shock and health concerns were generally deemed to be of more serious concern. A bioterrorism attack upon children attending school or college students enjoying a football game would seriously disrupt the local community and attract significant media attention (shock value). Vulnerabilities identified within these operations included situations in which food was in direct human contact immediately before service to the consumer. In addition, publicly accessible foods (such as bulk condiment dispensers) were of particular concern as they offer unlimited public access and could be contaminated by anyone (FDA, 2008b).

The ALERT initiative, sponsored by the FDA, CDC, and USDA, is applicable to all areas along the farm-to-table food chain, including foodservice (FDA, 2009). It is intended to raise awareness among state and local governments as well as industry and business professionals regarding food security. ALERT is an acronym that stands for five points to address the risk of bioterrorism in a food operation:

- Assuring the supplies and ingredients used come from safe and secure sources.
- Looking after the security of ingredient and products used in your facility.
- Employees' comings and goings within your facility.
- Reports about the security of your products while under your control.
- Threat notification – what to do and whom to notify if there is an issue at your facility.

Although the ALERT initiative does not quantify the degree of risk like CARVER plus shock, it is still a useful tool to educate and promote discussion regarding mitigation strategies to improve food security in any operation producing or handling food (FDA, 2009). In a Food Defense Surveillance Assignment (FDSA) field activity, several FDA and USDA operational divisions partnered with the Food Emergency Response Network (FERN) Laboratories and local and state regulatory agencies. Their goal was to increase food defense awareness through the use of ALERT messages along the food chain, while conducting routine food safety inspections. School central kitchens, retail foodservice establishments, distributors and food manufacturers were inspected and employees were actively involved in discussions intended to increase food defense awareness using ALERT training. It was found that 59% of the firms that participated in the FDSA field activity were found to be receptive to the ALERT message and 55% of those conducting food safety inspections planned to continue sharing ALERT messages regarding food defense (FDA, 2007).

The Special Event Food Defense Assignment (SEFDA) was a joint effort between the Center for Food Safety and Applied Nutrition (CFSAN), the Office of Regulatory Affairs (ORA) state and local regulatory agencies, as well as FERN Laboratories. SEFDA was conducted in May 2008 and focused upon preparing for food security during Democratic and Republican conventions. A trial run was conducted in retail foodservice establishments with the intention of creating a food security template for use during special events. SEFDA Food safety inspections were conducted in foodservice establishments and samples were sent to laboratories for analysis. The goals of this study were to increase food defense preparedness in the food industry, demonstrate a system of preventative measures that could be used for special events, integrate food defense activities at the federal, state, and local levels, conduct training to help improve communication with the Department of Defense (DoD), and identify gaps and increase preparedness in the food defense system for special events. SEFDA activities included: 124 food safety inspections of retail foodservice establishments, communication and dissemination of ALERT messages, completing and returning traceback information for given foods and beverages, and collecting 364 samples and returning them to FERN laboratories. Items identified needing improvement were standardization of the traceback forms, better clarification of roles in the assignment, and confusion with the collection and shipment of samples (FDA, 2008a).

## **Governmental Agencies Responsible for Dealing with Bioterrorism**

Many governmental agencies and government partnerships are responsible for responding to bioterrorism in the U.S. The U.S. Department of Homeland Security issued the National Response Framework (NRF), which “defines the principles, roles, and structures that organize how we respond as a nation”. The NRF is a document that provides a unified national response to emergencies and disasters, including chemical, biological, or radiological weapons of mass destruction. The NRF replaced the (former) National Response Plan on March 22, 2008 and “establishes a comprehensive, national, all-hazards approach to domestic incident response” (U.S. Department of Homeland Security, 2008).

The Strategic Partnership Program Agroterrorism (SPPA) Initiative is a partnership of the Department of Homeland Security (DHS), the Federal Bureau of Investigation (FBI), the Food and Drug Administration (FDA), and the USDA to “help secure the nation's food supply” (FDA, 2005). The objectives of the SPPA Initiative are to identify vulnerabilities, indicators, and warnings that could lead to a terrorist attack; develop mitigation strategies to prevent an attack; gather information to enhance existing government and industry tools; validate government food and agriculture assessments; provide reports regarding all of the aforementioned; and to strengthen relationships among the Federal, State, and local law enforcement agencies and the food and agriculture industry (FDA, 2005).

The Biosecurity Research Institute (BRI) at Kansas State University (KSU) is the sole U.S. training and research facility that can facilitate food safety, plant pathology, veterinary medicine, and molecular biology research together under the same roof (Kansas State University, 2006). This offers a unified interdisciplinary setting in which to study risks to the U.S. food supply (Kansas State University, 2008). In addition, KSU was selected by the DHS as the preferred site for the National Bio and Agro-defense Facility -- NBAF. Once completed, the NBAF will become the most state of the art biocontainment facility in the world, designed to carry out important research pertaining to agriculture and the food supply chain. The NBAF will contain Biosafety Level - 4 (BL-4) laboratories that are necessary for studying agricultural diseases that could have serious public health ramifications (Jaax & Jaax, 2008).

The Department of Health and Human Services (HHS) assists state and local public health systems, provides support for existing biosurveillance programs, and funds medical research that combats potential agents used for bioterrorism. HHS funds product development

and medical research through the National Institute of Allergy and Infectious Diseases (NIAID), which is part of the National Institutes of Health (NIH). The NIAID develops medical tools to identify and respond to the consequences of bioterrorist attacks (NIAID, 2007).

Following the terrorist events of September 11th, 2001, the Environmental Protection Agency (EPA) has identified the security of the U.S. drinking water and wastewater infrastructures to be a top priority. The EPA has taken decisive actions to monitor and decrease vulnerabilities from possible terrorist attacks; to plan, practice and respond to terror incidents and emergencies; and to develop new methods to identify and monitor contaminants and thwart potential breaches of security (EPA, 2007).

CDC helps prepare people for emerging health threats, including bioterrorist attacks. The Coordinating Office for Terrorism Preparedness and Emergency Response (COTPER) helps prepare the U.S. to effectively respond to significant threats to public health by offering coordination, support, and strategic direction for terrorism preparedness and response activities of the CDC. CDC supports local, state, and national activities to help prevent disasters, improve public health during a disaster, and help with restoration and recovery after a disaster has occurred (CDC, 2007d).

The USDA Food Safety Inspection Service (FSIS) conducts vulnerability assessments on egg, meat, and poultry products to better prepare for and prevent a potential bioterrorist attack on these food systems. Within FSIS, the Office of Food Defense and Emergency Response (OFDER) oversees homeland security issues and works collaboratively with FDA, DHS, the USDA Homeland Security Office and additional food-related State and Federal agencies, and industry (USDA/FSIS, 2008; SIS 2008).

The USDA Food and Nutrition Service (USDA/FNS) considers food security and safety to be important components of its nutrition assistance programs. The USDA/FNS takes a proactive stance on food defense and has developed training manuals and a biosecurity checklist for school foodservice programs to protect the safety and security of school children and adults in public schools. These resources provide recommendations for school foodservice directors to implement preventative measures in order to protect their operations from bioterrorism. Areas covered in the biosecurity checklist include: receiving/inspection of food, storage of food and chemicals, food preparation, chemical handling, foodservice equipment concerns, personnel issues, facility security, utility security, training needs, crisis handling, communication, and



maintenance of the school's biosecurity plan (United States Department of Agriculture Food and Nutrition Service, 2004).

The United States General Accounting Office (GAO) is a nonpartisan, independent agency that serves Congress. The GAO is often referred to as the "congressional watchdog," because it advises Congress how taxpayer dollars are spent by the federal government. In addition to auditing federal funds, investigating allegations of wrongdoings, and reporting on the effectiveness of government programs, the GAO can also perform policy analyses and issue opinions and legal decisions (United States General Accounting Office, 2008b).

In a press release dated November 6, 2008, the GAO identified thirteen urgent issues facing the incoming 44<sup>th</sup> U.S. President, amongst which was food safety (GAO Office of Public Affairs, 2008). On their newly-established 2009 Congressional and Presidential Transition website, the GAO elaborated, stating that the "fragmented nature of the federal food oversight system" inhibits the U.S. government's ability to monitor the safety and preserve the integrity of the food supply. The GAO stated that although the USDA expended most of the federal funds allocated for food safety inspection, the USDA only regulates 20% of the U.S. food supply. The FDA regulates 80% percent of the U.S. food supply, but it expends only 24 percent of federal food safety inspection allocations. The GAO recognized the FDA claims that due to limited funding and increasing responsibilities (including counterterrorism activities), the FDA is challenged in carrying out its responsibilities of ensuring the safety and security of the U.S. food supply (United States General Accounting Office, 2008a).

The FDA is the U.S. federal agency that is responsible for regulating biological products, cosmetics, drugs, foods, medical devices, radiation-emitting electronic products, and veterinary products. The FDA is "responsible for ensuring that foods are safe, wholesome and sanitary" and monitors the safety of all food products (except meat and poultry), labeling of foods, and bottled water sold in the U.S. marketplace (FDA, 2008d).

As a response to the events of September 11, 2001, the Public Health Security and Bioterrorism Preparedness and Response Act of 2002 (henceforth referred to as the Bioterrorism Act of 2002) was signed into law by President George W. Bush on June 12, 2002. The Bioterrorism Act of 2002 had a significant impact on the U.S. food industry and granted extensive responsibilities to the FDA to protect the safety and security of the U.S. food and drug supply (United States Food and Drug Administration, 2002). The Bioterrorism Act of 2002

allowed the FDA to require any facility (domestic or international) that manufactures, packs, holds, or processes food for U.S. consumption to be registered. The FDA also has the authority to detain any food found during an inspection that may be potentially harmful to humans or animals (United States Food and Drug Administration, 2002). Project Bioshield, signed into law by President George W. Bush on July 21, 2004, improved medical procedures to better protect the U.S. from chemical, biological, radiological, or nuclear (CBRN) attacks (The White House, 2008). This act gave the FDA authority “to make promising drugs, biologics, diagnostics, or devices quickly available in emergencies” (Meadows, 2004).

The priority the U.S. government places on the safety and security of the U.S. food supply is demonstrated in its continuing funding of the FDA budget requests. The FDA, whose core mission is “promoting and protecting public health”, reported a \$42.2 million budget request for 2009 (representing a total investment of \$662 million) to fund the Food Protection Plan. The requested funds will allow the FDA to protect the U.S. food supply and strengthen food safety by “preventing foodborne illness outbreaks, intervening when food defense or food safety vulnerabilities emerge, and rapidly responding to food defense and food safety threats” (FDA, 2008c). In addition, the overall amount requested by the FDA for food defense for fiscal year (FY) 2009 is \$213 million, a \$43 million increase from 2007 and a \$198 million increase from 2001, the first year the FDA request for bioterrorism funding was granted (U.S. Department of Health and Human Services, 2008).

### **Previous Bioterrorism Research Conducted in Foodservice**

“Farm to fork” is the commonly-used term describing the “human food chain from agricultural production to consumption” (Dictionary.com's 21st Century Lexicon, 2010). Foodservice establishments represent the last link on the food chain (the “fork”) where food is prepared before final service to customers. There has been significant bioterrorism research conducted of the production and transportation of food, but research regarding the preparedness of the commercial foodservice segment is minimal at best (Yoon & Shanklin, 2007c). Previous bioterrorism research was conducted in school and hospital foodservice operations (Yoon & Shanklin, 2007a; Yoon & Shanklin, 2007b; Yoon & Shanklin, 2007c). Yoon and Shanklin (2007) studied food and nutrition professionals’ perceived importance, frequency of preventative measures, and self-efficacy in developing a food defense management plan. Foodservice

operators who indicated more concern and caution towards threats of food bioterrorism more often performed preventive practices than foodservice operations that were less concerned and less cautious about food terrorism (Yoon & Shanklin, 2007c). Among preventative practices, foodservice operators considered chemical use and storage practices to be of the greatest concern for protection from bioterrorism and these practices were also the most frequently implemented in their operation (Yoon & Shanklin, 2007a). Yoon and Shanklin's research concluded that increased awareness of foodservice operators and implementing preventive practices against bioterrorism can enhance levels of food defense in foodservice operations (Yoon & Shanklin, 2007b). It is reasonable to assume that these conclusions could apply to other foodservice operations, besides schools and hospitals. For this reason, private country clubs were selected for future foodservice research in food bioterrorism.

### **Roles/responsibilities of Club Managers and other foodservice professionals**

Clubs are exclusive and typically only invite affluent and influential individuals (along with their families) to join their membership (Walker, 2009). Examples of people frequenting private clubs (members, their guests, or non-members) include: prominent citizens, business executives, celebrities, and government officials.

Nearly all U.S. private clubs have food and beverage facilities and serve food procured and prepared from the U.S. food supply (Walker, 2009). The safety and security of food served in private clubs ultimately resides with the club's general manager, who is directly responsible for supervising all club professionals and department heads (Perdue, 2007).

Private clubs, which typically exclude non-affluent individuals from their membership roles, unintentionally project an image of wealth and privilege to non-members. Because private clubs are exclusive and cater to affluent, powerful and influential individuals, they could be considered as potential targets to would-be terrorists. Club members consider their club as an extension of their business and home and will use its facilities for both business and leisure (Angelo & Vladimir, 2004). The service of food and beverages is generally at the center of all club events.

To facilitate these events, private clubs employ foodservice workers and banquet servers. These positions may have up to a 285% annual turnover rate, due to significant numbers of seasonal employees hired to meet peak demands (Aziz et al., 2007). English is a second

language for many foodservice employees and communication difficulties can occur between managers and non-English speaking employees. This can complicate attempts at conducting background checks or verification of job references. Background checks can be easily run on every line-level employee, including temporary employees who may be hired for busy times of the year, however this may be cost prohibitive to the club.

Food prepared in large quantities is easy to contaminate, thus banquets held at private clubs may present a terrorist (possibly an employee of the operation) the opportunity to harm 200 people or more at a time. One disgruntled employee could intentionally contaminate food or beverages served to members and cause extensive harm to club members, their guests, and club employees. Food production equipment that combines large batches of food ingredients together, such as a floor mixer, offer a would-be terrorist an ideal opportunity for contamination. Additionally, equipment located in low-traffic or out of the way areas, such as an icemaker in a side room, could provide opportunities for intentional contamination with little chance of being detected.

After the physical damage from an initial bioterrorism attack, the psychological effects and shock value lingers, often causing more problems for a private club. A perceived violation of safety and security with something as personal as food (which they trust the club to be safe to put in their bodies) may result in members resigning from the private club, even if they themselves were not directly affected.

## **Overview of Private Clubs**

### ***Origins and Background of Private Clubs***

Private clubs are places where people of shared interests can congregate and socialize (Angelo & Vladimir, 2004). These interests can be professional, social, fraternal, or recreational. Private clubs have been a gathering place for wealthy citizens since ancient times (Perdue, 2007). Roman baths could be considered as one of the first documented examples of private clubs. These baths were designed for a specific group of people for the purpose of socializing with one another (Angelo & Vladimir, 2004). Likewise, in medieval Europe, craft and merchant guilds could also be considered in some ways to be private clubs, as they catered to the needs of an exclusive group of individuals (Perdue, 2007).

With the importation of coffee into England during the mid- 1700s, coffeehouses (the precursors of city clubs) were established at three major English universities: All Souls, Cambridge, and Oxford (Perdue, 2007). London city clubs offered an exclusive, cultivated atmosphere where members could browse the club library and socialize with one another (Perdue, 2007). The Royal and Ancient Golf Club of St. Andrews, Scotland, founded in 1754, is renowned for being the birthplace of golf and is considered to be the very first country club (Perdue, 2007). English social clubs and Scottish golf clubs such as St. Andrews, are the direct predecessors of U.S. country clubs and city clubs (Perdue, 2007)

Historically, private club membership was exclusive and a privilege of the affluent and powerful, with established etiquette and certain expectations of social conventions (Walker, 2009). Individuals wishing to join a private club typically required strong support from existing club members to even be considered for club membership and, if considered, then underwent a rigid screening process (Perdue, 2007). Due to the rigorous membership requirements, private clubs were effectively able to deny admittance to those individuals who lacked the wealth or desired qualities of the club's existing members (Walker, 2009).

The first city clubs in the U.S. were patterned after the English social clubs and were founded in the Colonies during the 1700s. These clubs were male-only social clubs, which gathered in taverns or lodges for the purpose of socialization and consumption of alcohol (Perdue, 2007). During the mid 1800s, construction of formal U.S. city clubs began. Examples included the Somerset Club in Boston (established [est.] in 1842), the Wilmington Club in Delaware (est. 1859), and the San Francisco Commercial Club (est. 1851) (Angelo & Vladimir, 2004). Other U.S. city clubs built during the nineteenth century include Honolulu's Pacific Club (est. 1851), both the Olympic Club (est. 1860) and the Pacific-Union Club (est. 1889) in San Francisco, and the Union League in Philadelphia (est. 1862) (Perdue, 2007).

The Country Club, located in Brookline, Massachusetts (MA), was founded as an equestrian and social club in 1882 (with golf introduced in 1893) and is generally regarded as the first country club in the U.S. (Angelo & Vladimir, 2004) (The Country Club, 2009). Like The Royal and Ancient Golf Club of St. Andrews, Scotland, The Country Club in Brookline, MA was established as a gathering place for the social elite and hub for business, especially on the golf course (Walker, 2009).

**Table 3: Types of Private Clubs**

<b>Athletic</b>	Athletic clubs vary greatly in their offerings and locations, from The New York Athletic Club, located in a building in midtown Manhattan, to athletic clubs that offer golf and that are similar to country clubs (Angelo & Vladimir, 2004; Perdue, 2007).
<b>City</b>	City clubs are usually located in a building or a suburban office complex and are the second most common type of private club behind country clubs, with over 2,000 U.S. clubs currently in operation (Perdue, 2007). On average, the city club initiation fee is \$4,294, with \$207 in monthly dues from 1,631 members (Perdue, 2007). Although city clubs may vary greatly in amenities, food and beverage service is almost always offered and a manager on hand is needed to direct the club operations (Angelo & Vladimir, 2004).
<b>Country</b>	Country clubs typically have a main clubhouse and enough land for one or more golf courses as well as other sports facilities, such as tennis courts and swimming pools (Perdue, 2007). There are an estimated 6,000 – 7,000 country clubs in the United States, the most common type of private club. The average monthly dues for a country club are \$430, with an average of 847 members and an average initiation fee of \$33,757 (Perdue, 2007).
<b>Corporate</b>	Corporate (or proprietary) clubs are operated for-profit and owned by a corporation or one or more individuals. Memberships offered by corporate clubs do not include ownership or equity sharing and members have limited or no voice in corporate club operations (Perdue, 2007).
<b>Developer-Owned</b>	Developer-owned clubs are private clubs built by developers with the intention of adding value and enhancing the desirability of housing developments. Often, developers are not interested in the long-term ownership of these clubs and instead wish to sell them to a corporation (becoming a corporate club) or the residents of the surrounding housing developments via equity conversion programs (becoming a member-owned club) (Perdue, 2007).

<b>Dining</b>	Dining clubs multiplied rapidly in the 1960s and were originally offered by building owners to entice companies to lease office space. Dining clubs may offer lunch only (luncheon clubs), or lunch and dinner. Some dining clubs offer private luncheons during the day and then open to the public in the evening for dinner and cocktail service after work. Most dining clubs close relatively early in the evening if lodging facilities are not readily available (Angelo & Vladimir, 2004).
<b>Fraternal</b>	Fraternal clubs foster strong bonds of fellowship amongst their members and include organizations such as the Shriners, Elks, and Veteran’s of Foreign Wars (VFW) (Walker, 2009). Fraternal clubs often sponsor charitable organizations and causes such as the Shriners Hospitals for Children (Shriners International Headquarters, 2010). Typically the facilities of fraternal clubs are not as fancy as most private clubs, but many of them offer banquet rooms, beverage service, overnight accommodations and meeting rooms (Angelo & Vladimir, 2004; Walker, 2009). Professional managers are required to run fraternal clubs (Angelo & Vladimir, 2004).
<b>Military</b>	Each branch of the military operates military clubs, which were traditionally managed in-house by military personnel. However, through military restructuring, this has changed and now most military club events and day-to-day activities are either contracted out or managed by civilians (Perdue, 2007). Many military clubs resemble city clubs, but may offer more elaborate and extensive services and facilities for enlisted personnel and officers such as social programs, recreational facilities, and lodging (Angelo & Vladimir, 2004). As military funding is currently being allocated for combat-related use, military clubs are now expected to break even or be profitable (Perdue, 2007).
<b>Professional</b>	Professional clubs offer social and dining activities for individuals sharing the same profession. Examples of professional clubs include the Friar’s Club (for actors) and the National Arts Club (for patrons and artists from all fields), both located in New York City, as well as the Press Club (for journalists) in Washington D.C. (Angelo & Vladimir, 2004).

<b>Proprietary</b>	Also known as corporate clubs (see definition above).
<b>Social</b>	Social clubs in the U.S. were originally based upon the men's social clubs of London (Angelo & Vladimir, 2004). Social clubs are places where members can enjoy each other's company (Walker, 2009). In some social clubs it is considered to be a faux pas to discuss business amongst club members, even being incorporated into the Shakespearean-inspired motto of San Francisco's Bohemian Club, "weaving spiders come not here," warning against conducting business deals while on the premises (Wikipedia, 2008).
<b>Tennis</b>	Tennis clubs are chartered around the popular game of tennis, offering tennis courts and tennis-related services and facilities to their members. Tennis clubs may also have additional athletic facilities, banquet rooms for member use, and a clubhouse with food and beverage service (Perdue, 2007).
<b>University</b>	University clubs are private clubs for the alumni, faculty, staff, and friends of a university (Perdue, 2007).
<b>Yacht</b>	Yacht clubs are typically accessible by boat, located on large bodies of water. They cater to people who either own boats or enjoy boating activities and may have marina facilities available for their members. Yacht clubs have a clubhouse that offers food and beverages and may also include athletic facilities (Perdue, 2007).



From the mid 1800s up until the 1940s, U.S. city and country clubs exclusively catered to the most affluent and powerful individuals in society and were not within the grasp of most Americans (Perdue, 2007). During World War II, hundreds of thousands of U.S. servicemen were introduced to golf during their stay on military bases, which subsequently led to a great demand for public golf courses and golf facilities in the U.S. upon veterans returning home following the war (Perdue, 2007). This demand resulted in the rapid construction of country clubs from the 1960s through the 1980s, providing the opportunity of country club membership to a much greater number of Americans than before World War II (Perdue, 2007). In 2008, there were about 14,000 private clubs located in North America (comprised of both city and country clubs) with approximately 6,000 of those clubs being country clubs (Walker, 2009). Private clubs possess extensive resources (including land, equipment, and buildings), employ thousands of individuals, and manage financial assets, all of which have an economic impact in the billions of dollars annually (Walker, 2009).

### ***Types of Private Clubs***

Clubs are difficult to categorize due to the wide variation in clubs' size, location, type, rules and services offered (Angelo & Vladimir, 2004). In addition, clubs may be categorized in more than one way (for example, a dining club is also usually a city club as well) (Perdue, 2007). Generally, the majority of most American private clubs can be classified as city clubs or country clubs, with the remaining establishments classified as "other private clubs" (Angelo & Vladimir, 2004). The various types of private clubs are shown in Table 3.

### ***Security Issues Associated with Private Clubs***

General Managers of private clubs are recommended to have emergency preparedness procedures in place to protect the safety and health of their members (Club Managers Association of America, 2002). A written Disaster Recovery Plan (DRP) is the primary document used to ensure continued and effective operations of private clubs during and following a disaster (Club Managers Association of America, 2002). Contained within the Disaster Recovery Plan is an Emergency Evacuation Plan (EEP), consisting of the following items: evacuation, facility protection, emergency equipment (inspection, maintenance, and readiness), public relations, employee welfare, fire fighting, first aid/CPR, utility controls,

pollution/decontamination, communication, transportation, recordkeeping, and drills (Club Managers Association of America, 2002).

In addition to Disaster Recovery Plans and Emergency Evacuation Plans, club managers are recommended to form a Crisis Management Team (CMT) and discuss the issues that could conceivably cause problems for their club. This may include the following possible crises: vandalism, member/employee injury, employee found with serious disease, golf course grass disease, bomb threat, loss of electricity/water, chemical spill, untimely death of staff member/director, terrorism, flood, fire, gas leak, earthquake, hurricane, tornado (Club Managers Association of America, 2002). The safety and security of private clubs in regards to terrorism preparedness should be of as much concern to both members and employees as other items in a Disaster Recovery Plan.

The events of September 11, 2001 changed worldwide perceptions of terrorist threats to safety and security and the costs associated with the terrorist attacks, which can amount to hundreds of billions of dollars. Statistical odds of 1 in 9.3 million for Americans being the target of a terrorist attack may seem favorable, but if an attack occurs, the results could be deadly and final (Flinn, 2003). After September 11th, insurers faced a host of claims from individuals, businesses, and building owners in terms of property and casualty, health care costs, workers' compensation, and the prospect of rising premiums that might force the insured to find new alternatives. Insurance companies began putting terrorism exclusions in their policies or charging exorbitant rates to cover the perceived risks of terrorism following the events of September 11th (Club Managers Association of America, 2002).

Terrorist incidents in the United States may not be as dramatic as the scenes from 2001 that unfolded to the entire world from New York City, yet terrorism still persists. In October 2002, two men carried out the Beltway Sniper Attacks, killing ten people around the Baltimore-Washington Metropolitan Area (Castaneda, 2007). In 2005, an engineering student blew himself up during a football game at the University of Oklahoma by detonating a backpack bomb only 200 yards from OU's stadium (Brady, 2009). In 2006, a man was stopped by federal agents before he could carry out a planned "violent jihad" grenade attack in an Illinois shopping mall (NBC News, 2006). In 2009, an 88-year-old white supremacist opened fire in the Washington, D.C. Holocaust Memorial Museum, killing a security guard (CNN, 2009). The events of September 11, 2001, focused the nation's and the world's attention on terrorism and the threat of

future terrorist acts. While the use of “weapons of mass destruction” by international terrorist organizations remains a potential threat, limited or individual attacks using common foodborne bacterial or zoonotic agents (to contaminate food systems or the public at large) will be more likely (Bledsoe & Rasco, 2002). This observation was echoed by the former Secretary of Health and Human Services Tommy Thompson. In his resignation speech, Mr. Thompson declared, “I, for the life of me, cannot understand why the terrorists have not, you know, attacked our food supply because it is so easy to do” (Branigin, Allen, & Mintz, 2004).

### **Summary**

Food security threats by terrorists have been predicted to be probable in the future and are easy to carry out. Motivations of food terrorists are varied but the final result is the intentional harm of humans using food as the delivery medium for biological, physical, or chemical contaminants. Retail foodservice is an indispensable part of life in America, where half of the food sold is prepared by others. The economic impact of the foodservice industry is enormous, and most hospitality organizations, including private clubs, have some sort of foodservice and beverage service offered to their customers. Employee turnover in foodservice operations can exceed 300% and employee background checks are not always conducted. Seasonal foodservice employees in club operations mean that workers come and go year-round. Clubs are exclusive and cater to the wealthy, making them a potential target for those who want to attack the wealthy and powerful using food terrorism. Many pathogens and easily obtainable chemicals exist that could be used for a terrorist attack. Although significant bioterrorism research has been done regarding the production and distribution of food, very little bioterrorism research has been conducted in retail foodservice and no research on bioterrorism has been conducted in private clubs. Many governmental agencies recommend creating a food defense management plan to counter the risk of bioterrorism. Previous research has shown that increased awareness of foodservice operators and implementing preventive practices to address bioterrorism can increase levels of food defense in foodservice operations.

