STATEWIDE EVALUATION OF FOODSERVICE WORKER HEALTH POLICIES IN GEORGIA: CAN POLICIES BE ENFORCED AND COMPLIANCE MEASURED?

by

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(Under the Direction of ELIZABETH L. ANDRESS)

ABSTRACT

Foodservice establishments are a significant source of foodborne disease outbreaks in the United States and transmission of pathogens from sick food workers is a substantial contributing factor. In an effort to reduce the likelihood that pathogens are transmitted from infected food workers to patrons, the U.S. Food and Drug Administration (FDA) *Food Code* has specific recommendations regarding sick foodservice employees that consider the degree of risk an infected food worker poses. In 2007, Georgia implemented food safety regulations that are closely aligned with the 2005 *FDA Food Code* which includes specific criteria for monitoring and enforcing employee health policies. Thus, foodservice establishments in this state are required to have employee health policies in place and management is expected to prevent infectious employees from handling food. This dissertation explores the factors that influence the feasibility of enforcing and determining compliance of FDA employee health recommendations that are theoretically sound but appear particularly challenging to enforce. Three studies were conducted and focused on: 1) quantifying the compliance status of

foodservice establishments in Georgia specific to employee health controls, 2) investigating the attitudes, beliefs, and practices of Environmental Health Specialists (EHS) regarding how compliance of employee health policies is evaluated during inspections and, 3) describing the personal and external factors that influence a manager's ability to enforce these policies effectively. Findings from this dissertation indicated that the majority of foodservice establishments in Georgia have employee health policies in place but determination of compliance with these policies may not be performed accurately during food safety inspections. Qualitative analyses suggested that EHS may lack the understanding and/or resources necessary to provide an accurate assessment of proper use of restriction and exclusion and foodservice managers may overestimate their ability to determine if an employee is working while ill. The findings of this dissertation provide information that can be used to help design more feasible intervention strategies and performance measures to help protect consumers from illnesses transmitted by infectious foodservice employees.

INDEX WORDS: Employee Health Policies, Restrict and Exclude, Foodborne Outbreaks, Foodservice, FDA Food Code, Food safety inspections, Infectious food handlers, Norovirus

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DEDICATION

This work is dedicated to my parents, Marilyn and Stanley (Mickey) Steinberg. I am eternally grateful for the opportunities you have provided me through your unconditional love and unyielding support.

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CHAPTER I

INTRODUCTION

Each year in the United States, there are an estimated 48 million cases of foodborne illness resulting in approximately 127,000 hospitalizations and 3,000 deaths (Scallan et al 2011). In terms of pain and suffering, medical costs, and lost productivity, the annual cost of food-related illness is estimated to be $10 -$83 billion (U.S. Food and Drug Administration (FDA) 2013d). Even though foodborne illness outbreaks account for only a small percentage of culture-confirmed illnesses, the detrimental impact on public health is significant (Gould et al 2013; Jones and Angulo 2006). While outbreaks can be associated with any setting where food is served, 48% of all outbreaks reported to the Centers for Disease Control and Prevention (CDC) between 2009 and 2010 were associated with food prepared in restaurants (CDC 2013b). Considering there are currently about 1 million commercial eating establishments in the United States that generate more than $680 billion in annual sales (National Restaurant Association 2014), the enormity of the actual and potential public health threat caused