Based upon the lack of research in private clubs regarding bioterrorism, the recommendations of past researchers and government reports to implement preventative practices within foodservice operations, the unique private and privileged nature of private clubs, and the ubiquitous nature of the foodservice industry for employees and customers alike, and the

economic ramifications surrounding private clubs, foodservice, and terrorism, this study tested the following propositions by conducting food bioterrorism research study in private country clubs:

Proposition 1: Club professionals with smaller gaps between importance perception and practice frequency are more concerned about food terrorism and biosecurity than operators with larger gaps.

Proposition 2: Club professionals with smaller gaps between importance perception and practice frequency implement preventive practices more frequently than operators with larger gaps.

Proposition 3: Club professionals with higher levels of perceived self-efficacy are more motivated to develop a food defense management plan in their country clubs than club professionals with lower levels of perceived self-efficacy.

Proposition 4: Club professionals with higher levels of perceived self-efficacy implement preventive practices more frequently than club professionals with lower levels of perceived self-efficacy.

Proposition 5: Club professionals with higher numbers of perceived barriers are less motivated to develop a food defense management plan in their country clubs than club professionals with lower numbers of perceived barriers.

Proposition 6: Club professionals with higher numbers of perceived barriers implement preventive practices less frequently than club professionals with lower numbers of perceived barriers.

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## **CHAPTER 3 - Methodology**

### **Population and Sample**

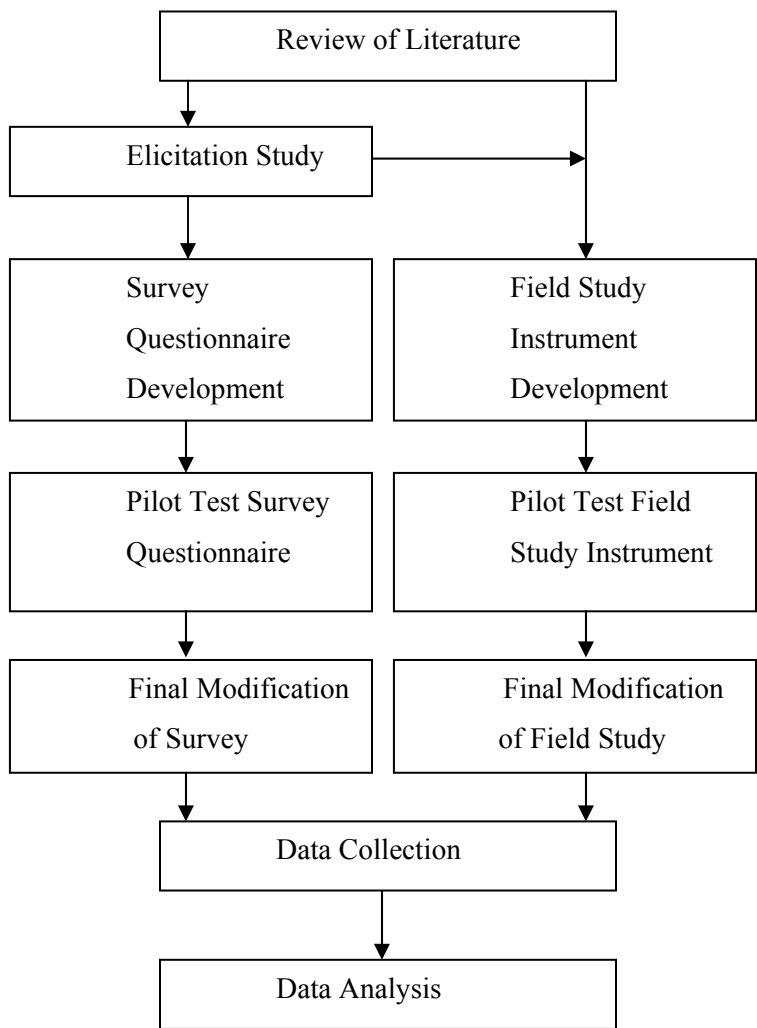
The population for this study was all country club professionals listed in the Club Manager's Association of America (CMAA) member directory and whose operation was located in the United States. Membership information in the CMAA directory was segmented by type of clubs, including country clubs. The study population for this study was CMAA members employed in private country clubs. As of February 2010, a total population of 3,924 club professionals was listed in the CMAA member directory, comprising every type of club segment within CMAA. The country club segment of the CMAA member directory listed 2,354 club professionals or approximately 60% of the total CMAA membership. Following pilot testing, 2,119 CMAA country club professionals remained as the sample used for the quantitative component of this research. According to Dillman, a population size of 2,119 with a +/- 5.68% sampling error for a 50/50 split requires a sample size of 261 usable responses (Dillman, 2000).

In addition to the national survey respondents, a convenience sample of 25 country club operations within a 500-mile radius of Manhattan, Kansas was used to collect field data (on-site interviews of club professionals and observations of club operations). The food and beverage operations of country clubs in the Midwest located in Iowa, Kansas, Missouri, and Nebraska were observed. Country club managers were contacted via telephone without prior notification to explain the purpose and goals of the study. They were asked to participate in a personal interview and to allow the researcher to observe the food and beverage operations and the club's premises.

### **Overview of Data Collection**

Measurement items were initially developed from two different sources: previous literature and focus groups with academic and industry experts. Pilot testing of the survey instrument determined which items needed modification or clarification before final data

**Figure 1 - Research Steps**



- Food Bioterrorism Factors
- Measurement Identification
- Prior Surveys
- Faculty experts and Club Professionals
- Confirm Measurement Items
- Review Existing Questionnaires and Field Study Instruments
- Apply results of Elicitation Study
- Survey - 20 Club Professionals; Validity & Reliability Check
- Field Study – Country Club; Feedback from Club Professional
- Interpret Results from Pilot Studies
- Review with Faculty / Experts
- Online survey – 261 responses
- Field Study – 25 Country Clubs and 25 Club Professionals
- Descriptive Statistics
- Cluster Analysis
- Independent T-Tests
- One-way ANOVA

collection. Data analysis was completed to answer the research questions. Figure 1 illustrates the research process used for this operational research study.

***Research Compliance***

The research protocol was reviewed and approved by Kansas State University Institutional Review Board as documented by the approval letter in Appendix A. Permission was obtained to adapt survey instruments used in prior biosecurity research and is documented in Appendix B.

### ***Elicitation Study***

The purpose of an elicitation study (or focus group) is to gather qualitative data from a group of people regarding a particular idea, concept, product, or service (Wikipedia, 2009a). Interactive group discussions can help to stimulate participant's memories, experiences, and ideas which can generate valuable insights into the items being discussed. Individuals familiar with foodservice, bioterrorism, and private club management participated in an elicitation study which helped to develop the study's survey and field study instruments. Participants included Kansas State University faculty and graduate students from the Department of Hospitality Management and Dietetics, faculty from the Kansas State University Food Science Institute, a country club manager, and three chefs with extensive experience in foodservice operations (including country clubs). Focus group participants were given an overview of food security, food bioterrorism, and country club operations and were informed of the purpose of the study. Survey instruments adapted from prior food defense research surveys of food and beverage operations were presented to the focus group for critique and constructive feedback. During the elicitation study, the semantics and wording of questions for the survey instrument were scrutinized and some questions pertaining to past research were modified or discarded. Revisions were made to the survey instrument based upon the focus group responses. This included identifying terminology familiar to club managers (e.g. using "security" instead of "biosecurity" when describing food defense practices). Other revisions included removing questions that pertained solely to school foodservice and aligning questions to measure operating practices and procedures within club operations. A pre-pilot version of the survey was sent to focus group participants and other individuals (see pilot study and refinement) for final inspection before the survey was administered for pilot testing.

### ***Development of Survey Instrument***

The questionnaire was adapted from existing surveys that were used to conduct prior research in food defense and bioterrorism in school foodservice and healthcare. Because these existing surveys were tested for validity and reliability before data collection, they served as a strong model for the survey instrument (Yoon & Shanklin, 2007a; Yoon & Shanklin, 2007b; Yoon & Shanklin, 2007c). The survey instrument was modified using feedback from the elicitation study and the pre-pilot testing by elicitation study members and other individuals. The



modified survey instrument measured items regarding club professionals' perceptions of bioterrorism and preventative practices used in their respective clubs to counter bioterrorism.

Factors regarding club managers' opinions toward food biosecurity explored in the study included: concern of club managers regarding biosecurity, perceived self-efficacy to implementing food defense practices, and perceived barriers to implementing food defense practices. Factors regarding club managers' importance perceptions and perceived frequency of practices performed in their clubs related to chemical use and storage, employee management, facility security, food handling, and utility security. Demographic variables about the country clubs included: number of club memberships, number of foodservice employees, number of employees working per shift, and individuals responsible for implementing and monitoring food security. Demographic variables of club professionals who completed the survey included: position title, length of employment in current position, years employed in foodservice and club management, age, education level, sex, and club foodservice operating budget. The survey instrument administered is presented in Appendix C.

### ***Development of Field Study Instruments***

Open-ended interview questions were developed from the literature review and ideas generated in an elicitation study that identified items to use in a separate survey research project. Interview questions were used to further explore club professionals' perceptions regarding food defense in their operation. The interview questions included knowledge of food security resources, resources needed for food defense, training needs, and policies and procedures in club operations. The interview questions are summarized in Appendix D.

Observation instruments were adapted from the literature review and existing observation instruments that were developed to conduct food defense and bioterrorism research in school foodservice. The observation instrument's initial framework was modified with ideas discussed in the separate survey elicitation study in order to adequately measure preventative practices used to counter bioterrorism in country clubs. The instrument included a place to record observations for the following locations: areas outside each country club, clubhouse receiving areas, clubhouse storage areas, clubhouse foodservice / food preparation areas, chemical storage areas, foodservice equipment, foodservice personnel, utility security, and general clubhouse security items. The observation instrument is presented in Appendix E.

### ***Pilot Study & Refinement***

Permission was obtained from CMAA to use their member directory to contact club professionals associated with country clubs. E-mail invitations were sent to 235 randomly selected CMAA country club professionals explaining the purpose of the study and encouraging them to click on a link to an online survey. Those who were invited to participate in the pilot study were not used again in the following main survey data collection.

The pilot test yielded 10 returned or undeliverable survey invitations and 25 responses (5 of which were unusable), for a total of 20 usable responses (an 8.51% response rate). A reliability check was performed upon the collected data using Cronbach's alpha ( $\alpha = .94$ ), which satisfied the desired value of  $\alpha \geq .90$  for reliability (Nunnally & Bernstein, 1994). Based on the results of the pilot study, the survey was revised and a final version of the questionnaire was developed and distributed to the remaining 2,119 club professionals in the country club sample.

Field study instruments (interview guide and observation form) were pilot tested in one country club in Kansas. Feedback from the club manager during the pilot test helped to establish the interview format and how to ask the questions clearly and concisely. Changes made to the observation instrument included omitting "n/a" (not applicable) from the "observed" category to avoid confusion with "yes/no" columns and omitting cash handling as private clubs typically operate with minimal cash exchange between staff and club members.

### ***Data Collection***

#### ***Survey Instrument***

Surveys were administered online via a dedicated e-mail link to each respondent linking to the Kansas State University survey system. No identifying information was asked and survey respondents were kept completely anonymous. Some researchers report that persons who respond to surveys answer questions differently than those who do not (Dillman, 2000). Efforts were taken to minimize survey non-response bias through effective online design and follow-up reminders. Because online surveys typically have low response rates, support from CMAA was requested and granted for use in the contact e-mail to respondents in an attempt to increase the participation rate. In addition, a chance to win a gift card redeemable for purchases in CMAA's bookstore was offered to club professionals as an incentive to complete the online surveys. Multiple attempts were made to contact non-respondents in order to delimit non-response bias.

Two reminder e-mails were sent to members who had not responded to the survey (for a total of three e-mails), after which the survey offering was closed.

The field data was collected in 25 country clubs. The purpose of the field study was to understand club managers' opinions and thoughts about food security (via interviews) and to directly observe country clubs' operational practices. Both items were used to gather baseline data and to help make determinations of country clubs' readiness to secure their operations against food bioterrorism.

### ***Interviews***

Club managers were interviewed in all 25 country clubs included in the data analysis. Prior to visiting each club, the investigator sent club managers an e-mail containing a set of Internet links (URLs) to background literature regarding food security. This provided club managers with some background information about food security and was intended to help facilitate discussion. However, upon visiting the clubs it became clear that the majority of club managers had not reviewed the material in advance. Only two out of 25 club managers interviewed were aware of the National Restaurant Association's publication "Food Security – An Introduction" (National Restaurant Association Educational Foundation, 2003). One club manager was aware of other resources pertaining to food security. Six club managers had heard about the Public Health Security and Bioterrorism Preparedness and Response Act of 2002 (the Bioterrorism Act), but did not know how it affected them.

In four of the 25 interviews, additional club professionals were invited to participate (per the club manager's discretion in all interviews). This included executive chefs, food and beverage directors, and assistant club managers. Probing, open-ended exploratory questions were used to obtain data related to club managers/professionals' perceptions of bioterrorism. Interviews ranged in length from 20 minutes to one hour and all interviews followed the same set of probing open-ended questions. Interview data were coded to remove links to those being interviewed to ensure anonymity of responses and to maintain confidentiality of participants and their operations. Following the completion of the study, a debriefing form containing a summary of the major findings of the research study and confirmation of confidentiality of responses was offered to all study participants. Country club professionals interviewed were also offered a list of resources to address concerns shared during interviews.

### ***Observations***

The observations of food security practices focused on the clubhouse or wherever the majority of food production occurred in all clubs. Observations focused on food defense practices, not individuals being observed; no individuals were identified when recording observation data. Data were aggregated so that specific locations observed remained anonymous. Any observations that revealed risks to an operation (such as a breach in food safety, an operational problem, or a food security risk) were communicated to the club professional during the on-site observation.

### ***Data Analysis***

#### ***Survey Instrument***

Survey data were analyzed with the Statistical Package for the Social Sciences (SPSS) version 17.0 (SPSS Inc., 2008). Significance levels were set at  $p \leq .05$  for all data unless otherwise noted. Cronbach's alpha was used to assess the reliability of scale items in the survey questionnaire. Statistical processes applied to data included independent t-tests, one-way analysis of variance (ANOVA), chi-square testing, and cluster analysis.

Responses of club managers' opinions about food security were sorted into three groups: concern (8 items), self-efficacy (7 items), and barriers (4 items). Three ungrouped items asked club managers' opinions of the state of their clubs' security (1 item) and reasons for implementing food defense management plans (2 items). Each opinion item was rated on a 1–5 Likert-type scale with 1 being “strongly disagree”, 2 being “somewhat disagree”, 3 being “neutral”, 4 being “somewhat agree”, and 5 being “strongly agree”.

Confirmatory factor analysis (CFA) was performed to assess the validity of importance perception factors used in previous surveys to address the study's propositions. Following CFA, the two questions comprising the communications factor from a previous study were merged into employee management and facility security. A total of five importance perception factors were confirmed, including chemical use and storage (5 items), employee management (7 items), facility security (8 items), food handling (10 items), and utility security (5 items).

Each importance perception item corresponded with a practice frequency item for use in gap analysis. For this reason, practice frequency items were sorted exactly as importance

perception items were, into the same five factors (chemical use and storage, employee management, facility security, food handling, and utility security).

Corresponding items used in gap analysis consisted of two parts, a statement (importance perception item) and a question (practice frequency item) that were worded very similarly. The statement asked the club manager how important a food security practice was and the question asked how often they performed this practice in their club. Each importance perception statement (e.g. “storing hazardous chemicals in a locked storage area”) was rated on a 1–5 Likert-type scale with 1 being “very unimportant”, 2 being “somewhat important”, 3 being “neutral”, 4 being “somewhat important”, and 5 being “very important”. Each corresponding practice frequency question (e.g. “our country club stores hazardous chemicals in a locked storage area”) was rated on a 1–5 Likert-type scale with 1 being “never”, 2 being “seldom”, 3 being “some of the time”, 4 being “most of the time”, and 5 being “all the time”. The gaps for all 35 corresponding food security practices were calculated by subtracting the practice frequency score from the importance score. The mean gaps were calculated for statements/questions in each factor and averaged.

Cluster analysis using Ward’s method with squared Euclidean distance was used to group respondents into high and low groups for self-efficacy, barriers and width of gap scores between importance perceptions and practice frequencies. Independent samples t-tests or one-way ANOVA were used to detect significant differences between groups. Levene's Test for Equality of Variances was conducted to see if the groups had approximately equal variance on the dependent variables used to test research propositions. Tukey's HSD Post Hoc Test was conducted for significant ANOVA values to identify which means were significantly different from one another.

### ***Field Study***

Interview data were compiled and sorted by categories per the interview question. Data were also sorted by themes; factors included importance perceptions, perceived self-efficacy, barriers, and attitudes. Observation items were recorded as “yes”, “no”, or “not applicable”. Observation data were analyzed with the Statistical Package for the Social Sciences (SPSS) version 17.0 (SPSS Inc., 2008). Frequencies and percentages were calculated for observation items.

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## **CHAPTER 4 - Manuscript 1**

### **FOOD DEFENSE MANAGEMENT PRACTICES IN PRIVATE COUNTRY CLUBS**

#### **Abstract**

The primary purpose of this study was to examine country club professionals' importance perceptions of securing their foodservice operations against a food terrorism attack and the perceived preventative practices that could be implemented to counter such an attack. Gaps between importance perceptions and the frequency of perceived preventative practices were examined to determine if there was a relationship with club professionals' concern about food terrorism and how often preventive practices were implemented in their clubs. Perceived self-efficacy measures and perceived barriers were studied to assess if there was a relationship with club professionals' motivation to develop a food defense management plan and the frequency to which preventive practices were implemented in private country clubs. Demographic characteristics were compared with importance perceptions and frequency of practices.

Importance perceptions and preventive practice frequencies were examined to ascertain if there were any significant differences among various operational factors. Gap scores were calculated by subtracting the practice frequency score from the importance score. The mean gap scores were positive, meaning that on average, club managers rated importance perceptions higher than practice frequency. Cluster analysis using Ward's method with squared Euclidean distance was used to group respondents into high and low groups for self-efficacy, barriers and width of gap scores between importance perceptions and practice frequencies. Independent samples t-tests and one-way analysis of variance (ANOVA) were used to determine differences between groups. Club professionals with smaller gaps implemented preventive practices more frequently than those with larger gaps. Club professionals with higher levels of self-efficacy were more motivated to develop a food defense management plan and implemented preventive practices more frequently than those with lower levels of self-efficacy. Those with higher perceived barriers were less motivated to develop a food defense management plan and implemented preventive practices less frequently than those with lower perceived barriers. This

study concluded that increasing the perceived importance and awareness of food security issues and implementing preventive practices can help a country club become more secure against food terrorism.

## **Introduction**

### ***Food Bioterrorism in the United States***

The turn of the millennium not only ushered in a new century, but also new concerns about the way we view threats to the safety and security of the food supply in the United States (U.S.). Following the terrorism attacks on New York City and the Pentagon in 2001, funding for counterterrorism was increased and as a result, the safety and security of the food supply received increased attention and priority (Rasco & Bledsoe, 2005). Historically, food safety in the U.S. has focused primarily on unintentional and accidental contamination of food and water. Unfortunately, foodservice operators, the foodservice industry, and the U.S. government are not thoroughly prepared for threats in the form of intentional disasters (such as terrorism) (Bryant et al., 2005; Hollingsworth, 2002; Rasco & Bledsoe, 2005) .

Opportunities for bioterrorist activities exist along the food supply chain, from agricultural production to consumption of food, commonly referred as “farm to fork” or “farm to table” (Dictionary.com's 21st Century Lexicon, 2010). Food security threats may affect any portion of the food supply chain and may be centered upon certain foods, production processes, or businesses producing food products (National Restaurant Association Educational Foundation, 2003). For the purpose of this study, individuals who intentionally commit criminal acts by contaminating or harming food products will be referred to as terrorists, bioterrorists, or food bioterrorists. Motivations of terrorists can include: political/ideological, creating chaos, revenge/retribution, financial benefit, thrill-seeking, notoriety, attention/publicity, humor/prank, and obtaining a competitive advantage (AIB International, 2006).

Research regarding the preparedness of the commercial foodservice segment to address food bioterrorism issues is minimal at best (Yoon & Shanklin, 2007c). Governmental agencies, such as the Centers for Disease Control and Prevention (CDC), the Federal Bureau of Investigation (FBI), and the Food and Drug Administration (FDA), have recommended foodservice professionals monitor the security of the food supply from production to



consumption (farm to fork) (Peregrin, 2002). Food bioterrorism research within the foodservice industry must not be ignored.

Past examples of food bioterrorism illustrate the need for proactive and preventive food defense practices. In 1996, twelve laboratory employees of a Texas hospital were intentionally infected with pastries containing a rare diarrhea-causing strain of *Shigella dysenteriae*. In January 2003, 148 people in Michigan became ill after consuming ground beef intentionally contaminated with insecticide purchased at a supermarket (CDC, 2003). In August 2009 at a Kansas restaurant, 48 people became ill after consuming salsa that was intentionally contaminated with Methomyl, a highly-toxic pesticide used for fruit, vegetable, and field crops (United States Department of Justice, 2010).

Foodservice operators must be informed of the potential risks and threats posed by bioterrorism as they are the final control point on the food supply chain. Developing a food defense management plan that specifies how to implement preventive practices should be the most direct and efficacious method to minimize the threat of bioterrorism to a foodservice operation (Bledsoe & Rasco, 2002; United States Department of Agriculture Food and Nutrition Service, 2004).

### ***The Foodservice Industry***

The preparation and consumption of wholesome food, either at home or away from home, is essential to human survival. Forty-nine cents of every dollar is spent away from home in the U.S. in a restaurant or another establishment serving food (National Restaurant Association, 2010). The restaurant industry will serve an estimated 70 billion meal and snacks in 2010, employ a projected 12.7 million people (9% of the U.S. workforce), and generate an estimated \$580 billion in revenues (National Restaurant Association, 2010).

Foodservice operations are ubiquitous in the U.S., offering people a place to socialize with one another, to restore their energy levels, and to relax (Walker, 2009). Commercial foodservice includes convenience stores and many types of restaurants, including: fast food, full-service, casual, fine dining, hotel/motel, and airport restaurants. Commercial foodservice operations may also be located in museums, aboard cruise ships, in zoos and museums, at sporting arenas and events, and in private country clubs.

### ***Private Country Clubs***

In 2008, there were about 6,000 private country clubs in North America. These clubs represented extensive financial assets, employed thousands of individuals, and provided an economic impact in the billions of dollars annually (Walker, 2009). Country clubs are exclusive and cater to the affluent, with initiation fees charged to new members as high as \$250,000 (Walker, 2009). All country clubs provide some form of food and beverage service, which is important for creating positive impressions in the minds of club members and their guests (Perdue, 2007). Country clubs employ many foodservice workers and hire seasonal employees to meet peak demands in a club's business, such as the busy summer and holiday seasons. Turnover among foodservice workers can reach approximately 300%, thus background checks are considered cost-prohibitive by many club managers (Aziz et al., 2007). Because country clubs are often exclusive and cater to wealthy and influential members of society, they could be selected as potential targets by would-be terrorists. A bioterrorist attack upon a country club's food supply could be carried out by a foodservice employee or someone who has access to the operation with the potential to harm hundreds of club members, their families, and their guests.

### ***Statement of Problem***

Foodservice professionals need to be aware of the risks of food bioterrorism as they are responsible for managing the final control point in the food supply chain. Most foodservice operations have crisis management plans in place to deal with natural disasters and workplace emergencies. Unfortunately, these crisis management plans do not properly address how to manage intentional contamination of an operation's food or water supply. All foodservice operations are recommended to secure their food supplies, and particularly those that serve high-risk individuals, such as children, seniors, and patients (Yoon & Shanklin, 2007c). Foodservice operators need to update their crisis management plans to protect their customers and employees from the possibility of bioterrorism (Bledsoe & Rasco, 2002; Bruemmer, 2003; United States Department of Agriculture Food and Nutrition Service, 2004; Yoon & Shanklin, 2007a)

Past research has studied bioterrorism perceptions and preventative practices in school foodservice and hospital foodservice operations (Yoon & Shanklin, 2007a; Yoon & Shanklin, 2007b; Yoon & Shanklin, 2007c). However, very little is currently known about club professionals' perceptions of the importance of these preventive practices and the frequency

these preventive practices are used in country club foodservice operations. Club professionals' perceived self-efficacy is their belief in their own capabilities to plan and implement necessary actions to effectively deal with events in their country club and should be explored. Club professionals' perceived barriers to implementing a biosecurity plan and implementing preventive practices also should be studied.

This study examined country club professionals' importance perceptions of securing their foodservice operations against a food terrorism attack and the perceived preventative practices that could be implemented to counter such an attack. Gaps between importance perceptions and the frequency of perceived preventative practices were examined to ascertain if there was a relationship with club professionals' concern about food terrorism and how often preventive practices were implemented in their clubs. Perceived self-efficacy measures and perceived barriers were studied to assess if there was a relationship with club professionals' motivation to develop a food defense management plan and the frequency that preventive practices were implemented in their clubs.

## **Literature Review**

### ***Food Terrorism, Food Biosecurity, and Bioterrorism***

Although it is difficult to pinpoint exactly when terrorism started, the origins of terrorism are believed to have begun around 2,000 years ago. Acts which could be regarded as terrorist activities were first recorded in the United States during the Civil War. Anarchist-related terrorism was active throughout the 1880s in the U.S. and continued into the 20<sup>th</sup> Century with organized groups such as the Ku Klux Klan (Center for Defense Information, 2003; Harper, November, 2001).

Modern terrorism generally employs the use of weapons, with (in descending popularity) the use of such items as bombs, guns, knives and other bladed weapons, remote control bombs, fire, chemical and biological weapons, and unknown or unspecified weapons (Bogen & Jones, 2006). Worldwide terrorism resulted in 86,568 casualties and 25,408 deaths from 1968 to 2004 in 19,828 documented terrorist events and 7,401 adverse events. Bogen and Jones (2006) projected that these numbers will increase in the future, with an upward trend in number of deaths, injuries, and terrorist events.

The Federal Emergency Management Agency (FEMA) defines terrorism as “the use of force or violence against persons or property in violation of the criminal laws of the United States for purposes of intimidation, coercion, or ransom”. According to FEMA (2006), terrorists use threats to strike fear into society, attempt to convince citizens that the government is unable to control terrorism, and to draw attention to terrorists’ causes. Types of terrorist acts may include bombings and bomb scares and the use of biological, chemical, nuclear and radiological weapons (FEMA, 2006).

Al-Qaeda terrorist attacks against high-profile U.S. landmarks on September 11, 2001 were witnessed by a worldwide television audience. The attacks upon the World Trade Center in New York City, the Pentagon in Washington D.C., and the hijacked American Airlines Flight 77 claimed 3,056 lives (Bogen & Jones, 2006). These attacks used commercial passenger jets as explosive devices, and grimly demonstrated how terrorism could effectively strike fear within society. Following September 11<sup>th</sup>, letters containing anthrax spores were mailed to multiple news media offices and two U.S. Senators. This resulted in the deaths of 17 Americans, becoming the worst case of biological terrorism in U.S. history (FBI, 2008). Despite these acts of bioterrorism being limited to a few selected targets, millions of U.S. citizens became uneasy with the simple act of opening the mail, a potentially dangerous undertaking (Hall et al., 2003).

Since 2001, governmental agencies and international organizations have substantially increased their efforts to address bioterrorism. According to the World Health Organization (2002), governments and companies cannot ignore the potential for biological attacks upon their organizations. Taking intelligent precautions, along with effective surveillance and response capability, are the best first lines of defense to counter bioterrorism and food safety emergencies (WHO, 2002).

### ***Motivation of Terrorists***

Individuals using food as a vehicle for terrorist activities likely have multiple motivations for doing so. Intentional contamination of the food chain could potentially have significant social, political, economic, and public health consequences (Crutchley, 2007). Terrorists’ motivation can be political, economic, or malicious mischief. Many individuals initiating food terrorism may have initially been good-intentioned activists whose actions have gone bad from various causes, such as environmental, consumer protection, animal rights movements, or

political anarchists (Rasco & Bledsoe, 2005). Other motivations of activists include those who fear social progress, innovation, or technology.

According to Stern (1999), conflicting ideologies between civilizations provides the primary reason for people to join organizations such as Al-Qaeda. Rasco and Bledsoe (2005) argue that those in the U.S. are unfortunately “naïve in assuming that all rational people share beliefs regarding the relative importance of rights and responsibilities between citizens and the state, the extent of governmental liberty and scope of governmental authority, and the equality of individuals regardless of gender, race, ethnic origin, or religious belief”. Terrorist groups driven by religious motivations have become more prevalent and threaten Western society by using more sophisticated methods, which may include biological and chemical agents (Stern, 1999). Rasco and Bledsoe noted that the terrorist threat against food production, processing, and research is increasing (2005).

### ***Repercussions from Bioterrorism Attacks***

To understand the potential impacts of intentionally contaminated food, one can observe the effects of unintentional foodborne illness upon the public due to poor food safety practices, both domestically and internationally. The Centers for Disease Control and Prevention (CDC) estimated that foodborne illnesses cause “approximately 76 million illnesses, 325,000 hospitalizations, and 5,000 deaths in the United States each year. Known pathogens account for an estimated 14 million illnesses, 60,000 hospitalizations, and 1,800 deaths...while unknown agents account for the remaining 62 million illnesses, 265,000 hospitalizations, and 3,200 deaths” (Mead et al., 1999).

The effect of foodborne illness upon public health services can be taxing, whether unintentional or not. Many countries simply do not have the resources to address the consequences during or after large-scale emergencies. Furthermore, a lack of readiness, coupled with potential difficulties in identifying uncommon pathogens could yield inaccurate diagnoses. This would have a significant and adverse effect upon a public health organization to effectively respond to a large food sabotage event (WHO, 2002).

Terrorists may use bioterrorism to destabilize society and may have many motives for doing so. The goal of terrorism for the purpose of social and political disruption is to create an atmosphere of public fear and anxiety. This, in turn, may lead to a decreased confidence in the government, which may or may not result in political destabilization. If used in conjunction with

attacks upon economic interests, the political effects can be magnified, especially in the presence of food shortages (WHO, 2002).

Prior to September 11<sup>th</sup> and the anthrax attacks, public health leaders and government agencies had not incorporated mental health management strategies as components of terrorism response plans (Becker, 2001; Hall, 2002). Since that time, predicting and understanding the behavioral and psychological repercussions from a terrorist attack has become an important task involving the U.S. healthcare system and government leaders (Hall et al., 2003).

### ***Biological and Chemical Agents used in Bioterrorism***

Bioterrorism as defined by the USDA is “the intentional use of biological and chemical agents for the purpose of causing harm” (United States Department of Agriculture Food and Nutrition Service, 2004). Bioterrorism utilizes biological or etiological toxins, agents, and diseases in the process of carrying out a terrorist act. The Federal Bureau of Investigation (FBI) has indicated that common household items can be utilized to create weapons that could contaminate food with biological or chemical agents. (CDC, 2008a; Rasco & Bledsoe, 2005).

Biological agents are either living microbes that cause infectious disease or the toxins created by microorganisms. Both microbes and toxins are capable of causing death or serious illness, and are highly specific for their targets (plants, animals, and people) (Rasco & Bledsoe, 2005). Biological agents are susceptible to issues regarding their controllability, including environmental conditions (air flow, temperature, and pH), the viability of each given strain, and secondary transmission of the biological agent to non-desirable targets (collateral damage).

Toxins, similar in nature to chemical agents, are capable of causing severe damage upon delivery. Biological toxins are extremely potent and are capable of death or damage at levels as miniscule as one to ten parts in one quadrillion. Furthermore, certain agents such as *Clostridium botulinum* and *Bacillus anthracis* may undergo sporification (spore formation), making them resistant to destruction and capable of persisting for extended periods of time in a variety of environments (Rasco & Bledsoe, 2005).

Depending upon the microorganism or toxin used, the effects of disease or intoxication can take anywhere from 30 minutes to several weeks to cause infection or intoxication. A delay between administering a biological agent until the first onset of symptoms might actually be desirable to perpetrators, giving them time to flee and confusing investigators of intentional food contamination incidents. In addition, symptoms of foodborne intoxication and infection can be

misdiagnosed, especially if an uncommon microbe, fungus, or biological toxin is used or the time of initial contact is unknown or falsely reported (Rasco & Bledsoe, 2005).

Those intent upon spreading disease can use virtually any naturally-occurring pathogens as agents of intentional contamination (Berns et al., 1998). Bioterrorism agents and diseases have been categorized by the CDC into three descending categories of priority (A, B, and C), based upon how easily they may be spread and the severity of illness and morbidity of which they cause (CDC, 2008a).

Category A agents include *Clostridium botulinum*, *Bacillus anthracis*, and smallpox. These agents have high mortality rates, are easily transmittable, and have the potential to severely impact public health. Of primary concern is *Clostridium botulinum*, the organism responsible for the most toxic compound produced by a biological system. One pure ounce of *Clostridium botulinum* toxin could potentially kill 200 million people (Fung & Goetsch, 2004). In 1991, the country of Iraq stated that they possessed 19,000 liters of botulinum toxin, which was calculated to be three times the amount needed to kill every human being on earth (Rasco & Bledsoe, 2005). *Bacillus anthracis*, the microorganism that causes the anthrax disease, is extremely stable and is 85% lethal if an infective dose (8,000-50,000 spores) is inhaled. It has been estimated that in an urban population of 5 million inhabitants, 50 kg of anthrax spores released via aircraft (airborne dispersion) would kill approximately 100,000 people and sicken 250,000 more (Rasco & Bledsoe, 2005). Smallpox is a contagious disease caused by the variola virus, with a fatality rate of up to 30%. Symptoms of smallpox disease include body aches, high fever, and vomiting. Rashes develop, which spread and become pus-filled blisters and raised bumps that crust, scab, and flake off in approximately three weeks, causing pitted scars. Just one confirmed case of smallpox is sufficient reason to declare a public health emergency (CDC, 2007b). Although smallpox was declared to be eradicated from the planet in 1980, there is still concern that smallpox may still exist and be able to be used as a bioweapon (CDC, 2002).

CDC Category B definitions represent bioterrorism agents and diseases with relatively lower morbidity and mortality rates than Category A agents that are less easily disseminated from person to person. Of particular notoriety is the ricin toxin, which can be rather simply extracted from the castor bean (*Ricinius communis*), for which there is no antidote. Furthermore, ricin toxin is extremely potent, can be inhaled or ingested, and remains stable for several hours, making it a good candidate for bioterrorism (Rasco & Bledsoe, 2005).

CDC Category C definitions represent emerging pathogens that could be used in a bioterrorist attack due to their ease of production, availability, and likelihood of high morbidity and mortality rates. This includes emerging infectious diseases such as Nipah virus and hantavirus.

Chemical agents can also be utilized for bioterrorist activities with the purpose of causing harm. The use of chemicals with the intent to poison others is an ancient technique, dating back thousands of years. In 331 B.C., following the suspicious deaths of many leading Roman citizens, a slave girl approached the magistrate and, in exchange for immunity from prosecution, revealed that cause of the deaths in question was due to intentional poisoning. As a result, twenty Roman women were put on trial for “brewing noxious concoctions”. When the defendants denied any allegations of wrongdoing and instead claimed to have been creating substances with “curative properties”, the court challenged the women to drink their creations to prove their claim of innocence. The defendants agreed and ingested the substances, which effectively killed them (Bauman, 1992).

Chemicals are “ready-made” and do not need to be cultivated or extracted as do biological toxins (Rasco & Bledsoe, 2005). Hazardous chemicals can be manufactured from easily obtained items, such as household cleaners, and released intentionally in a terrorist attack (CDC, 2005a). Furthermore, some of the chemical agents are not overly-difficult for motivated individuals or groups to manufacture (National Research Council, 2002). Because chemicals are widespread and used throughout society, access to chemical sources should be secured to protect citizens from those who could use them to cause intentional harm (United States Department of Agriculture Food and Nutrition Service, 2004). Periodic review of procedures for access, handling, and storage procedures of hazardous materials in the workplace is recommended. This includes acids, solvents, cleaning materials, pesticides, paints, bases, water treatment and other chemicals (Bledsoe & Rasco, 2002).

There are potentially hundred of chemical agents that could be used in a bioterrorist attack. Chemical agents have long been used in warfare. For example, chlorine was used as a choking agent in World War I. Chemical weapons were also used by Saddam Hussein in the first Gulf War during the 1990s and in the Iran-Iraq war (Rasco & Bledsoe, 2005). Pertaining to food, however, it is more likely that agricultural or industrial chemicals would be used rather than military-developed chemicals. Steven Musser of the Center for Food Safety and Applied



Nutrition, Food and Drug Administration (CFSAN/FDA) has commented that even though the list of hundred of potential chemical agents could be reduced to 12-15, there is no “guarantee” that would-be terrorists would use any of those agents (Bryant et al., 2005).

### ***Previous Bioterrorism Research Conducted in Foodservice***

“Farm to fork” is the commonly-used term describing the “human food chain from agricultural production to consumption” (Dictionary.com's 21st Century Lexicon, 2010). Foodservice establishments represent the last link on the food chain (the “fork”) where food is prepared before final service to customers. There has been significant bioterrorism research conducted of the production and transportation of food, but research regarding the preparedness of the commercial foodservice segment is minimal at best (Yoon & Shanklin, 2007c). Previous bioterrorism research was conducted in school and hospital foodservice operations in the U.S. (Yoon & Shanklin, 2007a; Yoon & Shanklin, 2007b; Yoon & Shanklin, 2007c). Yoon and Shanklin (2007) studied food and nutrition professionals’ perceived importance, frequency of preventative measures, and self-efficacy in developing a food defense management plan. Foodservice operators who indicated more concern and caution towards threats of food bioterrorism more often performed preventive practices than foodservice operators who were less concerned and less cautious about food terrorism (Yoon & Shanklin, 2007c). Among preventative practices, foodservice operators considered chemical use and storage practices to be of the greatest concern for protection from bioterrorism and these practices were also the most frequently implemented in their operation (Yoon & Shanklin, 2007a). Yoon and Shanklin’s research concluded that increased awareness of foodservice operators and implementing preventive practices against bioterrorism can enhance levels of food defense in foodservice operations (Yoon & Shanklin, 2007b). It is reasonable to assume that these conclusions could apply to other foodservice operations, besides schools and hospitals. For this reason, private country clubs were selected for future foodservice research in food bioterrorism.

### ***Roles/Responsibilities of Club Managers and Other Foodservice Professionals***

Clubs are exclusive and typically only invite affluent and influential individuals (along with their families) to join their membership (Walker, 2009). Examples of people frequenting private clubs (members, their guests, or non-members) include: prominent citizens, business executives, celebrities, and government officials.

Nearly all U.S. private clubs have food and beverage facilities and serve food procured and prepared from the U.S. food supply (Walker, 2009). The safety and security of food served in private clubs ultimately resides with the club's general manager who is directly responsible for supervising all club professionals and department heads (Perdue, 2007).

Private clubs, which typically exclude non-affluent individuals from their membership roles, unintentionally project an image of wealth and privilege to non-members. Because private clubs are exclusive and cater to affluent, powerful and influential individuals, they could be considered as potential targets to would-be terrorists. Club members consider their club as an extension of their business and home and will use its facilities for both business and leisure (Angelo & Vladimir, 2004). The service of food and beverages is generally at the center of all club events.

To facilitate these events, private clubs employ foodservice workers and banquet servers. These positions may have up to a 285% annual turnover rate, due to significant numbers of seasonal employees hired to meet peak demands (Aziz et al., 2007). English is a second language for many foodservice employees and communication difficulties can occur between managers and non-English speaking employees. This can complicate attempts at conducting background checks or verification of job references. Background checks can be easily run on every line-level employee, including temporary employees who may be hired for busy times of the year, however this may be cost prohibitive to the club.

Food prepared in large quantities is easy to contaminate, thus banquets held at private clubs may present a terrorist (possibly an employee of the operation) the opportunity to harm 200 people or more at a time. One disgruntled employee could intentionally contaminate food or beverages served to members and cause extensive harm to club members, their guests, and club employees. Food production equipment that combines large batches of food ingredients together, such as a floor mixer, offer a would-be terrorist an ideal opportunity for contamination (United States Department of Agriculture Food and Nutrition Service, 2004). Additionally, equipment located in low-traffic or out of the way areas, such as an icemaker in a side room, could provide opportunities for intentional contamination with little chance of being detected.

After the physical damage from an initial bioterrorism attack, the psychological effects and shock value lingers, potentially causing more problems for a private club (USDA-FSIS & FDA, 2007). A perceived violation of safety and security with something as personal as food

(which they trust the club to be safe to put in their bodies) may result in members resigning from the private club, even if they themselves were not directly affected.

### ***Security Issues Associated with Private Clubs***

General Managers of private clubs are recommended to have emergency preparedness procedures in place to protect the safety and health of their members (Club Managers Association of America, 2002). A written Disaster Recovery Plan (DRP) is the primary document used to ensure continued and effective operations of private clubs during and following a disaster (Club Managers Association of America, 2002). Contained within the Disaster Recovery Plan is an Emergency Evacuation Plan (EEP), consisting of the following items: evacuation, facility protection, emergency equipment (inspection, maintenance, and readiness), public relations, employee welfare, fire fighting, first aid/CPR, utility controls, pollution/decontamination, communication, transportation, recordkeeping, and drills (Club Managers Association of America, 2002).

In addition to Disaster Recovery Plans and Emergency Evacuation Plans, club managers are recommended to form a Crisis Management Team (CMT) and discuss the issues that could conceivably cause problems for their club. This may include the following possible crises: vandalism, member/employee injury, employee found with serious disease, golf course grass disease, bomb threat, loss of electricity/water, chemical spill, untimely death of staff member/director, terrorism, flood, fire, gas leak, earthquake, hurricane, tornado (Club Managers Association of America, 2002). The safety and security of private clubs in regards to terrorism preparedness should be of as much concern to both members and employees as other items in a Disaster Recovery Plan.

The events of September 11, 2001 changed worldwide perceptions of terrorist threats to safety and security and the costs associated with the terrorist attacks, which can amount to hundreds of billions of dollars. Statistical odds of 1 in 9.3 million for Americans being the target of a terrorist attack may seem favorable, but if an attack occurs, the results could be deadly and final (Flinn, 2003). After September 11th, insurers faced a host of claims from individuals, businesses, and building owners in terms of property and casualty, health care costs, workers' compensation, and the prospect of rising premiums that might force the insured to find new alternatives. Insurance companies began putting terrorism exclusions in their policies or charging

exorbitant rates to cover the perceived risks of terrorism following the events of September 11th (Club Managers Association of America, 2002).

While the use of “weapons of mass destruction” by international terrorist organizations remains a potential threat, limited or individual attacks using common foodborne bacterial or zoonotic agents (to contaminate food systems or the public at large) will be more likely (Bledsoe & Rasco, 2002). This observation was echoed by the former Secretary of Health and Human Services Tommy Thompson. In his resignation speech, Mr. Thompson declared, “I, for the life of me, cannot understand why the terrorists have not, you know, attacked our food supply because it is so easy to do” (Branigin et al., 2004).

### *Summary*

Food security threats by terrorists have been predicted to be probable in the future and are easy to carry out. Motivations of food terrorists are varied but the final result is the intentional harm of humans using food as the delivery medium for biological, physical, or chemical contaminants. Retail foodservice is an indispensable part of life in America, where half of the food sold is prepared by others. The economic impact of the foodservice industry is enormous, and most hospitality organizations, including private clubs, have some sort of foodservice and beverage service offered to their customers. Employee turnover in foodservice operations can exceed 300% and employee background checks are not always conducted. Seasonal foodservice employees in club operations mean that workers come and go year-round. Clubs are exclusive and cater to the wealthy, making them a potential target for those who want to attack the wealthy and powerful using food terrorism. Many pathogens and easily obtainable chemicals exist that could be used for a terrorist attack. Although significant bioterrorism research has been done regarding the production and distribution of food, very little bioterrorism research has been conducted in retail foodservice and no research on bioterrorism has been conducted in private clubs. Many governmental agencies recommend creating a food defense management plan to counter the risk of bioterrorism. Previous research has shown that increased awareness of foodservice operators and implementing preventive practices to address bioterrorism can increase levels of food defense in foodservice operations.

## **Purpose and Research Questions**

The primary purpose of this study was to examine country club professionals' importance perceptions of securing their foodservice operations against a food terrorism attack and the perceived preventative practices that could be implemented to counter such an attack. Gaps between importance perceptions and the frequency of perceived preventative practices were examined to determine if there was a relationship with club professionals' concern about food terrorism and how often preventive practices were implemented in their clubs. Perceived self-efficacy measures and perceived barriers were studied to assess if there was a relationship with club professionals' motivation to develop a food defense management plan and the frequency to which preventive practices were implemented in private country clubs. Demographic characteristics were compared with importance perceptions and frequency of practices.

Based upon the lack of research in private clubs regarding bioterrorism, the recommendations of past researchers and government reports to implement preventative practices within foodservice operations, the unique private and privileged nature of private clubs, and the ubiquitous nature of the foodservice industry for employees and customers alike, and the economic ramifications surrounding private clubs, foodservice, and terrorism, this study explored the following research questions and propositions related to food bioterrorism in private country clubs:

### ***Research Questions and Propositions***

The research questions guiding this dissertation were as follows:

1. What are club professionals' perceptions of the importance of facility security in their country clubs?
2. What are club professionals' perceptions of the importance of utility security in their country clubs?
3. What are club professionals' perceptions of the importance of employee management in their country clubs?
4. What are club professionals' perceptions of the importance of communication in their country clubs?
5. What are club professionals' perceptions of the importance of food handling in their country clubs?

6. What are club professionals' perceptions of the importance of chemical use and storage in their country clubs?
7. To what frequency are the items mentioned in research questions 1 – 6 practiced in these country clubs as reported by the club professionals?
8. To what frequency are the items mentioned in research questions 1 – 6 practiced in these country clubs as directly observed through an onsite visit in these country clubs?
9. Are club managers' levels of concern about biosecurity in their operations affected by the gaps between importance and the frequency of practice in research questions 1 – 6?
10. What level of perceived self efficacy do club professionals possess to develop a management plan related to food defense?
11. What level of perceived self efficacy do club professionals possess to implement preventive practices to deal with items mentioned in research questions 1 – 6?
12. What perceived barriers exist that could prevent club professionals from developing a food defense management plan?
13. What perceived barriers exist that could prevent club professionals from implementing preventive practices to deal with items mentioned in research questions 1 – 6?
14. What differences among demographic characteristics exist in comparison with importance and frequency of practices?

The gap between the perception of the importance of preventive practices and actual practice frequency was evaluated to see if risk perception was affected by the size of the gap. By using the size of gaps, the study elucidates which preventive measures should receive more attention in training materials or bulletins. When club professionals are more concerned about food bioterrorism and biosecurity, a smaller gap between importance perception and practice frequency should occur because club professionals are then more likely to perform the preventive practices frequently.

Club professionals' self-efficacy is their belief in their own capabilities to plan and implement necessary actions to effectively deal with events in their country club. Club professionals with higher levels of perceived self-efficacy should be more motivated to develop food defense management plans and should implement preventative practices more often in their country clubs than club professionals with lower levels of perceived self-efficacy. Conversely, club professionals with higher numbers of perceived barriers should be less motivated to develop

food defense management plans and should implement preventive practices less frequently in their country clubs than club professionals with lower numbers of perceived barriers.

Based on this reasoning, six research propositions were investigated:

Proposition 1: Club professionals with smaller gaps between importance perception and practice frequency are more concerned about food terrorism and biosecurity than operators with larger gaps.

Proposition 2: Club professionals with smaller gaps between importance perception and practice frequency implement preventive practices more frequently than operators with larger gaps.

Proposition 3: Club professionals with higher levels of perceived self-efficacy are more motivated to develop a food defense management plan in their country clubs than club professionals with lower levels of perceived self-efficacy.

Proposition 4: Club professionals with higher levels of perceived self-efficacy implement preventive practices more frequently than club professionals with lower levels of perceived self-efficacy.

Proposition 5: Club professionals with higher numbers of perceived barriers are less motivated to develop a food defense management plan in their country clubs than club professionals with lower numbers of perceived barriers.

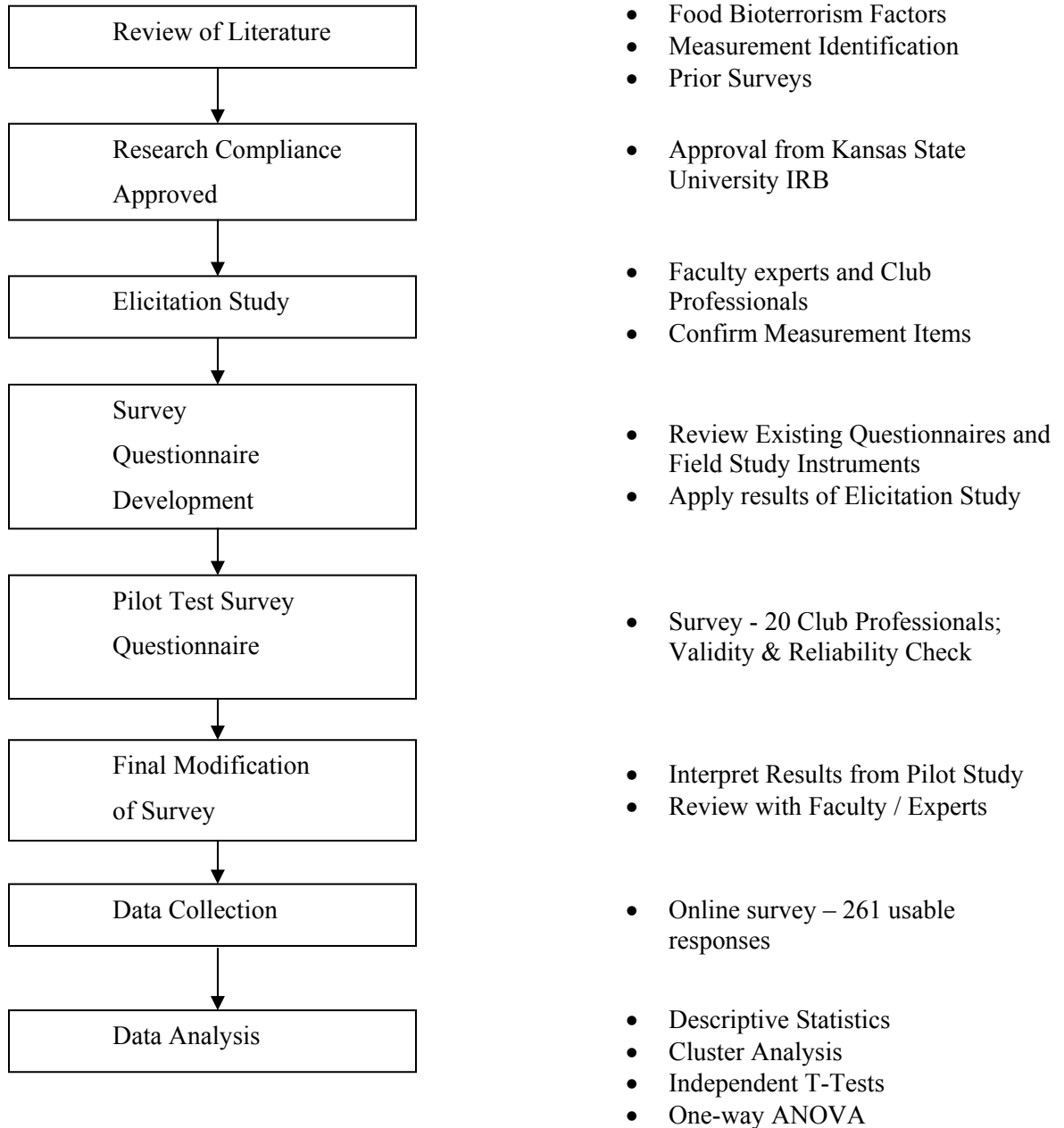
Proposition 6: Club professionals with higher numbers of perceived barriers implement preventive practices less frequently than club professionals with lower numbers of perceived barriers.

## **Methodology**

### ***Population and Sample***

The population for this study was all country club professionals listed in the Club Manager's Association of America (CMAA) member directory and whose operation was located in the United States. Membership information in the CMAA directory was segmented by type of clubs, including country clubs. The study population for this study was CMAA members employed in private country clubs. As of February 2010, a total population of 3,924 club professionals was listed in the CMAA member directory, comprising every type of club segment within CMAA. The country club segment of the CMAA member directory listed 2,354 club

**Figure 2 - Research Steps**





professionals or approximately 60% of the total CMAA membership. Following pilot testing, 2,119 CMAA country club professionals remained as the sample used for the study's main data collection. According to Dillman, a population size of 2,119 with a +/- 5.68% sampling error for a 50/50 split requires a sample size of 261 usable responses (Dillman, 2000).

### ***Overview of Data Collection***

Figure 2 illustrates the research process used for this operational research study. Measurement items were initially developed from two different sources: previous literature and focus groups with academic and industry experts. Pilot testing of the survey instrument determined what items needed modification or clarification before final data collection. Data analysis was completed to answer the research questions.

### ***Research Compliance***

The research protocol was reviewed and approved by Kansas State University Institutional Review Board as documented by the approval letter in Appendix A. Permission was obtained to adapt survey instruments used in prior biosecurity research and is documented in Appendix B.

### ***Elicitation Study***

The purpose of an elicitation study (or focus group) is to gather qualitative data from a group of people regarding a particular idea, concept, product, or service (Wikipedia, 2009a). Interactive group discussions can help to stimulate participant's memories, experiences, and ideas which can generate valuable insights into the items being discussed. Individuals familiar with foodservice, bioterrorism, and private club management participated in an elicitation study which helped to develop the study's survey and field study instruments. Participants included Kansas State University faculty and graduate students from the Department of Hospitality Management and Dietetics, faculty from the Kansas State University Food Science Institute, a country club manager, and three chefs with extensive experience in foodservice operations (including country clubs). Focus group participants were given an overview of food security, food bioterrorism, and country club operations and were informed of the purpose of the study. Survey instruments adapted from prior food defense research surveys were presented to the focus group for critique and constructive feedback. Revisions were made to the survey instrument

based upon the focus group responses. This included identifying terminology familiar to club managers (e.g. using “security” instead of “biosecurity” when describing food defense practices). Other revisions included removing questions that pertained solely to school foodservice and aligning questions to measure operating practices and procedures within club operations. A pre-pilot version of the survey was sent to focus group participants and other individuals (see pilot study and refinement) for final inspection before the survey was administered for pilot testing.

### ***Development of Survey Instrument***

The questionnaire was adapted from existing surveys that were used to conduct prior research in food defense and bioterrorism in school foodservice and healthcare. Because these existing surveys were tested for validity and reliability before data collection, they served as a strong model for the survey instrument (Yoon & Shanklin, 2007a; Yoon & Shanklin, 2007b; Yoon & Shanklin, 2007c). The survey instrument was modified using feedback from the elicitation study and the pre-pilot testing by elicitation study members and other individuals. The modified survey instrument measured items regarding club professionals’ perceptions of bioterrorism and preventative practices used in their respective clubs to counter bioterrorism.

Factors regarding club managers’ opinions toward food biosecurity explored in the study included: concern of club managers regarding biosecurity, perceived self-efficacy to implementing food defense practices, and perceived barriers to implementing food defense practices. Factors regarding club managers’ importance perceptions and perceived frequency of practices performed in their clubs related to chemical use and storage, employee management, facility security, food handling, and utility security. Demographic variables about the country clubs included: number of club memberships, number of foodservice employees, number of employees working per shift, and individuals responsible for implementing and monitoring food security. Demographic variables of club professionals completing survey measure included: position title, length of employment in current position, years employed in foodservice and club management, age, education level, sex, and club foodservice operating budget. The survey instrument administered is presented in Appendix C.

### ***Pilot Study & Refinement***

Permission was obtained from CMAA to use their member directory to contact club professionals associated with country clubs. E-mail invitations were sent to 235 randomly

selected CMAA country club professionals explaining the purpose of the study and encouraging them to click on a link to an online survey. Those who were invited to participate in the pilot study were not used again in the following main survey data collection.

The pilot test yielded 10 returned or undeliverable survey invitations and 25 responses (5 of which were unusable), for a total of 20 usable responses (an 8.51% response rate). A reliability check was performed upon the collected data using Cronbach's alpha ( $\alpha = .94$ ), which satisfied the desired value of  $\alpha \geq .90$  for reliability (Nunnally & Bernstein, 1994). Based on the results of the pilot study, the survey was revised and a final version of the questionnaire was developed and distributed to the remaining 2,119 club professionals in the country club sample.

### ***Data Collection***

Surveys were administered online via a dedicated e-mail link to each respondent linking to the Kansas State University survey system. No identifying information was asked and survey respondents were kept completely anonymous. Some researchers report that persons who respond to surveys answer questions differently than those who do not (Dillman, 2000). Efforts were taken to minimize survey non-response bias through effective online design and follow-up reminders. Because online surveys typically have low response rates, support from CMAA was requested and granted for use in the contact e-mail to respondents in an attempt to increase the participation rate. In addition, a chance to win a gift card redeemable for purchases in CMAA's bookstore was offered to club professionals as an incentive to complete the online surveys. Multiple attempts were made to contact non-respondents in order to delimit non-response bias. Two reminder e-mails were sent to members who had not responded to the survey (for a total of three e-mails), after which the survey offering was closed.

### ***Data Analysis***

Survey data were analyzed with the Statistical Package for the Social Sciences (SPSS) version 17.0 (SPSS Inc., 2008). Significance levels were set at  $p \leq .05$  for all data unless otherwise noted. Cronbach's alpha was used to assess the reliability of scale items in the survey questionnaire. Statistical processes applied to data included independent t-tests, one-way analysis of variance (ANOVA), chi-square testing, and cluster analysis.

Responses of club managers' opinions about food security were sorted into three groups: concern (8 items), self-efficacy (7 items), and barriers (4 items). Three independent items asked

club managers' opinions of the state of their clubs' security (1 item), reasons for implementing food security management plans (2 items), and are detailed in the study's discussion. Each opinion item was rated on a 1–5 Likert-type scale with 1 being “strongly disagree”, 2 being “somewhat disagree”, 3 being “neutral”, 4 being “somewhat agree”, and 5 being “strongly agree”.

Confirmatory factor analysis (CFA) was performed to assess the validity of importance perception factors used in previous surveys to address the study's propositions. Following CFA, the two questions comprising the communications factor from a previous study were merged into employee management and facility security. A total of five importance perception factors were confirmed, including chemical use and storage (5 items), employee management (7 items), facility security (8 items), food handling (10 items), and utility security (5 items) for a total of 35 items.

Each importance perception item corresponded with a practice frequency item for use in gap analysis. For this reason, practice frequency items were sorted exactly as importance perception items were, into the same five factors (chemical use and storage, employee management, facility security, food handling, and utility security).

Corresponding items used in gap analysis consisted of two parts, a statement (importance perception item) and a question (practice frequency item) that were worded very similarly. The statement asked the club manager how important a food security practice was and the question asked how often they performed this practice in their club. Each importance perception statement (e.g. “storing hazardous chemicals in a locked storage area”) was rated on a 1–5 Likert-type scale with 1 being “very unimportant”, 2 being “somewhat important”, 3 being “neutral”, 4 being “somewhat important”, and 5 being “very important”. Each corresponding practice frequency question (e.g. “our country club stores hazardous chemicals in a locked storage area”) was rated on a 1–5 Likert-type scale with 1 being “never”, 2 being “seldom”, 3 being “some of the time”, 4 being “most of the time”, and 5 being “all the time”. The gaps for all 35 corresponding food security practices were calculated by subtracting the practice frequency score from the importance score. The mean gaps were calculated for statements/questions in each factor and averaged.

Cluster analysis using Ward's method with squared Euclidean distance was used to group respondents into high and low groups for self-efficacy, barriers and width of gap scores between

**Table 4: Demographic Characteristics of Club Managers Responding to Food Biosecurity Survey (n=261)**

<b>Characteristic</b>	<b>n</b>	<b>%<sup>a</sup></b>	<b>Characteristic</b>	<b>n</b>	<b>%<sup>a</sup></b>
<b>Age</b>			<b>Number of years employed in current position</b>		
Less than 20 years old	0	0	0 - 5 years	145	55.6
20 – 29 years	16	6.1	6 - 10 years	71	27.2
30 – 39 years	40	15.3	11 - 15 years	18	6.9
40 – 49 years	88	33.7	16 - 20 years	11	4.2
50 – 59 years	89	34.1	21 - 25 years	6	2.3
60 years or older	20	7.7	26 - 30 years	4	1.5
			Greater than 30 years	4	1.5
<b>Sex</b>			<b>Number of years employed in foodservice</b>		
Male	227	87.0	0 - 5 years	12	4.6
Female	31	11.9	6 - 10 years	19	7.3
			11 - 15 years	26	10.0
<b>Education</b>			16 - 20 years	41	15.7
High school	7	2.7	21 - 25 years	45	17.2
Some college	48	18.4	26 - 30 years	58	22.2
Associate, 2-year, or Vocational	49	18.8	Greater than 30 years	58	22.2
Bachelor’s degree	134	51.3			
Graduate degree (Masters, Doctoral)	21	8.0	<b>Number of years employed in club mgmt</b>		
			0 - 5 years	30	11.5
<b>Annual foodservice operating budget</b>			6 - 10 years	43	16.5
Less than \$2,000,000 per year	129	49.4	11 - 15 years	53	20.3
\$2,000,000 - \$5,000,000 per year	109	41.8	16 - 20 years	46	17.6
Greater than \$5,000,000 per year	13	5.0	21 - 25 years	48	18.4
Don't know or prefer not to respond	8	3.1	26 - 30 years	21	8.0
			Greater than 30 years	18	6.9

<sup>a</sup>Responses may not equal 100% due to non-response to a question.

**Table 5: Comparison of Full-time/Part-time/Temporary Foodservice Employees in Country Clubs Whose Managers Responded to Food Security Survey<sup>a</sup> (n=261)**

<b>Number of employees</b>	<b>Full-time</b>	<b>Part-time</b>	<b>Temporary</b>
0 – 10 employees	67 (25.7%)	88 (33.7%)	147 (56.3%)
11 – 25 employees	92 (35.3%)	101 (38.7%)	63 (24.1%)
26 – 50 employees	73 (28.0%)	50 (19.2%)	34 (13.0%)
51 – 75 employees	16 (6.1%)	13 (5.0%)	7 (2.7%)
76 – 100 employees	5 (1.9%)	4 (1.5%)	3 (1.2%)
101 – 125 employees	3 (1.1%)	2 (0.8%)	0 (0.0%)
126 – 150 employees	3 (1.1%)	0 (0.0%)	0 (0.0%)
No Response	2 (0.8%)	3 (1.1%)	7 (2.7%)

<sup>a</sup> Question(s) asked of respondents: “How many full-time/part-time/temporary foodservice employees are on your payroll?”

importance perceptions and practice frequencies. Independent samples t-tests or one-way ANOVA were used to detect significant differences between groups. Levene's Test for Equality of Variances was conducted to see if the groups had approximately equal variance on the dependent variables used to test research propositions. Tukey's HSD Post Hoc Test was conducted for significant ANOVA values to identify which means were significantly different from one another.

Independent variables used to answer research questions, test propositions, and examine demographic characteristics included gap scores, self-efficacy, barriers, number of club members, status of crisis management plan in club, and club operating budget. Dependent variables used in the study included concern, practice frequency, intent to implement food security management plan, and importance perceptions.

## **Results**

### ***Response Rate***

From the 2,119 CMAA country club members invited to complete the survey, a total of 392 people responded to the survey invitations. Of these 392 responses, 261 were usable, for a response rate of 12.32%. Only 22 e-mails (out of 2,119 sent) were returned as undeliverable. A reliability check was performed upon the collected data using Cronbach's alpha ( $\alpha = .95$ ), which satisfied the desired value of  $\alpha \geq .90$  for reliability (Nunnally & Bernstein, 1994).

### ***Demographics***

Demographic characteristics of club professionals responding to the survey and their respective club operations are detailed in Table 4. Of the 261 respondents, 87% were male and 51.3% held bachelor's degrees. Ages ranged from 22 years to 68 years of age. The majority of respondents were between 40 – 59 years of age (67.8%). The majority of respondents' reported position titles were "Club Manager" (64%), "Clubhouse Manager" (12.3%), and "Food and Beverage Director" (6.5%). Other titles included Assistant General Manager (5.7%) and Executive Chef (3.8%). All respondents occupied a managerial position in the clubs where they were employed, thus satisfying the requirement of being a club professional. Over half of respondents (55.6%) had been employed in their current position for 5 years or less. However,

50.9% of club professionals indicated they had worked in club management for over 20 years. In addition, 61.6% of respondents stated that they had over 20 years of experience in foodservice.

An annual foodservice operating budget of under \$2,000,000 was reported for 49.4% of clubs, with 41.8% reporting an annual budget of \$2,000,000 - \$5,000,000 and 5.0% of clubs reporting an annual budget of over \$5,000,000. A one-way ANOVA was used to test for differences in practice frequencies among annual budgets. Practice frequencies differed significantly across the three budget size ranges,  $F(3, 255) = 3.79, p = .011$ . Tukey post-hoc comparisons of the three groups indicate that clubs with operating budgets greater than \$5,000,000 annually ( $M = 4.46, 95\% \text{ CI } [4.22, 4.70]$ ) performed preventive practices significantly more frequently than clubs with budgets of less than \$2,000,000 annually ( $M = 3.88, 95\% \text{ CI } [3.78, 3.97]$ ),  $p = .005$ . Clubs with operating budgets greater than \$5,000,000 annually ( $M = 4.46, 95\% \text{ CI } [4.22, 4.70]$ ) performed preventive practices more frequently than clubs with budgets of \$2,000,000 - \$5,000,000 annually ( $M = 3.96, 95\% \text{ CI } [3.83, 4.08]$ ),  $p = .022$ . Comparisons between clubs with budgets of \$2,000,000 - \$5,000,000 annually ( $M = 3.96, 95\% \text{ CI } [3.83, 4.08]$ ) and clubs with budgets of less than \$2,000,000 annually ( $M = 3.88, 95\% \text{ CI } [3.78, 3.97]$ ) were not statistically significant at  $p \leq .05$ . Respondents were asked, "How many total club memberships does your club have?" This referred to the person, family, or business holding the membership and not the total number of people that each membership covered. One third of all clubs (34.1%) had 501 – 750 memberships; 29.1% of clubs reported 251 – 500 memberships. Larger clubs (30.2%) reported memberships from 751 – 5,000 members, while only 5.4% of clubs had 250 memberships or less. One-way ANOVA was conducted to determine if there were differences between size of clubs (i.e. number of memberships) in relation to practice frequency. No significant differences were found.

Demographic questions regarding human resources focused upon number of workers (full-time, part-time, temporary, and average number working per shift) employed at each respondent's respective country club. A total of 35.3% of clubs employed 11 – 25 full-time workers, followed by 26 – 50 full time employees (28%), and 0 – 10 full time employees (25.7%). The remaining 10.2% of clubs employed from 51 – 150 full time workers.

Table 5 shows that 38.7% of clubs employed 11 – 25 part-time workers (as compared to 35.3% for the same number/range of full-time employees). Clubs also employed more part-time workers at the 0 – 10 employee range (33.7%) than full-time employees (25.7%). The 51 – 125



employee range accounted for 7.3% of the part-time workers, which was at a lower level than the reported full-time workers (10.2%). Part-time workers in the 26 – 50 employee range (19.2%) were also lower than full-time numbers (28%).

Respondents also were asked how many temporary foodservice employees were on their payroll during peak periods. The question requested the number of additional employees needed to help cover the summer season (June – August) and the traditional winter holiday season (mid-November through New Year’s Eve), both busy time periods during annual club operations. Table 5 shows that over half of the clubs (56.3%) only hired 0 – 10 temporary employees. This percentage descended as the range of employees hired increased, suggesting that clubs with more employees need less temporary workers.

Respondents were queried of the average number of foodservice employees working per shift in their club operations. Clubs employing up to 25 workers per shift accounted for 81.6% of the respondents. Only 12.6% of clubs hired 26 – 50 employees per shift and only 1.2% reported that they hired more than 50 workers per shift. Although 36.4% of clubs hired 0 – 10 employees per shift, the majority reported an average of 11 – 25 employees per shift (45.2%), reinforcing the importance of foodservice labor in club operations.

No significant differences existed in managers’ length of employment in foodservice, length of employment in club management, or highest level of education completed when each was compared with concern, self-efficacy, barriers, importance perceptions, and practice frequencies. Additional tables are provided in Appendix F.

### ***Opinions***

Club managers’ opinions regarding food biosecurity were used to test propositions 1, 3, 4, 5, and 6 (n = 261). Ratings for all opinion items are shown in Appendix F.

### ***Concern***

Club managers’ (n = 261) perceived level of concern regarding food biosecurity was used to test proposition 1. Aggregated ratings for eight opinion items indicated a higher than average (3.00) level of concern for food biosecurity ( $M = 3.77$ ,  $SD = 1.16$ ).

**Table 6: Country Club Manager’s Importance Perceptions, Practice Frequencies and Gap Analysis Related to Food Biosecurity<sup>a</sup>**

	<b>Importance Perception <sup>a</sup></b>	<b>Practice Frequency <sup>b</sup></b>	<b>Gap <sup>c</sup></b>
<b>Chemical Use and Storage</b>	4.52 ±0.89	4.35±0.94	0.17
<b>Utility Security</b>	4.38±0.86	3.89±1.28	0.49
<b>Employee Management</b>	4.28±0.89	3.90±1.19	0.38
<b>Facility Security</b>	4.26±0.90	3.68±1.23	0.58
<b>Food Handling</b>	4.20±1.04	3.98±1.22	0.22
<b>Overall Average</b>	4.33±0.92	3.96±1.17	0.37

<sup>a</sup> Scale: 1= very unimportant to 5 = very important

<sup>b</sup> Scale: 1 = never to 5 = all the time

<sup>c</sup> Gap score = (Importance score – Practice score)  
(n=261)

**Table 7: Comparison between Perceived Importance and Frequency of Food Security Practices<sup>a</sup>**

	Mean ± Standard Deviation	
	Perceived Importance (n=261)	Practice Frequency (n=261)
<b>Chemical Practices</b>		
Training employees to use chemicals properly to prevent accidental food contamination and human exposure.	4.70±.078	4.36±0.86
Obtaining Material Safety Data Sheets (MSDS) for hazardous chemicals from our suppliers.	4.59±0.87	4.59±0.79
Making MSDS sheets readily available to foodservice staff who follow manufacturer’s instructions for storage and use of hazardous chemicals.	4.54±0.89	4.49±0.90
Storing hazardous chemicals in a locked storage area.	4.48±0.93	4.23±1.02
Maintaining accurate inventories of all foods and chemicals so we can detect and investigate unexplained additions to or withdrawals from stock.	4.20±0.98	4.06±1.05
<b>Utility Security Practices</b>		
Protecting computer data systems with passwords, network firewalls, and effective virus detection systems.	4.64±0.71	4.71±0.60
Installing and using backflow prevention devices on all water supply equipment and beverage dispensers.	4.57±0.74	4.41±0.98
Having procedures to follow if the management team suspects the airflow or water source has been contaminated with biological or other contaminants.	4.26±0.90	3.22±1.42
Securing outside access to all ice-making equipment to prevent unauthorized access.	4.23±0.90	3.57±1.29
Securing outside access to all water supply equipment to prevent unauthorized access.	4.20±0.94	3.55±1.29

Scale values range from Very unimportant (1) to Very important (5) for Perceived Importance Items and Never (1) to All the time (5) for Practice Frequency Items.

**Table 7: Comparison between Perceived Importance and Frequency of Food Security Practices (ctd)<sup>a</sup>**

<b>Employee Management Practices</b>	<b>Mean ± Standard Deviation</b>	
	<b>Perceived Importance (n=261)</b>	<b>Practice Frequency (n=261)</b>
Maintaining a current contact list of local authorities such as the police and fire departments, who should be notified in case of a security incident and distributes the list to the foodservice staff.	4.64±0.74	4.48±0.88
Providing employee training on identifying packaging that is acceptable and not acceptable.	4.49±0.73	4.05±1.00
Accounting for all keys, uniforms, and identification badges provided to current and former employees.	4.32±0.87	4.18±0.92
Training employees about a food security management plan.	4.28±0.81	3.46±1.25
Enforcing policies that define the personal items foodservice employees may and may not have in the food production or service areas.	4.25±0.82	3.86±1.11
Requiring all job candidates to pass background security checks beyond reference checks prior to hiring.	4.01±1.05	3.61±1.46
Using a system that ensures clear identification of foodservice personnel and their specific functions within the country club.	3.95±0.97	3.67±1.27
<b>Facility Security Practices</b>		
Securing all outside refrigeration / storage units at all times.	4.52±0.81	4.15±1.10
Controlling, monitoring, and securing all access points into all storage areas.	4.46±0.77	3.95±1.06
Having procedures in place for monitoring foodservice equipment to prevent someone from intentionally contaminating food during preparation.	4.37±0.89	3.72±1.19
Controlling, monitoring, and securing all access points into the foodservice facility.	4.34±0.88	3.78±1.15

Scale values range from Very unimportant (1) to Very important (5) for Perceived Importance Items and Never (1) to All the time (5) for Practice Frequency Items.

**Table 7: Comparison between Perceived Importance and Frequency of Food Security Practices (ctd)<sup>a</sup>**

<b>Facility Security Practices (ctd)</b>	<b>Mean ± Standard Deviation</b>	
	<b>Perceived Importance (n=261)</b>	<b>Practice Frequency (n=261)</b>
Controlling access of all visitors and unauthorized persons to food production areas.	4.32±0.85	3.80±1.15
Securing all doors, windows, roof openings, and vent openings at all times.	4.09±0.95	3.63±1.23
Inspecting security in all storage facilities regularly and maintaining a log of the results.	4.09±0.89	3.33±1.36
Meeting with local vendors to increase awareness about food security issues.	3.88±0.99	3.10±1.32
<b>Food Handling Practices</b>		
Purchasing all food ingredients, food products, packaging materials, and other foodservice supplies only from reputable suppliers who have appropriate permits, licenses, or insurance.	4.71±0.81	4.82±0.45
Storing all leftover food items in tightly sealed, clearly labeled, and dated containers.	4.60±0.85	4.61±0.69
Inspecting ingredient packages prior to use for evidence of tampering. (Examples of evidence are a broken seal or discoloration of food inside package).	4.58±0.82	4.48±0.80
Having procedures for safe handling and disposal of contaminated products.	4.55±0.84	4.10±1.03
Assigning an authorized person to verify and receive shipments both during business hours and after business hours.	4.35±0.93	4.22±0.93

Scale values range from Very unimportant (1) to Very important (5) for Perceived Importance Items and Never (1) to All the time (5) for Practice Frequency Items.

**Table 7: Comparison between Perceived Importance and Frequency of Food Security Practices (ctd)<sup>a</sup>**

<b>Food Handling Practices (ctd)</b>	<b>Mean ± Standard Deviation</b>	
	<b>Perceived Importance (n=261)</b>	<b>Practice Frequency (n=261)</b>
Verifying deliveries against a roster of scheduled deliveries and approved suppliers.	4.10±1.04	3.68±1.30
Requiring all food suppliers to use sealed packaging on foods delivered to our facility.	4.08±1.01	4.02±0.98
Requiring suppliers to provide advance notification for off-hour deliveries.	4.08±1.06	3.84±1.22
Using sealed packaging for food sent to satellite foodservice areas in our country club.	3.76±1.07	3.82±1.08
Having a policy that all delivery trucks on the premises be locked when not being loaded or unloaded.	3.17±1.07	2.22±1.26

Scale values range from Very unimportant (1) to Very important (5) for Perceived Importance Items and Never (1) to All the time (5) for Practice Frequency Items.

### ***Self-Efficacy***

Club managers' perceived level of self-efficacy regarding food biosecurity was used to test propositions 3 and 4. Aggregated ratings for seven opinion items associated with self-efficacy indicated a higher than average (3.00) level of self-efficacy for food biosecurity ( $M = 3.55$ ,  $SD = 1.04$ ). Of 261 respondents, 87 were placed in a low self-efficacy group ( $M = 2.78$ ,  $SD = 0.91$ ) and 174 were placed in a high self-efficacy group ( $M = 3.92$ ,  $SD = 0.88$ ).

### ***Barriers***

Club managers' perceived level of barriers regarding food biosecurity was used to test propositions 5 and 6. Aggregated ratings for four opinion items indicated a lower than average (3.00) level of barriers for food biosecurity ( $M = 2.40$ ,  $SD = 1.01$ ). Of 261 respondents, 186 were placed in the low barriers group ( $M = 2.03$ ,  $SD = 0.82$ ) and 75 were placed in the high barriers group ( $M = 3.33$ ,  $SD = 0.81$ ).

### ***Importance perceptions***

Club managers' perceived level of importance regarding food biosecurity was used to test propositions 1 and 2 ( $n = 261$ ). Aggregated ratings for 35 items comprising five importance factors are shown in Table 6. Scores for all 35 items are shown in Table 7. Club managers reported high overall levels of importance for food biosecurity ( $M = 4.33$ ,  $SD = 0.92$ ). Chemical use and storage rated highest in importance ( $M = 4.52$ ,  $SD = 0.89$ ), followed by utility security ( $M = 4.38$ ,  $SD = 0.86$ ). Food handling rated lowest in importance ( $M = 4.20$ ,  $SD = 1.04$ ), with facility security rating slightly higher ( $M = 4.26$ ,  $SD = 0.90$ ). All importance perceptions were rated between "4 – somewhat important" and "5 – very important", which indicated that club managers took the importance of these practices seriously.

### ***Practice Frequencies***

Club managers' perceived level of practice frequency regarding food biosecurity was used to test propositions 2, 4, and 6 ( $n = 261$ ). Aggregated ratings for 35 items comprising five practice frequency factors are shown in Table 6. Ratings for all 35 items are shown in Table 7. Overall, club managers reported moderately high levels of practice frequency for food biosecurity ( $M = 3.96$ ,  $SD = 1.17$ ). Club managers reported mid to high levels of practice frequency for food biosecurity ( $M = 3.96$ ,  $SD = 1.17$ ). Chemical use and storage rated highest in

practice frequency ( $M = 4.35$ ,  $SD = 0.94$ ), followed by food handling ( $M = 3.98$ ,  $SD = 1.22$ ). Facility security rated lowest in practice frequency ( $M = 3.68$ ,  $SD = 1.23$ ), with utility security rating slightly higher ( $M = 3.89$ ,  $SD = 1.28$ ). All importance perceptions were rated between “3- neither unimportant nor important” and “5 – very important”, which indicated that club managers took the importance of these practices somewhat seriously.

### ***Gap Scores***

Gaps scores used to test propositions 1 and 2 were calculated by subtracting aggregated practice frequency factor scores from corresponding aggregated importance perception factor scores. Specific details regarding mean gap scores for each factor are shown in Table 6. All factors’ importance perception scores were greater than practice frequency scores, and the average gap score was positive ( $M = 0.37$ ). Chemical use and storage had the smallest gap between importance perception and practice frequency (0.17), followed by food handling (0.22). Facility security had the largest gap (0.58), with utility security rating slightly smaller (0.49).

### ***Crisis Management and Food Security***

Respondents were asked about responsibilities for crisis management in their clubs. Specifically, they were asked “Does your country club have a crisis management plan?” Only 20.7% of club managers indicated that their club had a formal crisis management plan that is under the stewardship of a club employee. Approximately 45% reported having an informal crisis management plan and 30.3% do not have one at all. Crisis management plans can be adapted to include food security items and having an existing one that is formalized in place is a prerequisite to implementing an effective food security management plan. A one-way ANOVA was used to assess if there were differences in importance practices among reported levels of crisis management plans in clubs. Importance practices differed significantly across the respondents,  $F(3, 255) = 3.28$ ,  $p = .022$ . Tukey post-hoc comparisons of the three groups indicated that respondents whose club had a formal crisis management plan in place ( $M = 4.50$ , 95% CI [4.36, 4.64]) rated importance perceptions significantly higher than those respondents who did not have a formal crisis management plan ( $M = 4.19$ , 95% CI [4.04, 4.33]),  $p = .016$ . Comparisons between clubs who had an informal crisis management plan ( $M = 4.30$ , 95% CI [4.20, 4.40]) and the other two groups were not statistically significant at  $p \leq .05$ .



**Table 8: Comparison of Club Managers' Perceived Self-Efficacy and Their Intention to Implement a Food Security Management Plan<sup>a</sup>**

<b>Response</b>	<b>High Self-Efficacy<sup>b</sup></b>	<b>Low Self-Efficacy<sup>c</sup></b>
No, and we do not plan to develop one in the near future	54 (33.3%)	46 (57.5%)
Yes, but we have not determined a specific timeline	79 (82.1%)	29 (93.8%)
Yes, we plan to develop one within the next 12 months	8 (87.0%)	0 (93.8%)
Yes, we plan to develop one within the next 6 months	6 (90.7%)	3 (98.0%)
Yes, we plan to develop one within the next 3 months	15 (100.0%)	2 (100.0%)
Total	162	80

<sup>a</sup> Question(s) asked of respondents (used to test Proposition 3 of the survey):

“Does your country club plan to develop and implement a food security management plan?”

<sup>b,c</sup> Values reported in cumulative percentages.

$\chi^2(4, N = 242) = 16.88, p = .002$

**Table 9: Comparison of Club Managers' Perceived Barriers and Their Intention to Implement a Food Security Management Plan<sup>a</sup>**

<b>Response</b>	<b>High Barriers<sup>b</sup></b>	<b>Low Barriers<sup>c</sup></b>
No, and we do not plan to develop one in the near future	41 (59.4%)	59 (34.1%)
Yes, but we have not determined a specific timeline	22 (31.9%)	86 (49.7%)
Yes, we plan to develop one within the next 12 months	1 (1.4%)	7 (4.0%)
Yes, we plan to develop one within the next 6 months	3 (4.3%)	6 (3.5%)
Yes, we plan to develop one within the next 3 months	2 (2.9%)	15 (8.7%)
Total	69	173

<sup>a</sup> Question(s) asked of respondents (used to test Proposition 5 of the survey):

“Does your country club plan to develop and implement a food security management plan?”

<sup>b,c</sup> Values reported in cumulative percentages.

$\chi^2(4, N = 242) = 14.61, p = .006$

Over half of club professionals (53.5%) somewhat agreed (25.8%) or strongly agreed (27.7%) with the statement “our country club is well-secured against any type of food hazard/threat”. Of the remaining club professionals, 21.9% were neutral, 16.2% somewhat disagreed and 8.5% disagreed.

Club professionals were asked “if the board of directors of my country club suggests implementing a food security management plan, then my country club will develop one.” The majority (83.4%) either somewhat agreed (33.8%) or strongly agreed (49.6%); this result provides insight on the importance of engaging the board of directors to convince them of the importance of implementing food security management plans in country clubs. In comparison, club managers were asked the same question but instead with CMAA as the entity suggesting the food security management plan. In this instance, only 28.4% agreed, with 44.6% neutral and 26.8% disagreeing. This suggests that the motivation to implement a food security management plan would less likely come from an external organization (such as CMAA), and more likely from internal management and stakeholders in the club (i.e. board of directors).

Club professionals were asked, “Does your country club have one or more employee(s) whose responsibility is implementing and monitoring food security?” Of the 261 respondents, almost two-thirds of them (63.6%) indicated that they did. Those that answered “yes” were asked to identify who was responsible for implementing and monitoring food security. Multiple responses were allowed in case more than one person was responsible in the club. The Executive Chef was identified as the primary individual in charge of monitoring food security (34.7%), followed by the General Manager (15.9%), and the Sous Chef (15.7%). The Clubhouse Manager (13.8%) and the Food and Beverage Director (13.4%) were also identified to be responsible for food security. This suggests that perhaps food security is a team effort.

Club professionals were finally asked if they planned to develop and implement a food security management plan. Many respondents (38.7%) indicated that they were not planning to implement one. Of those that responded “yes”, only 15.5% stated that they had any sort of deadline for completing a food security management plan, while the majority (41.4%) of respondents indicated “yes”, but did not have a specific timeline.

## Proposition testing

### *Gap Analyses*

Proposition 1 (club professionals with smaller gaps [ $M = 3.78$ ,  $SD = 0.61$ ] between importance perception and practice frequency are more concerned about food terrorism and biosecurity than operators with larger gaps [ $M = 3.75$ ,  $SD = 0.61$ ]) was not supported. T-test results were not significant ( $t = .29$ ,  $p = .770$ ).

Proposition 2 (club professionals with smaller gaps [ $M = 4.16$ ,  $SD = 0.52$ ] between importance perception and practice frequency implement preventive practices more frequently than operators with larger gaps [ $M = 3.50$ ,  $SD = 0.53$ ]) was supported. T-test results were significant ( $t = 9.61$ ,  $p = .000$ ).

### *Self-Efficacy*

Proposition 3 (club professionals with higher levels of perceived self-efficacy are more motivated to develop a food defense management plan in their country clubs than club professionals with lower levels of perceived self-efficacy) was supported.  $\chi^2(4, N = 242) = 16.88$ ,  $p = .002$ . See Table 8 for specific results.

Proposition 4 (club professionals with higher levels of perceived self-efficacy [ $M = 3.95$ ,  $SD = 0.75$ ] implement preventive practices more frequently than club professionals with lower levels of perceived self-efficacy [ $M = 3.59$ ,  $SD = 0.64$ ]) was supported. T-test results were significant ( $t = 3.82$ ,  $p = .000$ ).

### *Barriers*

Proposition 5 (club professionals with higher numbers of perceived barriers are less motivated to develop a food defense management plan in their country clubs than club professionals with lower numbers of perceived barriers) was supported.  $\chi^2(4, N = 242) = 14.61$ ,  $p = .006$ . See Table 9 for specific results.

Proposition 6 (club professionals with higher numbers of perceived barriers [ $M = 3.57$ ,  $SD = 0.69$ ] implement preventive practices less frequently than club professionals

with lower numbers of perceived barriers [ $M = 3.93$ ,  $SD = 0.73$ ]) was supported. T-test results were significant ( $t = 3.70$ ,  $p = .000$ ).

## **Discussion**

The findings of this study revealed that club managers with smaller gaps between importance and practice frequency were not significantly more concerned about food terrorism than club managers with larger gaps. Club managers with smaller perceived gaps and clubs with larger operating budgets implemented preventive practices more frequently. In addition, club managers with higher levels of self-efficacy were significantly more motivated to develop a food defense management plan and performed preventive practices more frequently than club managers with lower levels of perceived self efficacy. This supported the proposition that club managers who think they are capable of implementing a food defense management plan will act upon their self-determination and do what is necessary to make their clubs secure. Club managers who had higher numbers of perceived barriers were significantly less motivated to develop a food defense management plan and performed preventive practices less frequently than club managers with lower numbers of perceived barriers. This supported the proposition that club managers who are overwhelmed with obstacles will be less motivated to protect their club against a possible bioterrorist act.

Data were compared with results from Yoon and Shanklin's food bioterrorism research conducted in U.S. school and hospital foodservice operations (Yoon & Shanklin, 2007a; Yoon & Shanklin, 2007b; Yoon & Shanklin, 2007c). Chemical use and storage also had the smallest gaps in both studies. This finding suggests that foodservice operators in school, hospital, and country club operations share similar views that chemicals are important potential dangers and should be monitored closely. Food handling, which was rated as the second highest most frequently implemented practice in schools and hospitals shared the same ranking as private clubs. Respondents in both studies also rated facility security and utility security as the two areas with the largest gaps between importance and practice frequency. This may show that schools, hospitals, and country clubs need to take steps to better secure outside access to their building and the access points to utility controls. Of particular interest are the comparisons of gap size

between the two studies. Both studies shared the same gap rankings, with chemical use and storage having the smallest gap, followed by (in increasing gap size) food handling, employee management, utility security, and facility security with the largest gap. Comparisons of gap values and rankings are shown in Appendix F, Table 20.

Club professionals were concerned about food biosecurity in their operations. The statement, “implementing preventive measures will decrease the risk of tampering or other malicious, criminal or terrorist actions in my country club” was rated the highest ( $M = 4.04$ ,  $SD = 1.00$ ) among concern items. This shows that club professionals agree that preventative practices can be implemented to counter the risk of food bioterrorism in their club.

Employees were perceived to be capable of implementing a food defense management plan ( $M = 3.78$ ,  $SD = 0.95$ ), rating slightly higher than club professionals’ own view of their capabilities to do the same ( $M = 3.59$ ,  $SD = 1.00$ ). This suggests that club professionals’ belief in their employees self-efficacy matches or exceeds their own perceived capabilities to plan to counter food terrorism. However, respondents indicated that club professionals were not as capable of knowing how to exactly respond to a food security threat ( $M = 2.99$ ,  $SD = 1.18$ ). Perhaps this could be related to the availability of a crisis management plan. For example, 30.3% of clubs did not have a crisis management plan, and 44.4% only had informal crisis management plans. The lack of formal policies and procedures likely contributes to a lack of confidence or capability to correctly respond to crises such as a viable food security threat.

Barriers to implementing a food security management plan included employee indifference ( $M = 2.55$ ,  $SD = 1.04$ ), cost ( $M = 2.40$ ,  $SD = 0.93$ ), time ( $M = 2.36$ ,  $SD = 1.00$ ), and club resources ( $M = 2.27$ ,  $SD = 1.05$ ). It is interesting that respondents indicated employees were capable of implementing a food defense management plan. However, respondents indicated that they may be indifferent or apathetic towards actually doing so. Cost barriers could be addressed by implementing practices that give a large return for a modest investment. These could include installing locks on exterior doors and securing food and chemicals within an operation.

Of particular interest is the importance of respondents’ opinions of the board of directors and CMAA in determining whether or not to implement a food defense

management plan. Respondents indicated they would be more likely to implement a food defense management plan when suggested by the board of directors ( $M = 4.24$ ,  $SD = 0.96$ ) than by CMAA ( $M = 3.02$ ,  $SD = 0.98$ ). Thus, the support of the board of directors is crucial for those clubs serious about implementing food defense.

Almost two-thirds of respondents (63.6%) indicated that they had one or more employees whose responsibility was implementing and monitoring food security in their club. Executive chefs were the most often identified employee (34.7%) responsible for implementing and monitoring food security. It would have been interesting to see if there were significant differences in responses between executive chefs and other club professionals. However, no executive chefs were identified among the respondents in this study.

Food handling practices needing attention include keeping delivery vehicles locked when not being loaded or unloaded. This rated the lowest for both importance ( $M = 3.17$ ,  $SD = 1.07$ ) and practice frequency ( $M = 2.22$ ,  $SD = 1.26$ ). Although this can be a challenge to address, keeping delivery vehicles secured is beneficial for both the club and delivery personnel. Besides reducing the opportunity for intentional tampering of food supplies, securing delivery vehicles may help reduce the chance of accidental contamination of food product. Eliminating the opportunity for pilferage is another benefit that helps protect the trust and integrity between the club and its delivery professionals.

It is recommended that club managers meet with local vendors to discuss the importance of food security issues and practices their clubs will be implementing. Meeting with local vendors to increase awareness about food security issues was the facility security practice identified as having both the lowest importance ( $M = 3.88$ ,  $SD = 0.99$ ) and practice frequency ( $M = 3.10$ ,  $SD = 1.32$ ) ratings, thus suggesting an area that needs improvement. Although cost and value issues generally take priority during interactions with vendors, club professionals should take the time to convey their concerns about securing food within their facilities. Vendors interested in a club's business should acknowledge club professionals' food security concerns and become more knowledgeable about food security.

Securing access to ice-making equipment was identified as an important utility security practice ( $M = 4.23$ ,  $SD = 0.90$ ) performed infrequently ( $M = 3.57$ ,  $SD = 1.29$ ). A disgruntled employee or an outsider with uncontrolled access to an ice-maker could contaminate a club's ice supply with chemicals already available onsite. This action would affect all who dine in a club, including employees. Therefore, it is recommended that ice-making equipment be secured from outside access and located in areas that are constantly monitored by club professionals.

Overall, chemical practices rated highest for both importance ( $M = 4.52$ ,  $SD = 0.89$ ) and practice frequency ( $M = 4.35$ ,  $SD = 0.94$ ). However, keeping chemicals in a locked storage area was the second lowest rated practice frequency ( $M = 4.23$ ,  $SD = 1.02$ ). Securing chemicals should be a high priority of club professionals and needs to be taken seriously. Thus, access to chemicals must be controlled and only granted to authorized individuals. Additional benefits of securing chemicals are reducing accidental or improper use of chemicals and reducing pilferage.

### ***Limitations of the Study***

Perceived difficulties in data collection and analysis included:

- 1.) Club professionals are typically very busy and it may have been time-prohibitive for them to have taken time to complete surveys or participate in lengthy interviews.
- 2.) Online surveys typically have a low response rate. Efforts to increase participation were employed, but the sample size and response rate were less than expected.
- 3.) Data collection can present challenges if the club professionals are too busy to complete surveys or schedule interviews. Following Memorial Day, persuading club managers to participate in data collection was challenging due to increased summer activities (pool, tennis, golf, etc.).
- 4.) Surveys that are self-administered have limitations. Club professionals who chose not to complete the survey may or may not have had significant differences than club professionals who did choose to complete the survey.



- 5.) Although this study added to the existing body of literature on bioterrorism in foodservice operations, results cannot be generalized and applied to settings other than country clubs.
- 6.) Due to the serious nature of the research topic, club professionals may have been resistant or reluctant to share weaknesses of their club's readiness to protect their members from harm.
- 7.) This study only focused upon country clubs whose managers were members of Club Managers Association of America (CMAA). It is unclear if there would be any significant differences with clubs whose managers were not CMAA members.
- 8.) Observations and interviews took place primarily in the off-season. It is unknown if there would be any significant differences between seasonal changes in club activity.
- 9.) The online survey system had limitations which increased the perceived length of the survey. This may have contributed to respondents quitting the survey early or not being willing to participate.

### **Conclusions and Recommendations for Future Study**

There is a lack of research on food defense practices in retail foodservice, including private country clubs. This study was the first attempt to identify country club professionals' opinions, importance perceptions, and operational practices pertaining to biosecurity. Recommendations for managers of country clubs are based on the results of the data collection.

Club managers' mean importance ratings for chemical use, employee management, facility security, food handling, and utility security were 4.20 or higher on a 5 point Likert scale. This means that club managers thought that protecting their club against bioterrorism is worthwhile. No mean practice frequency ratings were lower than 3.89 on a 5 point scale, which is still higher than average and is to be commended. These results suggest that on average, club managers are addressing some issues associated with food defense, either directly or indirectly.

It is interesting that there was no difference in concern between club professionals with smaller gaps than larger gaps. This suggests that like importance, club managers are concerned about protecting their clubs, even though they may not be putting their concern into practice. Exactly why that is so could be part of a future research study.

Club managers' self-efficacy affected their motivation to implement a food defense management plan and implement preventive practices. In other words, those individuals who believed in their own capabilities to take action were more likely to do so. Closely related with this observation were barriers. Club managers who felt that there were many barriers in their way were less motivated to put procedures in place to secure their clubs against bioterrorism.

Future research recommendations are to study what factors could increase club professionals' self-efficacy to make them more confident about addressing serious security issues such as food defense in their club. It would be interesting to see if the same preventive food security factors would have achieved higher scores if they were framed in the context of overall club security and controlling pilferage instead of food bioterrorism.

Other club segments could also be explored to see if there were any differences between city clubs and country clubs and to gather initial data in segments other than country clubs. Public clubs could also be studied to determine if the threat of bioterrorism was perceived differently than in comparison to private clubs.

Furthermore, researching what specific barriers need to be removed in order to secure one's country club against food terrorism could be efficacious. As this topic has now been studied in hospitals, schools and country clubs, further research in independent or chain restaurants could also be useful. This study concludes with the observation that raising the importance and awareness of food security issues and implementing preventive practices can help a country club become more secure against food terrorism.

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## **CHAPTER 5 - Manuscript 2**

### **FOOD DEFENSE MANAGEMENT PRACTICES IN PRIVATE COUNTRY CLUBS – A CASE ANALYSIS**

#### **Abstract**

This field study investigated food security practices in private country clubs. Country clubs in the Midwestern United States whose managers were members of Club Managers Association of America (CMAA) comprised the convenience sample. Interviews with managers of country clubs and observations of actual operational practices were conducted to identify areas in country clubs that could be at potential risk of a bioterrorist attack. Most club managers indicated that their clubs were not at risk of a bioterrorist attack on their foodservice operations. Cost and lack of need were identified as barriers to implementing a food defense management plan. Club employees were identified as more likely to initiate a bioterrorism attack against country clubs than non-employees. Background checks and good employment practices were perceived as effective in increasing food security in clubs. Most country clubs did not monitor visitors' arrivals or departures and over half did not secure their chemicals. Recommendations to improve food security in country clubs included installing video surveillance, conducting background checks for all employees, securing access to chemicals, appointing a dedicated purchasing/receiving agent, issuing identification badges to all employees, and developing an overall disaster management plan that includes food defense.

#### **Introduction**

##### ***Food Security***

Safety and security is a major concern of country club managers, including the security of the food prepared for club members. The terrorism attacks on New York City and the Pentagon on September 11, 2001, closely followed by anthrax attacks on



governmental officials and members of the media, forever changed public perceptions of safety and security in the United States (U.S.). Following these incidents, increased priority was placed upon the safety and security of the food supply (Rasco & Bledsoe, 2005). *Bioterrorism* is defined as the “intentional use of biological or chemical agents for the purpose of causing harm” (United States Department of Agriculture Food and Nutrition Service, 2004). The USDA defines *Food biosecurity* as the “protection of food from bioterrorism” (United States Department of Agriculture Food and Nutrition Service, 2004). “Food biosecurity” is also referred to as “food security” (United States Department of Agriculture Food and Nutrition Service, 2004). The National Restaurant Association (NRA) defines *Food security* (also known as *food defense*) as “preventing or eliminating the deliberate contamination of food” (National Restaurant Association Educational Foundation, 2003). In addition, it is important to note the differences between *food safety* and food security. Food safety pertains to the accidental contamination of food, while food security (or food defense) refers to intentionally contaminating food with the goal of harming people and disrupting society (National Restaurant Association Educational Foundation, 2003).

The food supply chain, from production to consumption of food, is commonly called “farm to fork” or “farm to table” (Dictionary.com's 21st Century Lexicon, 2010). Threats to food security may occur in any portion of the food supply chain (National Restaurant Association Educational Foundation, 2003). For the purpose of this study, individuals or groups who intentionally contaminate or harm food products will be referred to as food terrorists, bioterrorists, or simply terrorists. A food terrorist is any individual who intentionally contaminates food including business competitors, people posing as customers, employees, vendors, and anyone with an agenda or cause (National Restaurant Association Educational Foundation, 2003). Bioterrorists may be motivated by attention/publicity, financial benefit, thrill-seeking, revenge/retribution, humor/prank, notoriety, creating chaos, obtaining a competitive advantage, and political/ideological differences (AIB International, 2006).

Although no publically documented incidents of food terrorism have occurred in country clubs, former incidents of food bioterrorism demonstrate the necessity of food defense practices. The Rajneeshee religious cult contaminated an Oregon restaurant’s

salad bar with *Salmonella* Typhimurium in 1984, affecting an estimated 751 people. The cult's motivation was to try to influence the outcome of a local election (AIB International, 2006). Ground beef purchased in a Michigan supermarket in 2003 was responsible for making 148 individuals ill. It was later discovered that 200 pounds of ground beef had been purposefully contaminated with insecticide by a disgruntled employee of the supermarket (CDC, 2003). Methomyl, a highly-toxic pesticide, was used to intentionally contaminate salsa served at a Mexican restaurant in Lenexa, Kansas in 2009. Two employees of the restaurant were charged, both who were relatives of the restaurant owner. Revenge was identified as the motivational factor to poison the restaurant's salsa that resulted in 48 customers becoming seriously ill (United States Department of Justice, 2010).

Country club managers should be aware of the dangers posed by bioterrorism because they oversee the final step of the food supply chain, where food is prepared and served to members. Creating a food defense management plan that outlines preventive practices to be implemented within a foodservice operation should be the most effective method to decrease the threat of bioterrorism (Bledsoe & Rasco, 2002; United States Department of Agriculture Food and Nutrition Service, 2004).

### ***Terrorism***

Historically, the roots of terrorism are believed to have started about 2,000 years ago. Religion was the primary driver of early terrorist activities, which originated in the first century A.D. and has continued somewhat into the modern day (Center for Defense Information, 2003). "Terrorism" came from the French word "terrorisme" coined during the Reign of Terror (regime de la terreur) in the French Revolution from 1793-1794 (Center for Defense Information, 2003; Harper, November, 2001). In the United States, terrorist-like activities were conducted during the Civil War. Further terrorist activity in the U.S. was documented during the 1880s and persisted into the 1900s in groups such as the Ku Klux Klan (Center for Defense Information, 2003; Harper, November, 2001). From 1968 to 2004, 86,568 casualties and 25,408 deaths were attributed to 19,828 documented terrorist events and 7,401 adverse events. These numbers are expected to

increase in the future, with greater numbers of projected terrorist events, injuries, and deaths (Bogen & Jones, 2006).

The terrorist attacks against the United States on September 11, 2001 showed a worldwide audience how terrorism could create chaos and strike fear within society. The combined attacks of September 11th caused 3,056 deaths (Bogen & Jones, 2006). In the weeks after September 11<sup>th</sup>, two U.S. Senators and members of the media received letters that contained anthrax spores, resulting in 17 people becoming ill and five deaths. This was regarded as the worst case of biological terrorism in U.S. history (FBI, 2008). Although the anthrax-laced letters were mailed to only a few individuals, many U.S. citizens were understandably concerned about opening their mail, a potentially lethal activity (Hall et al., 2003).

Governmental agencies and international organizations have increased their efforts to counter bioterrorism since 2001. No longer can governments, businesses, and institutions (including country clubs) dismiss the possibility of intentional biological attacks upon their organizations. Taking precautions, effective monitoring, and response capability are vital to managing bioterrorism and food safety emergencies (WHO, 2002).

### ***Previous Bioterrorism Research Conducted in Foodservice***

Country club foodservice operations are one of the endpoints of the food chain (the “fork”) where final food preparation occurs before service to customers. Prior research was conducted in school and hospital foodservice operations in the U.S. regarding food bioterrorism (Yoon & Shanklin, 2007a; Yoon & Shanklin, 2007b; Yoon & Shanklin, 2007c). Yoon and Shanklin (2007) researched foodservice operators’ importance perceptions, implementation frequency of preventive practices, and self-efficacy measures in the development of a food defense management plan. Operators who were more concerned and cautious of threats of food bioterrorism performed preventive practices more often than foodservice operators who were less concerned and less cautious of food bioterrorism (Yoon & Shanklin, 2007c). Foodservice operators identified chemical use and storage practices as the largest concern in protecting their operations from bioterrorism; these were the most frequently implemented practices in their operation (Yoon & Shanklin, 2007a). Yoon and Shanklin’s research concluded that

greater awareness of foodservice operators and the implementation of preventive practices in foodservice operations can enhance levels of food defense against bioterrorism (Yoon & Shanklin, 2007b). It is not unreasonable to suggest that Yoon and Shanklin's conclusions could be applied to foodservice operations outside of hospitals and schools. For this study, private country club foodservice operations were identified to continue Yoon and Shanklin's research in food bioterrorism.

### *Summary*

Food security threats are predicted to be likely in the future and are relatively simple to execute. Regardless of the motivations or types of food terrorists, the ultimate outcome is purposefully harming humans using food intentionally contaminated with biological, chemical, or physical agents. Almost all country clubs provide foodservice and beverage service for their members. Foodservice is an integral part of daily life, where half of the retail food sold has been prepared by someone other than the purchaser. The employee turnover rate in club foodservice operations may exceed 300% and background checks of line-level employees may not always be conducted. Temporary foodservice employees may be utilized to provide additional labor during busy times in club operations (e.g. summer and holiday seasons), meaning that workers come and go year-round. Most country clubs are private and serve affluent individuals, and could potentially be selected as a target by bioterrorists. Many biological agents and readily available chemicals can be used to intentionally contaminate food. Minimum research has been conducted regarding bioterrorism in retail foodservice and no bioterrorism research has been conducted in private clubs. Governmental agencies recommend implementing a food defense management plan to manage the risk of bioterrorism. Prior research has concluded that increasing awareness of foodservice operators and implementing preventive practices to address bioterrorism can increase levels of food defense in foodservice operations.

### **Statement of Problem**

Foodservice professionals should be knowledgeable of the risks of food bioterrorism as they are responsible for supervising the endpoint of the food supply chain - the preparation and service of wholesome food to the public. Some foodservice

operations have implemented crisis management plans to address events such as workplace emergencies and natural disasters. However, crisis management plans do not adequately deal with intentional contamination of food or an operation's water supply. Foodservice operations are advised to protect their food supplies against bioterrorism, especially those operations that serve individuals at greater risk, such as seniors and children (Yoon & Shanklin, 2007c). Foodservice operators should revise their crisis management plans in order to secure their operation against food bioterrorism (Bledsoe & Rasco, 2002; Bruemmer, 2003; United States Department of Agriculture Food and Nutrition Service, 2004; Yoon & Shanklin, 2007a)

Past research has focused upon foodservice operator's importance perceptions of bioterrorism and preventative practices implemented in hospital and school foodservice operations to protect food from intentional contamination (Yoon & Shanklin, 2007a; Yoon & Shanklin, 2007b; Yoon & Shanklin, 2007c). However, to the best of our knowledge, there has been no research in country club foodservice operations that has studied club professionals' importance perceptions and preventative practices regarding food bioterrorism.

### ***Purpose of Study***

This operational research involved conducting interviews with managers of country clubs and observations of actual operational practices. The purpose of the study was to identify operation areas that could be at potential risk of a bioterrorist attack due to current operational practices. Based on results of the interviews and observations, recommendations for managers of country clubs were identified and are presented.

## **Methodology**

### ***Population and Sample***

The population used for this study was country clubs within a 500-mile radius of Manhattan, Kansas whose managers were members of Club Managers Association of America (CMAA). The CMAA member directory was used with permission to identify country club professionals to contact for the field study. Twenty-five private country clubs were included in the field study. Country clubs in the Midwest including clubs in

Kansas (14), Iowa (5), Nebraska (4), and Missouri (2) comprised the convenience sample and were selected given their close proximity to Kansas State University. Country clubs were visited during regular business hours. Visits to country clubs were scheduled during key production times at lunch or dinner from February 2, 2010 through June 25, 2010. The summer season for country clubs generally begins around Memorial Day weekend and is typically a busy time of the year. Thus, access to club managers' time (i.e. agreeing to a visit) became increasingly difficult following Memorial Day weekend (May 31, 2010). Country club managers were contacted via telephone; after explaining the purpose and goals of the study, they were asked to participate in a personal interview and to allow the researcher to observe their respective country club's premises (i.e. the field study). Of 33 club managers contacted, only two declined to participate in the field study. One manager who declined indicated that the field study would touch upon sensitive issues in their club and another manager simply refused, citing no reasons. A total of 31 clubs were visited during the course of the field study. Clubs not used in the final data collection included one club selected for the pilot study, two clubs in which the club managers were not available at the time of the scheduled visit even though they had indicated they would be available at the designated time, and three clubs in which access to observations of the clubs' foodservice operations was restricted during the visit. A total of 25 clubs composed the final sample for the field study.

### ***Development of Field Study Instruments***

Open-ended interview questions were developed from the literature review and ideas generated in an elicitation study that identified items to use in a separate survey research project. Interview questions were used to further explore club professionals' perceptions regarding food defense in their operation. The interview questions included knowledge of food security resources, resources needed for food defense, training needs, and policies and procedures in club operations. The interview questions are summarized in Appendix D.

Observation instruments were adapted from the literature review and existing observation instruments that were developed to conduct food defense and bioterrorism research in school foodservice. The observation instrument's initial framework was

modified with ideas discussed in the separate survey elicitation study in order to adequately measure preventative practices used to counter bioterrorism in country clubs. The instrument included a place to record observations for the following locations: areas outside each country club, clubhouse receiving areas, clubhouse storage areas, clubhouse foodservice / food preparation areas, chemical storage areas, foodservice equipment, foodservice personnel, utility security, and general clubhouse security items. The observation instrument is presented in Appendix E.

### ***Pilot Study and Refinement***

Field study instruments (interview guide and observation form) were pilot tested in one country club in Kansas. Feedback from the club manager during the pilot test helped to establish the interview format and how to ask the questions clearly and concisely. Changes made to the observation instrument included omitting the “n/a” (not applicable) column from the “observed” category to avoid confusion with “yes/no” columns (and instead recording “n/a” in a blank space used for comments next to each item). Cash handling was also omitted as private clubs typically operate with minimal cash exchange between staff and club members.

### ***Data Collection***

The field data was collected in 25 country clubs. The purpose of the field study was to understand club managers’ opinions and thoughts about food security (via interviews) and by observing country clubs’ operational practices. Both items were used to gather baseline data and to help make determinations of country clubs’ readiness to secure their operations against food bioterrorism.

Club managers were interviewed in all 25 country clubs included in the data analysis. Prior to visiting each club, the investigator sent club managers an e-mail containing a set of Internet links (URLs) to background literature regarding food security. This provided club managers with some background information about food security and was intended to help facilitate discussion. However, upon visiting the clubs it became clear that the majority of club managers had not reviewed the material in advance. Only two out of 25 club managers interviewed were aware of the National Restaurant Association’s publication “Food Security – An Introduction”. One club manager was

aware of other resources pertaining to food security. Six club managers had heard about the Public Health Security and Bioterrorism Preparedness and Response Act of 2002 (the Bioterrorism Act), but did not know how it affected them.

In four of the 25 interviews, additional club professionals were invited to participate (per the club manager's discretion in all interviews). This included executive chefs, food and beverage directors, and assistant club managers. Probing, open-ended exploratory questions were used to obtain data related to club managers/professionals' perceptions of bioterrorism. Interviews ranged in length from 20 minutes to one hour and all interviews followed the same set of probing open-ended questions. Interview data were coded to remove links to those being interviewed to ensure anonymity of responses and to maintain confidentiality of participants and their operations. Following the completion of the study, a debriefing form containing a summary of the major findings of the research study and confirmation of confidentiality of responses was offered to all study participants. Country club professionals interviewed were also offered a list of resources to address concerns shared during interviews.

The observations of food security practices focused on the clubhouse or wherever the majority of food production occurred in all clubs. Observations focused on food defense practices, not individuals being observed; no individuals were identified when recording observation data. Data were aggregated so that specific locations observed remained anonymous. Any observations that revealed risks to an operation (such as a breach in food safety, an operational problem, or a food security risk) were communicated to the club professional during the on-site observation.

### ***Data Analysis***

Interview data were compiled and sorted by categories per the interview question. Data were also sorted by themes; factors included importance perceptions, perceived self-efficacy, barriers, and attitudes. Observation items were recorded as "yes", "no", or "not applicable". Observation data were analyzed with the Statistical Package for the Social Sciences (SPSS) version 17.0 (SPSS Inc., 2008). Frequencies and percentages were calculated for observation items.



## **Results**

### ***Interviews***

All club managers were asked if they thought that their country club was at risk for an intentional attack on their food production systems. Four club managers answered “yes” while the remaining 21 managers answered “no”. Six club managers indicated that it was possible but not probable that an attack could occur and three club managers stated that the risk was lower in a private club setting than in a public setting. Nine club managers indicated that if someone really wanted to contaminate food that it would more likely be a disgruntled employee that did so (rather than a non-employee). Conversely, two club managers stated that it would be more likely that an outsider would contaminate food rather than a disgruntled employee.

Club managers were asked to identify areas of the club that were the most vulnerable to intentional attack from outsiders (non-employees). Fourteen managers indicated that vendors and/or delivery people would be able to exploit vulnerabilities in a club’s food security due to the direct access they had to foodservice preparation areas in their club. These areas include the delivery dock and anywhere food was stored (storerooms, coolers, etc.). Since these areas are generally located in proximity to food production areas, the potential that a club’s food production system would be vulnerable to delivery personnel is high. Six club managers stated that vendors could also potentially tamper with food before delivery. However, three club managers indicated that they trusted their vendors and that intentional contamination of food would not occur by the actions of a vendor or a delivery person. Six club managers stated that buffets, beverage service, condiment dispensers, and food served at wedding receptions, poolside areas, and corporate events could be vulnerable to contamination from other individuals granted public access to club premises. This included members, their guests (including former members and former club employees), and contractors.

Club managers also were asked to identify areas of the club that were the most vulnerable to intentional attack from insiders (employees). Sensitive areas of vulnerability identified where food was stored, produced, or served including: the main kitchen, coolers, snack bar, buffet, at a wedding reception or corporate event, condiment

dispensers, areas where only one person is working in the kitchen, service staff areas, food warmers/holding ovens, satellite kitchens, mixers, kettles, storerooms, produce storage areas, and the pantry.

Club managers were asked to identify resources such as facility, employee, and security needs to implement a food defense plan in their operations. For facility needs, fencing, more secure club design, and pass gates were the most commonly cited examples of improvements to a club's overall security. However, one manager indicated that while effective, installing pass gates would be problematic for club traffic. Other responses included locks on coolers and storage units, and a dedicated secure receiving area for all deliveries.

For employee needs, 16 club managers identified good employment practices (including background checks of all new potential employees) were needed to increase food defense. Regular staff meetings and training to increase awareness of overall club security (including food) was also mentioned. Seven managers stated the method used for training employees about food security should avoid presenting information that could result in negative behavior. Creating an environment of trust and identifying employees that are problematic, unhappy, or exhibiting unusual behaviors also are important. Fair and dignified progressive disciplinary procedures were mentioned as a way to curtail disgruntled employees. Hiring a dedicated purchasing agent who oversees the procurement and inspection of all goods also was identified as an effective employment strategy to increase food defense. Six managers recommended having and enforcing an operational policy that required at least two people to be in food production areas at all times (to keep an eye on one another).

For security needs, club managers were supportive of having video surveillance installed and monitored. Eleven clubs already had video cameras installed, but their value as a deterrent was questioned. Five club managers indicated that someone committed to intentionally contaminating a club's food supply would do so regardless of video cameras being in place. In addition, an employee would be needed to observe the security tapes, this practice was viewed by managers as not being cost-effective. Finally, 15 club managers stated that for video surveillance to truly be effective, it would need to be club-

wide. Given that, the feasibility of installing video cameras in coolers, locker rooms, and seldom-trafficked areas (in addition to club member acceptance) was also questioned.

When asked about perceived barriers to implementing a food defense plan, 16 club managers stated that the cost was the biggest issue. Six club managers were not convinced of a sufficient enough threat to their country club to warrant the expense of implementing food defense strategies. The time required to implement a food security management plan or to continually train employees also was identified as a barrier by six club managers. Apathy, lack of need, and staff resistance were mentioned as potential barriers. Low motivation to implement new changes (unless a food security issue arose) was identified as a barrier. Suggestions to improve motivation were to issue CMAA education credits to club managers who implemented food security management plans or to require (by law) that clubs have such plans in place. Board approval and the quality of member/employee life (e.g. excessive surveillance) also were identified as barriers to implementing a food security management plan.

Training programs already in place pertaining to club security included procurement procedures, pilferage and inventory control, food safety/sanitation training, chemical handling, grounds security training, and CPR/defibrillator training. Training needs identified as essential to club operations to increase food security included the following topics: financial implementation of food defense plans, specific training on the topic for management staff, service employees, vendors, training employees to use an anonymous hotline (whistleblower) and OSHA compliance. Further recommendations include awareness training, having written training materials in place, and training to prevent anything else that has the potential to harm a club member.

Club managers were asked to what extent they already had policies and procedures developed that would overlap with or indirectly address food security issues. Fifteen club managers indicated they had no disaster management plan (DMP) in place. Twelve club managers stated that they had some policies and procedures in place, such as CPR training, chemical handling procedures, and informal disaster management procedures (e.g. calling 911). Only four club managers had formal disaster management plans in place which detailed specific actions to take in the event of an emergency in their club.

### ***Themes Identified in Interviews***

Club managers' input was valuable in identifying themes regarding food defense from their perspective. During the interviews, managers freely offered their opinions of food security issues in country clubs. At the close of each interview, club managers' were explicitly asked if they had any additional information to provide, including any constructive criticism or their "gut feelings" about the subject matter. What follows is a compilation of club managers' responses (in their own words) grouped into common themes. Responses from interviews were also organized into theme diagrams and are presented in Appendix G.

#### ***Importance Perceptions***

Importance perceptions regarding food security included responses such as "this is a very important topic", "this is a very serious issue", and "it should be a higher priority than it currently is". Other responses were "you should not be naïve about food security – it should be on a club manager's radar", "this is relevant to today's operations", and "if implementing food security management procedures prevents even one incident from happening, then it's worth the investment". Some club managers did not perceive food security to be as important as others did. Comments included "this is not as important as other areas to focus your resources", "this is not practical", and "you shouldn't make a mountain out of a molehill if you don't have to".

#### ***Perceived Self-Efficacy***

Club professionals' perceived self-efficacy is their belief in their own capabilities to plan and implement necessary actions to effectively deal with events in their country club. Club managers' responses showed varying degrees of self-efficacy while describing food terrorism issues. Responses of lower self-efficacy levels included "if it's going to happen, then it's going to happen", "unless you catch them red-handed, they will be hard to catch", "a crook is a crook", and "if someone wanted to do it, they could". Conversely, responses indicating higher levels of self-efficacy were "it is better to be proactive than reactive", "if this ever became a true issue in my club, I would eliminate food and beverage service altogether", and "I could do this. If I told the board (that we should create a food defense management plan) they would say it was a good idea".

### ***Barriers***

Club managers also described potential barriers that could either impede implementing food biosecurity in country clubs or affect club operations in general. These included “wouldn’t this (food defense) get in the way of employees doing their job”, “the lack of need (of food defense management) would be the biggest barrier”, and “new initiatives take twice as long to initiate in private clubs than elsewhere due to board and member approval, plus the lack of available funds to do so”. Some club managers indicated that there were factors in their clubs that could possibly reduce barriers to food security issues. Comments included “every item purchased by our club comes through one door and is inspected by one person – our purchasing agent”, “besides the local hospital, we have the highest concentration of doctors under one roof in town”, and “the fire department is next door – they can be here in two or three minutes”.

### ***Attitudes***

Club managers’ attitudes varied regarding food security. Attitudes supportive of food security included “the benefits of training outweigh the risks – it is incumbent of managers to take steps to maintain security and act upon the risks and take precautions”, “you need to offer your staff an enjoyable, nurturing work environment so they don’t get disgruntled”, and “there should be mandatory (food defense) certification and it should be posted on the front door”. Attitudes less supportive of food security were “if you were to try to address this issue, you would risk someone copycatting or mimicking it – it would appear as if you were ‘professing’ food terrorism”, “in my 25 years as a club manager, I’ve only heard of two incidents of intentional food contamination, and neither of them occurred in a club”, and “this doesn’t happen in country clubs”.

### ***Observations***

Following interviews, observations were conducted at each private country club visited. For items that were directly observable (e.g. if entrance guidelines were posted by the employee entrance), the researcher recorded the results. For items that were not directly observable (e.g. if a key log was readily available), the researcher queried club professionals for the answer. The observation results are presented in Appendix E.

### ***Exterior Premises***

Upon arrival at each country club, the researcher examined the exterior of the country club. Nineteen country clubs observed did not have a dedicated front gate to limit vehicle access into the country club. Security patrols were present in only seven clubs visited. The majority (19) of clubs did not have signs that helped maintain control of the premises. Access was limited to outside controls for utilities, including airflow (18), water (20), and electricity (18). All but one club had a dedicated public entrance to the clubhouse and 22 clubs had a dedicated employee entrance. However, only one employee entrance had formal entrance/exit guidelines posted and only four were considered secure. Most clubs had an authorized person assigned to receive shipments during regular business hours (23), however, docks doors in 16 clubs were usually not closed and locked when not in use.

### ***Storage Areas***

All 25 clubs indicated that they could take accurate inventory anytime. Storage doors were tamper proof in 20 clubs. However, 10 clubs stated that access to food product was not secured and 12 clubs indicated that access to chemicals was also not secure.

### ***Foodservice / Food Preparation Areas***

Only three clubs restricted access to foodservice areas via signage and only five had doors secured at all times. All but four clubs had at least one authorized employee in the foodservice area at all times and 20 restricted access to foodservice areas to only designated employees. However, only five clubs indicated that they possessed documentation describing where ingredients and foods were stored and prepared in their country club.

### ***Hazardous Chemicals***

Chemicals were stored outside of food preparation areas in all but one of the clubs observed but less than half (12) of the chemical storage areas were secured. Only one club took a daily inventory of chemicals and all but two clubs labeled their chemicals (e.g. spray bottles filled from bulk containers).

### ***Foodservice Equipment***

Access to foodservice equipment was secured in 22 clubs, with only designated employees allowed to operate and/or clean equipment. There was a lack of signs or instructions posted to increase safety with potentially dangerous equipment in the majority of clubs (18). Supervisors indicated that the operation of equipment was a part of an employee's training.

### ***Foodservice Personnel***

An updated shift roster was available in all but one club, however, employees were not clearly identifiable in 18 clubs (no identification badge or nameplate). In addition, only 10 clubs stated that they clearly identified temporary workers.

### ***Water and Ice Supply***

As required by law, backflow devices were observed in all club's water-supply equipment. The water supply was considered safe in 21 of the clubs. Ice machines were secure in only 17 clubs.

### ***Clubhouse General Security***

The majority of clubs kept their firewalls and virus detection systems up to date (24), and backed up system files regularly (20). No club issued identification badges to visitors and only seven had sign in desks (7) for visitors.

## **Discussion**

### ***Suggestions for Improving Food Defense in Country Clubs***

Only four club managers thought that their country club was at risk for an intentional attack on their food production systems. Sixteen club managers indicated that cost was the primary barrier to implementing a food defense management plan. Furthermore, 15 clubs had no disaster management plan in place. Given the low perceived risk of food security, the high perceived cost, and the lack of formal disaster management plans in place at the majority of country clubs visited, it is recommended to implement economical improvements to overall club security that overlap with food security issues. This could include securing exterior doors that are used infrequently and

installing locks on all storage areas. A key log program could be implemented that specifies how keys are issued, revoked, and under what circumstances keys and lock should be changed. A calling tree specifying who to call could help expedite emergency response to club disasters. Criminal background checks are relatively low-cost insurance to screen applicants before hiring. Establishing a “backdoor” policy specifying how deliveries are handled and access is granted into sensitive club areas could also improve overall club security.

Sixteen club managers indicated background checks of all new employees were important to increasing food defense. Several club managers stated that a disgruntled employee would be more likely to intentionally contaminate food than a non-employee. Therefore, it is specifically recommended for country clubs to conduct background checks on all employees.

Fifteen club managers recommended club-wide video surveillance as an effective security measure. Although cost could be an issue, video cameras could be installed as a general security procedure (including food security) and as a deterrent against pilferage. If cost was truly an issue, then “dummy” video cameras are available for approximately \$10.00 each. Dummy cameras could serve as an inexpensive alternative to functioning video cameras and as a psychological deterrent even though images were not actually being recorded. Of course, resistance from club members could be an issue when installing video surveillance (real or not), especially in sensitive areas such as locker rooms. However, given the fact that 21 clubs could be entered through doors other than the dedicated public entrances, video surveillance is highly recommended for country clubs.

Access to chemicals was not secured in 12 clubs. Chemicals are of primary concern in food defense management, thus it is recommended that all clubs secure their chemical storage areas. Chemicals are also costly, so securing access to them could reduce pilferage, while increasing food security.

An authorized person was assigned to receive shipments in 23 clubs visited. This meant that for every delivery, someone authorized accepted delivery. However, only one club visited had a dedicated purchasing agent that was solely responsible for inspecting all deliveries to a main delivery area. The researcher recommends that the club appoint a



dedicated purchasing agent and to route deliveries to a primary delivery area in the club. Access granted to areas past the delivery area (such as coolers and storage areas) should be regulated and granted only to trusted delivery personnel. In addition, club access should also be monitored for anyone else who is not a member or an employee of the club (e.g. contractors). The perceived cost of hiring a purchasing agent could be justified by lower pilferage, spoilage, and savings from improved purchasing practices, while improving food defense practices.

Eighteen clubs did not clearly identify their employees using nameplates or identification badges. Clear identification of all club employees is recommended. This includes temporary workers and back-of-the-house workers who do not normally come into contact with members. A timely issuance of identification badges or nameplates would ensure that workers are always identified, even on their first day of employment. If the employee terminates his position, he/she should be required to return the identification before receiving his/her last check. In addition, 18 clubs did not have sign-in desks and were easily entered unnoticed through the front entrance. It is recommended to have a dedicated greeter/sign-in desk at the front entrance of clubs to welcome every visitor that enters.

Fifteen clubs had no disaster management plan in place. Disaster management plans help prepare clubs for disasters before they occur, detail the responses to take in the event of a disaster, and help support rebuilding after a disaster occurs. It is strongly recommended that clubs develop formal written procedures to deal with issues such as fire, flood, lightning, evacuation and food defense procedures.

### ***Limitations of the Study***

The field study conducted observations and interviews in 25 clubs over a four month time period. During the course of the data collection, potential limitations in data collection and analysis were identified. These included:

- 1.) The researcher's observations focused primarily on the main clubhouse, or wherever the majority of food production occurred. Even though the country club segment was selected to help standardize observations and interviews, country club facilities varied slightly from club to club.

- 2.) Of the 25 club managers interviewed, 24 were male and one was female. This may or may not have contributed to sex bias in the interviews.
- 3.) Data collection can present challenges if the club professionals are too busy to complete surveys or schedule interviews. Following Memorial Day, persuading club managers to participate in data collection was challenging due to increased summer activities (pool, tennis, golf, etc.).
- 4.) Although this study added to the existing body of literature on bioterrorism in foodservice operations, results cannot be generalized and applied to settings other than country clubs.
- 5.) Due to the serious nature of the research topic, club professionals may have been resistant or reluctant to share weaknesses of their club's readiness to protect their members from harm.
- 6.) Due to time and cost considerations, only 25 country clubs were visited. Only clubs in the Midwestern region of the United States were visited, limiting the ability to generalize results to the U.S. or beyond.
- 7.) This study only focused upon country clubs whose managers were members of Club Managers Association of America (CMAA). It is unclear if there would be any significant differences with clubs whose managers were not CMAA members.
- 8.) Observations and interviews took place primarily in the off-season. The time the data were collected could have influenced the outcome or access to several clubs managers and their clubs.

### **Conclusions and Future Research Directions**

Within the hospitality foodservice literature, there is a dearth of research on food defense practices. This study attempted to identify country club operation areas that could be at potential risk of a bioterrorist attack due to current operational practices. Recommendations for managers of country clubs were identified and were based on results of the interviews and observations.

Club managers were initially unfamiliar with the topic of bioterrorism and few were convinced that their clubs were at risk for an intentional attack on their foodservice

operations. Most country clubs were easily entered with little or no questioning from staff of the purpose of the investigator's visit. This suggests that better monitoring of club visitors is needed. Barriers identified by club managers in implementing improvements to food security were mainly cost/benefit related. As most club managers did not perceive themselves to be at risk, they felt that the cost to implement food defense practices outweighed the benefits.

Future research recommendations are to gather more baseline data from club managers across the United States. This could include studying if there were any differences between club managers who were members of CMAA and those who were not. It would be interesting to assess if the same preventive food security practices would be more accepted if they were framed in the context of overall club security and controlling pilferage. As this topic has now been studied in hospitals, schools and country clubs, further research in independent or chain restaurants could be useful.

Risk perceptions also could be explored in future research. Although the perceptions in this study were that the risk of food bioterrorism in country clubs is low, having a formal food defense management plan in place is better than assuming no one will commit a bioterrorist attack on your club's foodservice operation.

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## **CHAPTER 6 - Conclusions / Recommendations**

### **Summary**

Within the hospitality foodservice literature, there is a dearth of research on food defense practices. This research study was the first to investigate country club professional's opinions, importance perceptions, and operational practices pertaining to biosecurity and food defense. In addition, the study conducted the first interviews and onsite observations designed to explore food defense practices in country clubs. Recommendations for managers of country clubs are based on the results of the data collection.

The survey research showed that club managers' mean importance scores were 4.20 or higher on a 5 point scale. The three highest importance scores were chemical use and storage (4.52), utility security (4.38), and employee management (4.28). Facility security (4.26) and Food handling (4.20) were the two lowest importance scores. Thus, club managers thought that protecting their club against bioterrorism was worthwhile. No mean practice frequency scores were lower than 3.68 on a 5 point scale, which was still higher than average and is commendable. The three highest practice frequency scores were chemical use and storage (4.35), food handling (3.98) and employee management (3.90). Utility security (3.89) and facility security (3.68) were the two lowest scores. These results suggest that on average, club managers are addressing some issues associated with food defense, either directly or indirectly.

Gap analysis was conducted to determine the difference between importance perceptions and frequency of practice. No differences were found in the level of concern between club professionals with smaller importance/practice gaps than those with larger gaps. This suggests that club managers are concerned about protecting their clubs even though they may not be putting their concern into practice.

A club manager's self-efficacy affected their motivation to implement a food defense management plan and implement preventive practices. Club managers who believed in their own capabilities to take action were more likely to do so. Closely related with this observation were barriers identified. Club managers who thought there were many barriers in their way were less motivated to implement practices to secure their clubs against bioterrorism.

The field study identified areas in country clubs that could be at potential risk of a bioterrorist attack due to current operational practices. Recommendations for managers of country clubs were based on results of the interviews and observations.

Club managers were initially unfamiliar with the topic of bioterrorism and few were convinced that their clubs were at risk for an intentional attack on their foodservice operations. Most country clubs were easily entered with little or no questioning from staff of the purpose of the investigator's visit. This suggests that better monitoring of club visitors is needed. Barriers identified by club managers in implementing improvements to food security were mainly cost/benefit related. As most club managers did not perceive themselves to be at risk, they felt that the cost to implement food defense practices outweighed the benefits.

### **Major Findings of the Study**

This study's propositions were tested by conducting food bioterrorism research study in private country clubs. The findings of this study revealed that club managers with smaller gaps between importance and practice frequency were not significantly more concerned about food terrorism than club managers with larger gaps. Club managers with a smaller perceived gaps and clubs with larger operating budgets implemented preventive practices more frequently. In addition, club managers with higher levels of self-efficacy were significantly more motivated to develop a food defense management plan and performed preventive practices more frequently than club managers with lower levels of perceived self efficacy. This supported the proposition that club managers who think they are capable of implementing a food defense management plan will act upon their self-determination and do what is necessary to make their clubs secure. Club managers who had higher numbers of perceived barriers were significantly

less motivated to develop a food defense management plan and performed preventive practices less frequently than club managers with lower numbers of perceived barriers. This supported the proposition that club managers who are overwhelmed with obstacles will be less motivated to protect their club against a possible bioterrorist act.

The majority of club managers indicated that they did not think their country club was at risk for an intentional attack on their food production systems. Club managers indicated that disgruntled employees would be more likely to contaminate food than an outsider to the club. However, club managers thought that vendors or delivery people would be able to exploit vulnerabilities in security due to their access to food production areas.

Club managers identified fencing and more secure club design as improvements to facility security needs. For employee needs, good employment practices were identified, including conducting background checks for all employees. Video surveillance was identified as effective to help improve food security in private clubs.

When asked about perceived barriers to implementing a food defense plan, the majority of club managers stated that the cost was the biggest issue. Apathy, lack of need, and staff resistance were also mentioned as potential barriers. Most clubs indicated that they had no disaster management plan (DMP) in place and few had formal disaster management plans in place which detailed specific actions to take in the event of an emergency in their club.

Most country clubs observed did not have a dedicated front gate to limit vehicle access into the country club. Most clubs had an authorized person assigned to receive shipments during regular business hours, but docks doors were usually not closed and locked when not in use. Nearly half of clubs observed stated that access to food product and chemicals was not secure.

Most clubs lacked signage restricting or regulating access to club premises. Most clubs had at least one authorized employee in the foodservice area at all times and restricted access to foodservice areas to only designated employees. Employees were not clearly identifiable in most clubs (no identification badge or nameplate). No club issued identification badges to visitors and few had sign in desks for visitors.



## **Limitations of the Study**

During the course of the data collection, potential limitations in data collection and analysis were identified. These included:

- 1.) Online surveys typically have a low response rate. Efforts to increase participation were employed, but the sample size and response rate were less than expected.
- 2.) Surveys that are self-administered have limitations. Club professionals who chose not to complete the survey may or may not have had significant differences than club professionals who did choose to complete the survey.
- 3.) Although this study added to the existing body of literature on bioterrorism in foodservice operations, results cannot be generalized and applied to settings other than country clubs.
- 4.) Due to the serious nature of the research topic, club professionals may have been resistant or reluctant to share weaknesses of their club's readiness to protect their members from harm.
- 5.) This study only focused upon country clubs whose managers were members of Club Managers Association of America (CMAA). It is unclear if there would be any significant differences with clubs whose managers were not CMAA members.
- 6.) Observations and interviews took place primarily during the off-season. It is unknown if there would be any significant differences between seasonal changes in club activity.
- 7.) The online survey system had limitations which increased the perceived length of the survey. This may have contributed to respondents quitting the survey early or not being willing to participate.
- 8.) The investigator focused observations primarily upon the main clubhouse, or wherever the majority of food production occurred. Even though the country club segment was selected to help standardize data collection, country club facilities varied slightly from club to club.
- 9.) Of the 25 club managers interviewed, 24 were male and one was female. This may or may not have contributed to bias of data collected during interviews.

- 10.) Data collection can present challenges if the club professionals are too busy to complete surveys or schedule interviews. Following Memorial Day, persuading club managers to participate in data collection was challenging due to the increased summer activities (pool, tennis, golf, etc.).
- 11.) Due to time and cost considerations, only 25 country clubs were visited. Only clubs in the Midwestern region of the United States were visited, limiting the ability to generalize results to the rest of the country.

### **Implications / Applications of Results**

Few club managers thought that their country club was at risk for an intentional attack on their food production systems and most indicated that cost was the primary barrier to implementing a food defense management plan. Most clubs had no disaster management plan in place. However, club managers indicated that if their board of directors suggested implementing a food security management plan, then they would do so. It is recommended to suggest implementing cost-effective improvements to overall club security that overlap with food security issues. This could be proposed to both the club manager and the club's board of directors. Securing exterior doors and installing locks on key storage areas could be an inexpensive first start toward strengthening food security in private clubs. Another suggestion is for clubs to develop procedures that specify how keys are issued, revoked, and under what circumstances keys and lock should be changed. In addition, establishing a policy detailing how access is granted to visitors in sensitive club areas could improve club security.

Background checks are relatively inexpensive in comparison to unknowingly hiring an individual with prior criminal activity. Given that most club managers stated that a disgruntled employee would be more likely to intentionally contaminate food than a non-employee, it is specifically recommended for country clubs to conduct background checks on all employees.

Club managers identified video surveillance as an effective security measure. Video cameras could be installed as a general security procedure and as a pilferage deterrent. Dummy cameras could be installed as an inexpensive alternative to functioning video cameras if cost were an issue. Given that most clubs could be entered through

doors other than the dedicated public entrances, video surveillance is highly recommended for country clubs.

Chemicals are of major concern in food defense management, thus it is recommended that all clubs secure their chemical storage areas. Chemicals are also costly, so securing access to them could reduce pilferage, while increasing food security.

Most clubs did not have a dedicated purchasing agent that was solely responsible for inspecting all deliveries to a main delivery area. The researcher recommends that the club appoint a dedicated purchasing agent and to traffic club deliveries to a primary delivery area. Access granted to areas past the delivery area (such as coolers and storage areas) should be regulated and granted only to trusted delivery personnel. The perceived cost of hiring a purchasing agent could be offset by lower pilferage, spoilage, and savings from improved purchasing practices, while improving food defense practices.

Most clubs did not clearly identify their employees using nameplates or identification badges. Clear identification of all club employees is recommended. Most clubs did not have sign-in desks and were easily entered unnoticed through the front entrance. It is recommended to have a dedicated greeter/sign-in desk at the front entrance of clubs to welcome every visitor that enters.

### **Recommendations for Future Research**

Future research recommendations include studying factors that could increase a club professional's self-efficacy to enable greater confidence in addressing serious security issues such as food defense in their club. Identifying specific barriers to be removed in order to secure one's country club against food terrorism could be efficacious. Other club segments could also be explored to see if there were any differences between city clubs and country clubs. Public club professionals could be surveyed to determine if food defense was perceived differently and the frequency of operational practices were implemented at a different rate in comparison to private clubs. Further research should be conducted in other sectors of the food chain including independent or chain restaurants. Results would be beneficial to the foodservice industry

in identifying targeted areas for greater emphasis that need to be implemented to protect consumers from food bioterrorism in this important industry.

Other research recommendations include gathering more baseline data from club managers across the United States. One possibility is to determine if there were any differences between responses of club managers who were members of CMAA and those who were not. It would also be interesting to assess if the same preventive food security practices (such as keeping chemicals under lock and key) would be more accepted if they were framed in the context of overall club security and controlling pilferage.

Risk perceptions could be explored in future research. The odds of becoming the victim of a terrorist attack are about the same as being hit by lightning, yet formal safety procedures regarding lightning strikes are in place in most swimming pools and golf courses (including private clubs). Although the risk of food bioterrorism in country clubs was perceived to be low, having a formal food defense management plan in place is better than assuming no one will commit a bioterrorist attack on a club's foodservice operation. This study concludes with the observation that raising the importance and awareness of food security issues and implementing preventive practices can help a country club become more secure against food terrorism.

**Appendix A - Institutional Review Board (IRB) Approval  
Letter**



University Research  
Compliance Office  
203 Fairchild Hall  
Lower Mezzanine  
Manhattan, KS 66506 -1103  
785-532-3224  
Fax: 785-532-3278  
<http://urco.ksu.edu>

TO: Carol Shanklin  
HMD  
103 Fairchild

Proposal Number: 5233

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

DATE: Octobert 28, 2009

RE: Proposal Entitled, "Food Defense Management Practices in Private Country Clubs"

The Committee on Research Involving Human Subjects / Institutional Review Board (IRB) for Kansas State University has reviewed the proposal identified above and has determined that it is EXEMPT from further IRB review. This exemption applies only to the proposal - as written - and currently on file with the IRB. Any change potentially affecting human subjects must be approved by the IRB prior to implementation and may disqualify the proposal from exemption.

Based upon information provided to the IRB, this activity is exempt under the criteria set forth in the Federal Policy for the Protection of Human Subjects, **45 CFR §46.101, paragraph b, category: 2, subsection: ii.**

Certain research is exempt from the requirements of HHS/OHRP regulations. A determination that research is exempt does not imply that investigators have no ethical responsibilities to subjects in such research; it means only that the regulatory requirements related to IRB review, informed consent, and assurance of compliance do not apply to the research.

Any unanticipated problems involving risk to subjects or to others must be reported immediately to the Chair of the Committee on Research Involving Human Subjects, the University Research Compliance Office, and if the subjects are KSU students, to the Director of the Student Health Center.

## **Appendix B - Permission letter**

Department of Hospitality Management and Dietetics  
152 Justin Hall  
Manhattan, KS 66506  
Kansas State University  
September 9, 2009

Dear Dr. Yoon:

I am completing a doctoral dissertation at Kansas State University entitled "Implementation of a Food Defense Management Plan in Private Country Clubs."

I am requesting permission to modify your questionnaires in your dissertation, "Food defense management plan implementation intention: an application of protection motivation theory" as published here:

<http://catalog.lib.ksu.edu/cgi-bin/Pwebrecon.cgi?DB=local&BBID=2136642>

The excerpts from your dissertation to be modified for use in my dissertation are: Appendices A, B, C, & D (pp. 150 – 173).

The requested permission extends to any future revisions and editions of my dissertation, including non-exclusive world rights in all languages, and to the prospective publication of my dissertation by UMI. These rights will in no way restrict republication of the material in any other form by you or by others authorized by you. Your signing of this letter will also confirm that you own the copyright to the above-described material.

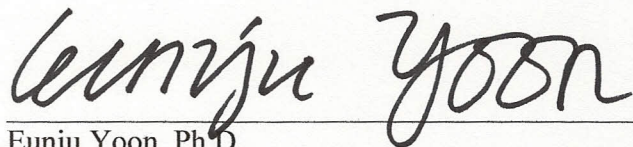
If these arrangements meet with your approval, please sign this letter where indicated below and return it to me. Thank you very much.

Sincerely,



David A. Olds

PERMISSION GRANTED FOR THE  
USE REQUESTED ABOVE:



Eunju Yoon, Ph.D.

(please sign here)

Date: September 9, 2009



## **Appendix C - Survey Instrument**

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# AXIO SURVEY

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## Food Security in Country Clubs

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### Survey Description

You will be asked to respond to questions about food security in country clubs. Please carefully read each question and do not leave any items blank. Your participation in this research study is completely voluntary and you may refuse to participate in the study at anytime without penalty. By completing this survey, you indicate to the researcher your willingness to participate in this research. Your responses are completely anonymous.

Please be assured that your responses will be confidential and all data will be reported as aggregated (group) data. For further information about this study, contact Dr. Carol W. Shanklin, 785-532-7927, or shanklin@ksu.edu. If you have questions about Kansas State University's policies regarding this research, please contact the University Research Compliance Office (URCO), 203 Fairchild Hall, Kansas State University, Manhattan, KS 66506, 785-532-3224, or comply@ksu.edu

If you wish to be sent information of the survey results upon completion of this study, then please send an e-mail to [daveolds@ksu.edu](mailto:daveolds@ksu.edu)

### Opening Instructions

**When you are ready to begin, click "next" at the bottom of this page.**

### Page 1

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#### Question 1

### YOUR OPINIONS ABOUT FOOD SECURITY

**INSTRUCTIONS:** The following set of statements asks for your opinions regarding food security in your country club. Using the scale below, please indicate the extent to which you agree with the following statements as it pertains to your country club. Feel free to honestly express your opinion. Your responses are totally confidential.

\*For the purpose of this study, **Food Security** is defined as the protection of food from intentional contamination from chemical, biological, radiological, or physical agents. A **Food Security Management Plan** is defined as a written document that describes policies and procedures that minimize the risk of intentional contamination of food and reduce the risk of illness or death in your club. For expanded information about food security please go to <http://www.box.net/shared/h1j0prn71h>

1 - Strongly disagree | 2 - Somewhat disagree | 3 - Neutral

4 - Somewhat agree | 5 - Strongly agree

	1	2	3	4	5
1.1 I am concerned about food security in my country club.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
1.2 Our country club is well-secured against any type of food security hazard/threat.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
1.3 Promoting food security awareness among employees is not a club professional's responsibility.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

1.4 Training all foodservice employees about food security is a priority for our country club.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
1.5 Implementing preventive measures will decrease the risk of tampering or other malicious, criminal or terrorist actions in my country club.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
1.6 Informing our members that food security is one of our primary concerns is not an important responsibility of club management.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
1.7 Developing and initiating a food security management plan is a priority even if it increases our country club's operating costs.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
1.8 Club professionals know exactly what to do if our country club receives a food security threat.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
1.9 Our country club does not need a food security management plan because the country club is not at risk for tampering or other malicious, criminal or terrorist actions.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
1.10 I am capable of implementing a food security management plan in my country club.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
1.11 Implementing a food security management plan in my country club would be difficult for me.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

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**Page 2**
**Question 2**


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**YOUR OPINIONS ABOUT FOOD SECURITY (Continued)**

1 - Strongly disagree | 2 - Somewhat disagree | 3 - Neutral

4 - Somewhat agree | 5 - Strongly agree

	1	2	3	4	5
2.1 If the Board of Directors of my country club suggests implementing a food security management plan, then my country club will develop one.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
2.2 Implementing a food security management plan in my country club would be complicated for my employees.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
2.3 Management does not care about implementing a food security management plan.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
2.4 Implementing a food security management plan in my country club would be too time-consuming.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
2.5 If CMAA headquarters suggests implementing a food security management plan, then my country club will develop one.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
2.6 Implementing a food security management plan in my country club would be difficult for my employees.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
2.7 Employees in my country club are capable of implementing a food security management plan.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
2.8 Implementing a food security management plan in my country club would be complicated for me.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
2.9 My country club does not have the resources available to implement a food security management plan.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
2.10 Implementing a food security management plan in my country club would be too costly.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>

2.11 Employees do not care about implementing a food security management plan.

<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
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## Question 3

**IMPORTANCE OF FOOD SECURITY PRACTICES**

**INSTRUCTIONS:** Using the following scale below, please rate how important each practice is in protecting your country club from food security threats.

\*For the purpose of this study, **Food Security** is defined as the protection of food from intentional contamination from chemical, biological, radiological, or physical agents. A **Food Security Management Plan** is defined as a written document that describes policies and procedures that minimize the risk of intentional contamination of food and reduce the risk of illness or death in your club. For expanded information about food security please go to <http://www.box.net/shared/h1j0pm71h>

1 - Very unimportant | 2 - Somewhat unimportant

3 - Neither unimportant nor important | 4 - Somewhat important | 5 - Very important

	1	2	3	4	5
3.1 Purchasing all food ingredients, food products, packaging materials, and other foodservice supplies only from reputable suppliers who have appropriate permits, licenses, or insurance.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
3.2 Requiring all food suppliers to use sealed packaging on foods delivered to our facility.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
3.3 Using sealed packaging for food sent to satellite foodservice areas in our country club.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
3.4 Inspecting ingredient packages prior to use for evidence of tampering. (Examples of evidence are a broken seal or discoloration of food inside package).	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
3.5 Requiring suppliers to provide advance notification for off-hour deliveries.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
3.6 Assigning an authorized person to verify and receive shipments both during business hours and after business hours.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
3.7 Verifying deliveries against a roster of scheduled deliveries and approved suppliers.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
3.8 Having a policy that all delivery trucks on the premises be locked when not being loaded or unloaded.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
3.9 Maintaining accurate inventories of all foods and chemicals so we can detect and investigate unexplained additions to or withdrawals from stock.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
3.10 Storing all leftover food items in tightly sealed, clearly labeled, and dated containers.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
3.11 Obtaining Material Safety Data Sheets (MSDS) for hazardous chemicals from our suppliers.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
3.12 Making MSDS sheets readily available to foodservice staff who follow manufacturer's instructions for storage and use of hazardous chemicals.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
3.13 Storing hazardous chemicals in a locked storage area.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>

3.14 Training employees to use chemicals properly to prevent accidental food contamination and human exposure.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
3.15 Having procedures in place for monitoring foodservice equipment to prevent someone from intentionally contaminating food during preparation.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
3.16 Having procedures for safe handling and disposal of contaminated products.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
3.17 Requiring all job candidates to pass background security checks beyond reference checks prior to hiring.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

## Page 4

## Question 4

**IMPORTANCE OF FOOD SECURITY PRACTICES (Continued)**

1 - Very unimportant | 2 - Somewhat unimportant

3 - Neither unimportant nor important | 4 - Somewhat important | 5 - Very important

	1	2	3	4	5
4.1 Using a system that ensures clear identification of foodservice personnel and their specific functions within the country club.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
4.2 Enforcing policies that define the personal items foodservice employees may and may not have in the food production or service areas.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
4.3 Accounting for all keys, uniforms, and identification badges provided to current and former employees.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
4.4 Protecting computer data systems with passwords, network firewalls, and effective virus detection systems.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
4.5 Training employees about a food security management plan.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
4.6 Providing employee training on identifying packaging that is acceptable and not acceptable.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
4.7 Controlling, monitoring, and securing all access points into the foodservice facility.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
4.8 Controlling, monitoring, and securing all access points into all storage areas.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
4.9 Securing all doors, windows, roof openings, and vent openings at all times.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
4.10 Securing all outside refrigeration / storage units at all times.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
4.11 Inspecting security in all storage facilities regularly and maintaining a log of the results.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
4.12 Controlling access of all visitors and unauthorized persons to food production areas.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
4.13 Having procedures to follow if the management team suspects the airflow or water source has been contaminated with biological or other contaminants.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
4.14 Securing outside access to all ice-making equipment to prevent unauthorized access.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
4.15 Securing outside access to all water supply equipment to prevent unauthorized access.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>

<b>4.16</b> Installing and using backflow prevention devices on all water supply equipment and beverage dispensers.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<b>4.17</b> Maintaining a current contact list of local authorities such as the police and fire departments, who should be notified in case of a security incident and distributes the list to the foodservice staff	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<b>4.18</b> Meeting with local vendors to increase awareness about food security issues.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

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**Page 5**
**Question 5****FREQUENCY OF FOOD SECURITY PRACTICES**

**INSTRUCTIONS:** Using the following scale below, please rate how how frequently each practice is currently implemented in your country club.

\*For the purpose of this study, **Food Security** is defined as the protection of food from intentional contamination from chemical, biological, radiological, or physical agents. A **Food Security Management Plan** is defined as a written document that describes policies and procedures that minimize the risk of intentional contamination of food and reduce the risk of illness or death in your club. For expanded information about food security please go to <http://www.box.net/shared/h1j0pm71h>

1 - Never | 2 - Seldom | 3 - Some of the time  
4 - Most of the time | 5 - All of the time

	1	2	3	4	5
<b>5.1</b> Our country club purchases all food ingredients, food products, packaging materials, and other foodservice supplies only from reputable suppliers who have appropriate permits, licenses, or insurance.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<b>5.2</b> Our country club requires all food suppliers to use sealed packaging on foods delivered to our facility.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<b>5.3</b> Our main kitchen uses sealed packaging for food sent to satellite foodservice areas in our country club.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<b>5.4</b> Our country club inspects ingredient packages prior to use for evidence of tampering. (Examples of evidence are a broken seal or discoloration of food inside package).	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<b>5.5</b> Our country club requires suppliers to provide advance notification for off-hour deliveries.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<b>5.6</b> Our country club assigns an authorized person to verify and receive shipments both during business hours and after business hours.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<b>5.7</b> Our country club verifies deliveries against a roster of scheduled deliveries and approved suppliers.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<b>5.8</b> Our country club has a policy that all delivery trucks on the premises be locked when not being loaded or unloaded.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<b>5.9</b> Our country club maintains accurate inventories of all foods and chemicals so we can detect and investigate unexplained additions to or withdrawals from stock.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<b>5.10</b> Our country club stores all leftover food items in tightly sealed, clearly labeled, and dated containers.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>

<b>5.11</b> Our country club obtains Material Safety Data Sheets (MSDS) for hazardous chemicals from our suppliers.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<b>5.12</b> Our country club makes MSDS sheets readily available to foodservice staff who follow manufacturer's instructions for storage and use of hazardous chemicals.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<b>5.13</b> Our country club stores hazardous chemicals in a locked storage area.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<b>5.14</b> Our country club trains employees to use chemicals properly to prevent accidental food contamination and human exposure.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<b>5.15</b> Our country club has procedures in place for monitoring foodservice equipment to prevent someone from intentionally contaminating food during preparation.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<b>5.16</b> Our country club has procedures for safe handling and disposal of contaminated products.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<b>5.17</b> Our country club requires all job candidates to pass background security checks beyond reference checks prior to hiring.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

## Question 6

**FREQUENCY OF FOOD SECURITY PRACTICES (Continued)**

1 - Never | 2 - Seldom | 3 - Some of the time

4 - Most of the time | 5 - All of the time

	1	2	3	4	5
<b>6.1</b> Our country club uses a system that ensures clear identification of foodservice personnel and their specific functions within the country club.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<b>6.2</b> Our country club enforces policies that define the personal items foodservice employees may and may not have in the food production or service areas.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<b>6.3</b> Our country club accounts for all keys, uniforms, and identification badges provided to current and former employees.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<b>6.4</b> Our country club protects computer data systems with passwords, network firewalls, and effective virus detection systems.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<b>6.5</b> Our country club trains employees about a food security management plan.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<b>6.6</b> Our country club provides employee training on identifying packaging that is acceptable and not acceptable.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<b>6.7</b> Our country club controls, monitors, and secures all access points into the foodservice facility.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<b>6.8</b> Our country club controls, monitors, and secures all access points into all storage areas.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<b>6.9</b> Our country club secures all doors, windows, roof openings, and vent openings at all times.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<b>6.10</b> Our country club secures all outside refrigeration/storage units at all times.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>

<b>6.11</b> Our country club inspects security in all storage facilities regularly and maintains a log of the results.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<b>6.12</b> Our country club controls access of all visitors and unauthorized persons to food production areas.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<b>6.13</b> Our country club has procedures to follow if the management team suspects the airflow or water source has been contaminated with biological or other contaminants.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<b>6.14</b> Our country club secures outside access to all ice-making equipment to prevent unauthorized access.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<b>6.15</b> Our country club secures outside access to all water supply equipment to prevent unauthorized access.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<b>6.16</b> Our country club installs and uses backflow prevention devices on all water supply equipment and beverage dispensers.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<b>6.17</b> Our country club maintains a current contact list of local authorities such as the police and fire departments, who should be notified in case of a security incident and distributes the list to the foodservice staff.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<b>6.18</b> Our country club meets with local vendors to increase awareness about food security issues.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Page 7

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## **CLUB OPERATIONS**

**INSTRUCTIONS:** The following set of questions asks you about your club memberships and foodservice employees.

### **Question 7**

How many total club memberships does your club have?

Characters Remaining: 200

### **Question 8**

How many full-time foodservice employees are on your payroll?

Characters Remaining: 200

### **Question 9**

How many part-time foodservice employees are on your payroll?

Characters Remaining: 200

### **Question 10**

---



How many temporary foodservice employees are on your payroll during peak periods (e.g. summer and the winter holiday season)?

Characters Remaining: 200

#### Question 11

What is the average number of foodservice employees working per shift?

Characters Remaining: 200

### Page 8

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#### **FOOD SAFETY, CRISIS MANAGEMENT, FOOD SECURITY**

**INSTRUCTIONS: The following set of questions asks you about responsibilities for crisis management and food security in your club.**

#### Question 12

Does your country club have a crisis management plan?

- No, we don't have one.
- Yes, we have one and it is rather informal.
- Yes, we have one and it is formal. (i.e. having a person who holds primary responsibility about it)
- I don't know.

#### Question 13 **\*\* required \*\***

Does your country club have one or more employee(s) whose responsibility is implementing and monitoring food security?

- Yes
- No

### Page 9

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Fill out this page only if you answered:

- **Yes** on question **13. Does your country club have one or..** on **page 8** .

#### **FOOD SECURITY MANAGEMENT TEAM**

**INSTRUCTIONS: The following set of questions asks you about your club's food security management team.**

#### Question 14

Which of the following individuals are responsible for implementing and monitoring food security in your country club?

- General Manager
- Clubhouse Manager
- Director of Security
- Food and Beverage Director
- Executive Chef
- Sous Chef
- Other:

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**Page 10**

Fill out this page only if you answered:

- **No** OR **Yes** on question **13. Does your country club have one or..** on **page 8** .

**Question 15**

---

**INTENTION TO DEVELOP A FOOD SECURITY MANAGEMENT PLAN**

Does your country club plan to develop and implement a food security management plan?

- No, and we do not plan to develop one in the near future.
- Yes, but we have not determined a specific timeline.
- Yes, we plan to develop one within the next 3 months.
- Yes, we plan to develop one within the next 6 months.
- Yes, we plan to develop one within the next 12 months.

Further comments about your response:

---

**Page 11****DEMOGRAPHIC QUESTIONS****Question 16**

What is your gender?

- Male
- Female

**Question 17**

What is your position title?

Characters Remaining: 200

**Question 18**

How long have you held your current position?

- 0 - 5 years
- 6 - 10 years
- 11 - 15 years
- 16 - 20 years
- 21 - 25 years
- 26 - 30 years
- Greater than 30 years

### Question 19

---

How many years have you been employed in foodservice?

- 0 - 5 years
- 6 - 10 years
- 11 - 15 years
- 16 - 20 years
- 21 - 25 years
- 26 - 30 years
- Greater than 30 years

### Question 20

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How many years have you been employed in club management?

- 0 - 5 years
- 6 - 10 years
- 11 - 15 years
- 16 - 20 years
- 21 - 25 years
- 26 - 30 years
- Greater than 30 years

### Question 21

---

What is your current age?

Characters Remaining: 2

### Question 22

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What is your highest level of education completed?

- High school
- Some college
- Associate, 2-year, or Vocational Degree
- Bachelor's degree
- Graduate degree (e.g. Master's, Doctoral)

### Question 23

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What is your annual foodservice operating budget (including food and labor)?

- Less than \$2,000,000 per year.
- \$2,000,000 - \$5,000,000 per year.
- Greater than \$5,000,000 per year.
- Don't know or prefer not to respond.

Further comments about your response:

Page 12

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## THANK YOU!

### Question 24

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#### Thank you for your participation in this study!

Resources that can help you to further understand food security are easily obtainable from governmental websites such as the Food and Drug Administration:

<http://www.fda.gov/Food/FoodDefense/Training/default.htm>

The National Restaurant Association also has specific information about food security in retail foodservice:

<http://www.servsafe.com/catalog/productDetail.aspx?ID=1401>

If you wish to be sent information of the survey results upon completion of this study, then please send an e-mail to [daveolds@ksu.edu](mailto:daveolds@ksu.edu)

**If you are interested in being entered in a drawing for a \$100 gift certificate redeemable at CMAA's Marketplace, then please send an e-mail to [daveolds@ksu.edu](mailto:daveolds@ksu.edu) and indicate that you wish to be entered in the drawing.**

**Please use the box below to share any comments, concerns, or feedback regarding this survey.**

**When you click "done" below, the survey will be completed.**

Characters Remaining: 1000

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### Closing Message

**Thank you for your participation in this study!**

- End of Survey -

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## **Appendix D - Interview Questions**

**Private Club Biosecurity – Club Manager Interview Form** (Estimated time for interview: 20 minutes)

**Section A: Knowledge of National Restaurant Association (NRA) and Food and Drug Administration’s (FDA) Resources**

The following set of interview questions pertain to your knowledge of NRA and FDA resources pertaining to Food Biosecurity Defense.

1.	Are you aware of the NRA publication “Food Security – An Introduction”?
2.	If so, then how did you first become aware of this resource?
3.	Are you familiar with the FDA’s responsibilities in enforcing the Public Health Security and Bioterrorism Preparedness and Response Act of 2002 (the Bioterrorism Act)?
4.	If so, then how did you first become aware of the NRA publication “Food Security – An Introduction”?
5.	Are you aware of any other resources on food biosecurity applicable to country clubs or private clubs? If yes, please specify:
6.	Do you feel that your country club is at risk for an intentional attack on your food production systems? (yes/no)
7.	What areas of your operation do you think are the most vulnerable to an intentional attack from outsiders (non-employees)?
8.	What areas of your operation do you think are the most vulnerable to an intentional attack from insiders (employees)?

**Section B: Resources Needed for Food Biosecurity Defense**

The following set of interview questions are designed to measure needed resources:

1.	What resources are needed to implement a Food Biosecurity Defense Plan in your club?
2.	Facilities needs (i.e. storage, utility updates, equipment upgrades, grounds or building improvements)?
3.	Employee needs (i.e. training, screening)?
4.	Security needs (i.e. security devices, alarms, etc)?
5.	Please explain some perceived barriers to implementing a Food Biosecurity Defense Plan in your operation:

**Section C: Training Needs Related for Food Biosecurity Defense**

The following set of interview questions are designed to measure your Training Needs for Food Biosecurity Defense. Please indicate the amount of training that is currently given in the following areas using this scale:

1.	What type of training programs have you implemented in your club related to Food Biosecurity? (Start with broad based, probing questions. Broad categories would be: facility security, utility security, employee management, communication, food handling, chemical use and storage.)
2.	What types of training needs would be essential in your club related to Food Biosecurity? (Begin to narrow focus – asking more specific questions).



**Section D: Policies and Procedures**

The following set of interview questions are designed to measure policies and procedures:

1. To what extent do you already have policies and procedures developed that would overlap with/indirectly address food biosecurity issues in your club (Crisis Management Plan, Disaster Management Plan)?

## **Appendix E - Observation Instrument**

**Table 10: Observed / Reported Food Security Items During Onsite Visit to Country Club Properties (n=25)**

FOOD SECURITY ITEMS	OBSERVED / REPORTED		
	Yes	No	N/A
<b>Exterior Premises &amp; Outside Exits/Entrances of Country Club</b>			
Parking lot for visitors & guests are at safe distance from CC.	17	8	
Outside lighting is adequate to detect unusual activities.	24	1	
Video surveillance monitoring is used.	11	14	
Gates/security checkpoints used to restrict access to club premises	6	19	
Fencing or other deterrents are used around sensitive areas (i.e. non-public perimeter and/or storage lockers, air intakes, etc.)	18	7	
Security patrols are present.	7	18	
Access limited to outside controls for airflow.	18	7	
Access limited to outside controls for water.	20	5	
Access limited to outside controls for electricity.	18	7	
Access limited to outside controls for refrigeration.	16	7	2
External facility signs are up-to-date and useful in maintaining control of premises.	6	19	
Dedicated public entrance(s) to clubhouse exists.	24	1	
Dedicated employee entrance(s) to clubhouse exists.	22	3	
All other non-dedicated clubhouse exits/entrances secured.	4	21	
Dedicated employee entrance to facility secured.	5	20	
Employee entrance has policy posted for entrance/exit guidelines.	1	24	
Outer doors are sturdy / reinforced (i.e. metal frame or equivalent).	25	0	
An authorized person is assigned to receive shipments during regular business hours.	23	2	
An authorized person is assigned to receive shipments after regular business hours.	5	20	
Daily schedule of deliveries is posted/available.	4	21	
List of approved suppliers is posted/available.	14	11	

**Observed / Reported Food Security Items During Onsite Visit to Country Club Properties (n=25) (Cont.)**

FOOD SECURITY ITEMS	OBSERVED / REPORTED		
	Yes	No	N/A
<b>Exterior Premises &amp; Outside Exits/Entrances of Country Club (Cont.)</b>			
Receiving logs are used and up-to-date.	4	21	
Receiving policies/procedures for food deliveries are posted/available.	13	12	
Receiving policies/procedures for chemical deliveries are posted/available.	13	12	
Receiving policies/procedures for MSDS sheets are posted/available.	20	5	
Guidelines for tamper-resistant verification are posted/available.	8	17	
Delivery trucks are kept locked when not being unloaded or loaded.	2	23	
Dedicated vehicles are secured at all times for transporting food produced in a centralized CC to satellite CC locations (pool/golf course).	12	10	
List of phone number of approved primary suppliers and alternative suppliers is posted/available.	22	3	
Dock doors are closed and locked when not in use.	9	16	
<b>Clubhouse Storage Areas</b>			
Access to all food product and food ingredients is secured.	15	10	
Access to chemical storage areas is secured.	14	11	
Only designated employees have access to storage rooms.	16	9	
Designated area for storing distressed, damaged, and returned products to ensure that they are not served or used in the operation.	19	6	
Accurate inventory of all supplies is readily available.	25	0	
Security alarm installed on storage room doors?	5	20	
Storage room doors reinforced and secure/tamper-proof?	20	5	

**Observed / Reported Food Security Items During Onsite Visit to Country Club Properties (n=25) (Cont.)**

FOOD SECURITY ITEMS	OBSERVED / REPORTED		
	Yes	No	N/A
<b>Clubhouse Foodservice / Food Preparation Areas</b>			
Restricted foodservice areas are assigned and clearly marked with appropriate signs, including food and chemical storage areas.	3	22	
Leftover food items stored in sealed containers that are labeled/dated.	23	2	
Only designated employees have access to restricted foodservice areas.	20	5	
Key log is readily available and up-to-date to verify access to restricted foodservice areas.	12	12	1
Access to airflow is restricted and accessible only by designated employees.	19	6	
Access to HVAC is restricted and accessible only by designated employees.	21	4	
Access to water system is restricted and accessible only by designated employees.	20	5	
Access to electricity is restricted and accessible only by designated employees.	18	7	
Access to gas is restricted and accessible only by designated employees.	21	4	
Emergency exits (alarmed) are present per local, state, fire/building codes.	17	7	1
Self-locking doors (opened from the inside only) are present per local, state, fire/building codes.	17	7	1
Doors are secured (lock, seal, sensor device) at all times.	5	20	
Windows are secured (lock, seal, sensor device) at all times.	15	9	1
Roof openings are secured (lock, seal, sensor device) at all times.	16	6	3
Vent openings are secured (lock, seal, sensor device) at all times.	16	6	3
Outside refrigeration are secured (lock, seal, sensor device) at all times.	6	7	12
Outside storage units are secured (lock, seal, sensor device) at all times.	4	7	14
At least one authorized employee is present in the foodservice area at all times when the area is not secure.	21	4	
Alternative storage place (outside of foodservice areas) exists for employees to secure personal foods and medications.	18	6	1
Documentation exists describing where ingredients and foods are stored and prepared in the CC.	5	20	

**Observed / Reported Food Security Items During Onsite Visit to Country Club Properties (n=25) (Cont.)**

FOOD SECURITY ITEMS	OBSERVED / REPORTED		
	Yes	No	N/A
<b>Clubhouse Foodservice / Food Preparation Areas (Cont.)</b>			
Self-service foodservice areas are monitored.	17	5	3
All leftover items are stored in sealed, labeled, and dated containers.	25	0	
Food or ingredients not properly sealed and labeled is discarded.	24	1	
Purchase records are available.	25	0	
Food production records are available.	7	18	
HACCP records are available (if applicable).	4	21	
Temperature logs are available.	11	14	
Map or diagram defining boundaries of all foodservice areas & locations of specific foodservice activities is available.	3	22	
<b>Clubhouse Hazardous Chemicals</b>			
Chemical storage area is outside of food preparation areas.	24	1	
Chemical storage area is secured.	12	13	
Chemical storage area is accessible only by designated employees.	15	10	
Manufacturer's instructions for use of hazardous chemicals are available, including instructions for amounts of chemicals to use, personal protective equipment guidelines, and guidelines for optimal environmental conditions for use of chemicals.	25	0	
Daily inventory of hazardous chemicals is available (should contain a chemical inventory and usage log).	1	24	
Material Safety Data Sheets (MSDS) for hazardous chemicals are readily available.	24	1	
Containers used to transport chemicals from the storage area to the work area are properly labeled.	22	2	1

**Observed / Reported Food Security Items During Onsite Visit to Country Club Properties (n=25) (Cont.)**

FOOD SECURITY ITEMS	OBSERVED / REPORTED		
	Yes	No	N/A
<b>Clubhouse Foodservice Equipment</b>			
Access to foodservice equipment is secured. Only designated employees are allowed to operate and maintain/clean equipment.	22	3	
Signs and/or instructions are posted to increase safety especially with potentially dangerous equipment (meat slicer, mixers, steamers).	7	18	
<b>Clubhouse Foodservice Personnel</b>			
Updated daily or shift roster of foodservice personnel is available to foodservice supervisors.	24	1	
Employees are easily identifiable (ID badge).	7	18	
Temporary workers, contractors, cleaning crews, construction workers, truck drivers, etc. are clearly identified.	10	14	1
Only authorized individuals in restricted sections of foodservice area.	22	3	
<b>Clubhouse Water and Ice Supply</b>			
Water supply is secured against outside access.	21	4	
Ice-making equipment are secured against outside access.	17	8	
Backflow devices are in place on all water-supply equipment.	25	0	
<b>Clubhouse General Security</b>			
Computer systems have effective, up-to-date firewalls and virus detection systems.	24	1	
Computer systems files are backed up regularly.	20	5	

**Observed / Reported Food Security Items During Onsite Visit to Country Club Properties (n=25) (Cont.)**

FOOD SECURITY ITEMS	OBSERVED / REPORTED		
	Yes	No	N/A
<b>Clubhouse General Security (Cont.)</b>			
Sign-in desk or other designated area for visitors and non-club employees to explain purpose of their visit.	7	18	
I.D. badges issued to visitors.	25	0	
Escort/Security personnel at public entrances.	5	20	
Written program in place specifying how access to keys, keycards, and number codes/PINs are granted and denied to employees.	7	18	
Adequate interior lighting.	25	0	
Adequate emergency lighting to facilitate detection of suspicious or unusual activity.	24	1	
Minimal number of places in non-public areas exist that an intruder could remain unseen after work hours (e.g. trash dumpster areas).	3	22	
Minimal number of places in non-public areas exist that could be used to temporarily hide intentional contaminants.	2	23	
Inspection of incoming and outgoing packages and briefcases.	2	23	
Duress alarms installed in refrigerators and freezers.	11	14	
Access to roof & roof equipment under control?	20	5	
Access to food product (i.e. to the interior) from roof under control?	20	5	
Employee lockers monitored/inspected?	3	18	4



## **Appendix F - Additional Survey Tables**

**Table 11: Club Managers Opinions of Food Security Factors**

	<b>Mean ± Standard Deviation</b>
<b>Concern Opinions</b>	<b>Agree/Disagree (n=261)</b>
Implementing preventive measures will decrease the risk of tampering or other malicious, criminal or terrorist actions in my country club.	4.04±1.00
Training all foodservice employees about food security is a priority.	3.80±1.18
I am concerned about food security in my country club.	3.48±1.28
Developing and initiating a food security management plan is a priority even if it increases our country club's operating costs.	3.38±1.01
Informing our members that food security is one of our primary concerns is not an important responsibility of club management. <sup>a</sup>	2.57±1.15
Our country club does not need a food security management plan because the country club is not at risk for tampering or other malicious, criminal or terrorist actions. <sup>a</sup>	2.30±1.09
Management does not care about implementing a food security management plan. <sup>a</sup>	2.10±0.99
Promoting food security awareness among employees is not a club professional's responsibility. <sup>a</sup>	1.62±1.18
<b>Self-Efficacy Opinions</b>	
Employees in my country club are capable of implementing a food security management plan.	3.78±0.95
I am capable of implementing a food security management plan in my country club.	3.59±1.00
Club professionals know exactly what to do if our country club receives a food security threat.	2.99±1.18
Implementing a food security management plan in my country club would be complicated for my employees. <sup>a</sup>	2.48±0.98

Scale values range from Strongly Disagree (1) to Strongly Agree (5).

<sup>a</sup>Reverse-coded.

**Table 12: Club Managers Opinions of Food Security Factors**

	<b>Mean ± Standard Deviation</b>
<b>Self-Efficacy Opinions (ctd)</b>	
	<b>Agree/Disagree (n=261)</b>
Implementing a food security management plan in my country club would be difficult for me. <sup>a</sup>	2.41±1.05
Implementing a food security management plan in my country club would be difficult for my employees. <sup>a</sup>	2.34±0.94
Implementing a food security management plan in my country club would be complicated for me. <sup>a</sup>	2.31±0.98
<b>Barriers Opinions</b>	
Employees do not care about implementing a food security management plan.	2.55±1.04
Implementing a food security management plan in my country club would be too costly.	2.40±0.93
Implementing a food security management plan in my country club would be too time-consuming.	2.36±1.00
My country club does not have the resources available to implement a food security management plan.	2.27±1.05
<b>Independent Opinions</b>	
If the Board of Directors of my country club suggests implementing a food security management plan, then my country club will develop one.	4.24±0.96
Our country club is well-secured against any type of food security hazard/threat.	3.39±1.06
If CMAA headquarters suggests implementing a food security management plan, then my country club will develop one.	3.02±0.98

Scale values range from Strongly Disagree (1) to Strongly Agree (5).

<sup>a</sup>Reverse-coded.

**Table 13: Total Country Club Memberships<sup>a</sup> (n=261)**

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<b>Number of Memberships</b>	<b>Number</b>	<b>Percentage</b>
0 – 250 memberships	14	5.4%
251 – 500 memberships	76	29.1%
501 – 750 memberships	90	34.5%
751 – 1000 memberships	34	13.0%
1001 – 2500 memberships	39	14.9%
2501 – 5000 memberships	5	1.9%
Over 5000 memberships	1	0.4%
No Response	2	0.8%

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<sup>a</sup> Question asked of respondents was “How many total club memberships does your club have?”

**Table 14: Average Foodservice Employees working per shift<sup>a</sup> (n=261)**

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<b>Number of employees</b>	<b>Number</b>	<b>Percentage</b>
0 – 10 employees per shift	95	36.4%
11 – 25 employees per shift	118	45.2%
26 – 50 employees per shift	33	12.6%
51 – 75 employees per shift	2	0.8%
76 – 100 employees per shift	1	0.4%
No Response	12	4.6%

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<sup>a</sup> Question asked of respondents was “What is the average number of foodservice employees working per shift?”

**Table 15: Country Clubs and Crisis Management Plans<sup>a</sup> (n=261)**

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<b>Response</b>	<b>Number</b>	<b>Percentage</b>
No, we don't have one.	79	30.3%
Yes, we have one and it is rather informal.	116	44.4%
Yes, we have one and it is formal (a person holds primary responsibility for it)	54	20.7%
I don't know.	10	3.8%
No Response	2	0.8%

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<sup>a</sup> Question asked of respondents was "Does your country club have a crisis management plan?"

**Table 16: Country Clubs with Food Security Monitoring Employee <sup>a</sup> (n=261)**

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<b>Response</b>	<b>Number</b>	<b>Percentage</b>
Yes	166	63.6%
No	94	36.0%
No Response	1	0.4%

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<sup>a</sup> Question asked of respondents was “Does your country club have one or more employee(s) whose responsibility is implementing and monitoring food security?”

**Table 17: Individuals Responsible for Implementing and Monitoring Food Security<sup>a b</sup> (number of responses = 427)**

<b>Position</b>	<b>Number</b>	<b>Percentage</b>
Executive Chef	148	34.7%
General Manager	68	15.9%
Sous Chef	67	15.7%
Clubhouse Manager	59	13.8%
Food and Beverage Director	57	13.4%
Director of Security	13	3.0%
Purchasing Agent	12	2.8%
Assistant General Manager	3	0.7%

<sup>a</sup> Question asked of respondents was “Which individuals are responsible for implementing and monitoring food security in your country club?”

<sup>b</sup> Note that the total number of responses (427) is greater than the number of respondents (261) because multiple answers were allowed in the case of more than one person being responsible.



**Table 18: Intent to Develop and Implement a Food Security Management Plan.<sup>a b</sup> (n=261)**

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<b>Response</b>	<b>Number</b>	<b>Percentage</b>
No, and we do not plan to develop one in the near future.	101	38.7%
Yes, but we have not determined a specific timeline.	108	41.4%
Yes, we plan to develop one within the next 12 months.	8	3.1%
Yes, we plan to develop one within the next 6 months.	9	3.4%
Yes, we plan to develop one within the next 3 months.	17	9.0%
No response	18	6.9%

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<sup>a</sup> Question asked of respondents was “Does your country club plan to develop and implement a food security management plan?”

**Table 19: Position Titles of Respondents asked in Food Security Survey<sup>a</sup> (number of responses = 261)**

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<b>Position</b>	<b>Number</b>	<b>Percentage</b>
General Manager	167	64.0%
Clubhouse Manager	32	12.3%
Food and Beverage Director	17	6.5%
Assistant General Manager	15	5.7%
Assistant Clubhouse Manager	4	1.5%
Director of Operations	4	1.5%
Dining Room Manager	3	1.1%
Controller	2	0.8%
Membership Director	2	0.8%
Catering Manager	1	0.4%
No Response	4	1.5%

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<sup>a</sup> Question asked of respondents was “What is your position title?”

**Table 20: Comparisons of Gaps between Importance Perceptions and Practice Frequencies to Previous Study Using Gap Analysis.**

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	<b>Gap<sup>a</sup></b>	<b>Gap<sup>b</sup></b>
<b>Chemical Use and Storage</b>	0.17	0.19
<b>Food Handling</b>	0.22	0.20
<b>Employee Management</b>	0.38	0.52
<b>Utility Security</b>	0.49	0.72
<b>Facility Security</b>	0.58	0.72
<b>Overall Average</b>	0.37	0.47

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<sup>a</sup> This study.

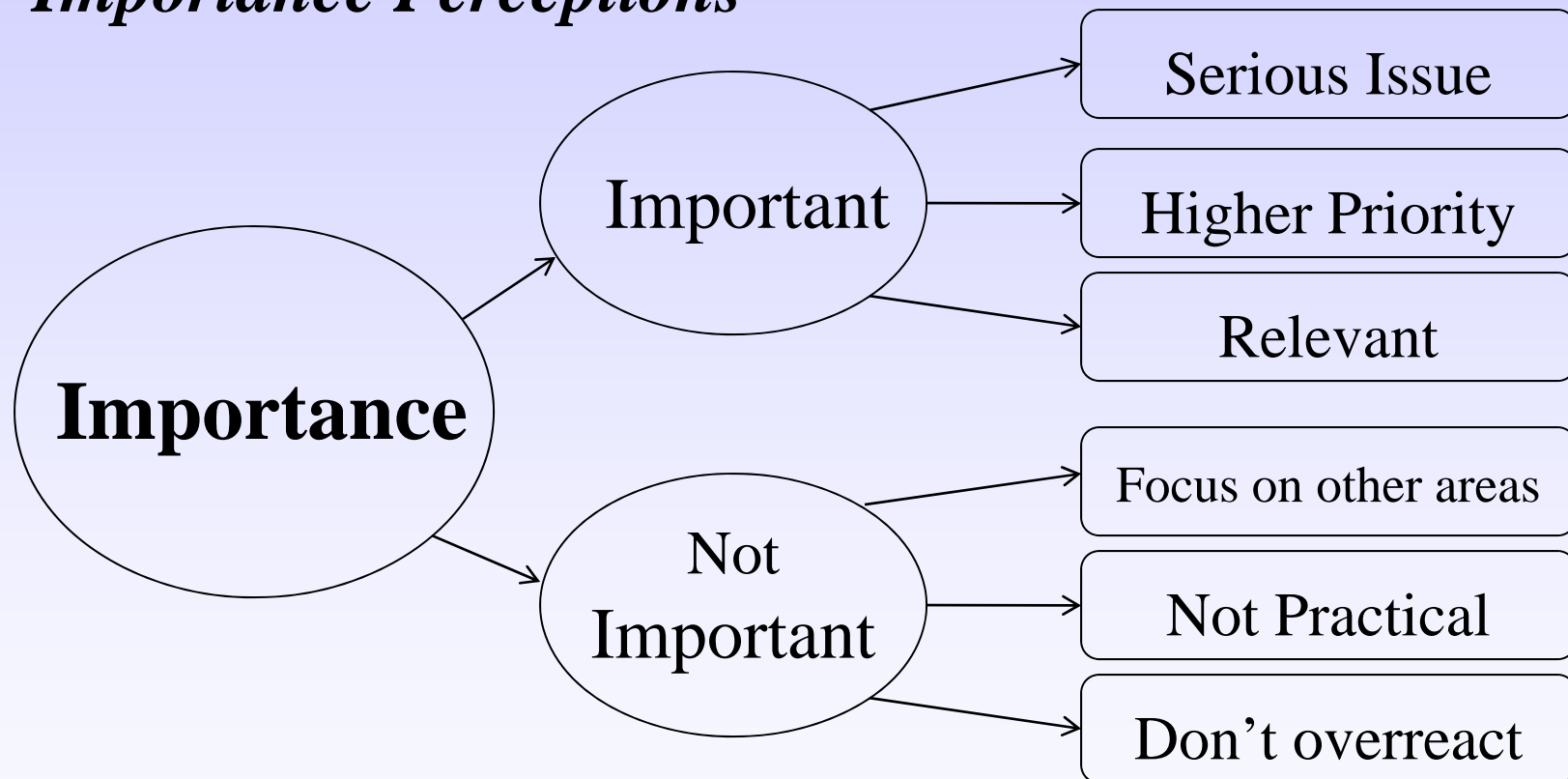
<sup>b</sup> Previous study by Yoon and Shanklin (2007).

## **Appendix G - Interview Theme Diagrams**

# Qualitative Data - Results

## *Interviews*

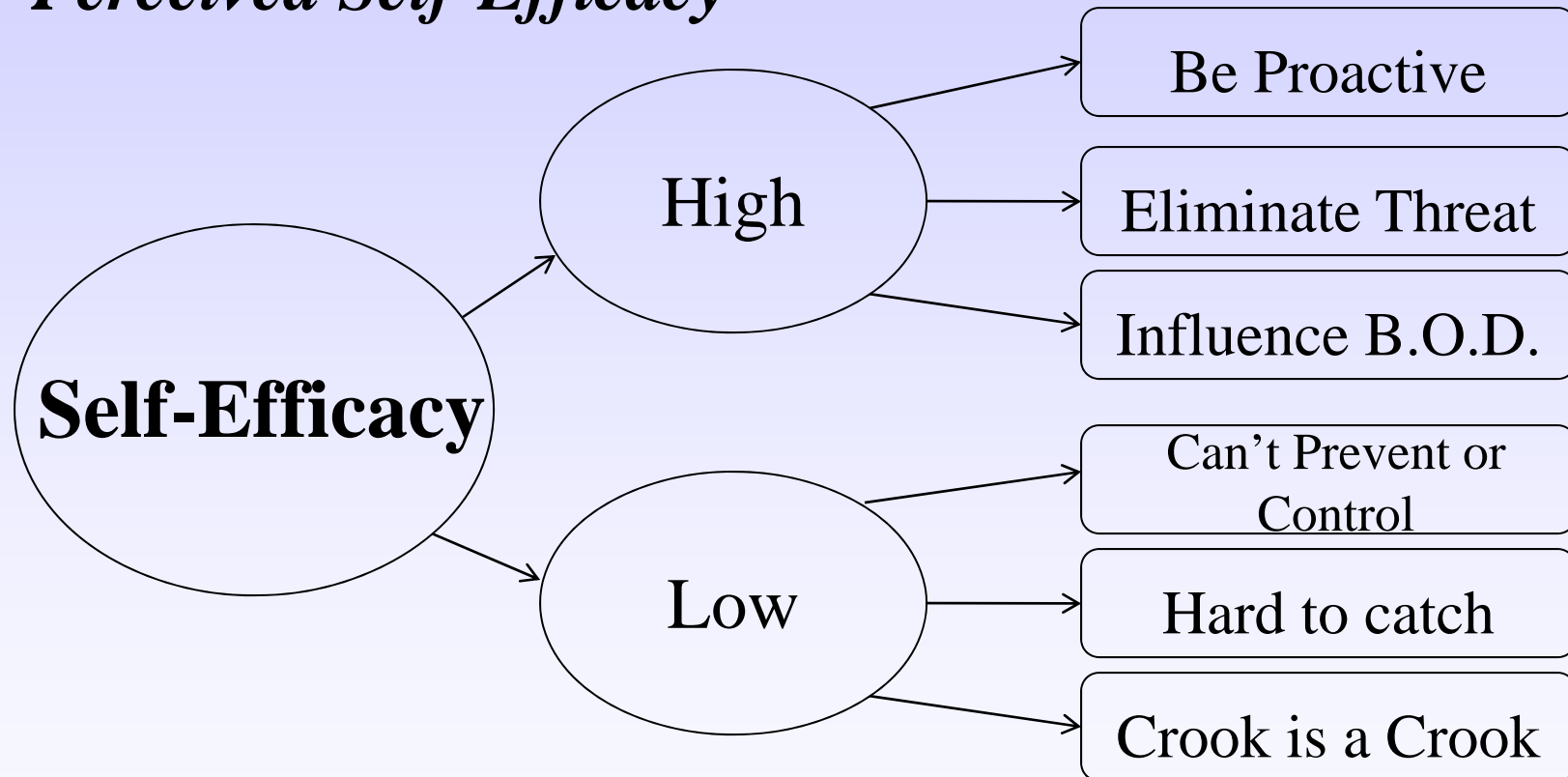
### *Importance Perceptions*



# Qualitative Data - Results

## *Interviews*

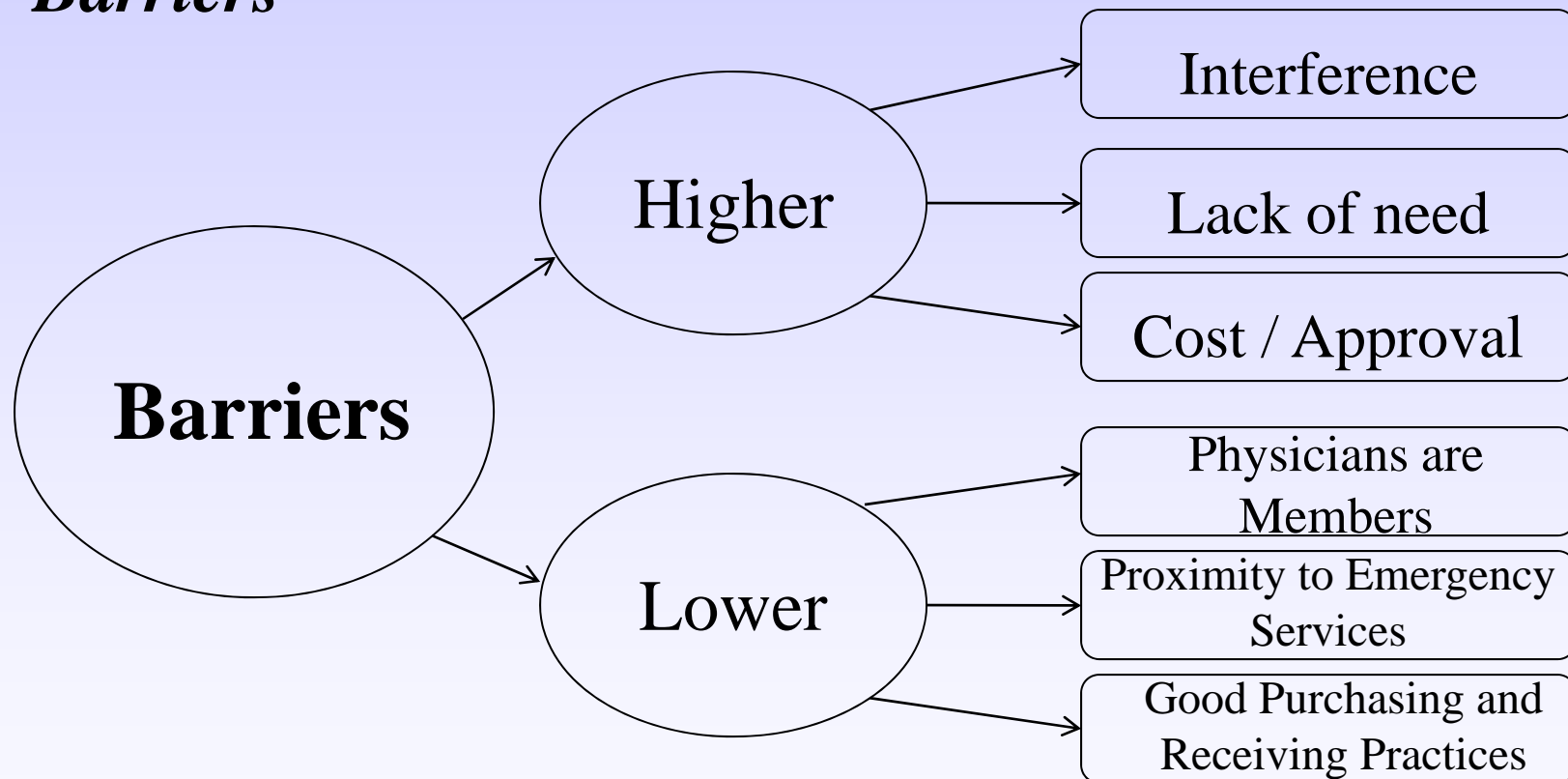
### *Perceived Self-Efficacy*



# Qualitative Data - Results

## *Interviews*

### *Barriers*



# Qualitative Data - Results

## *Interviews*

### *Attitudes*

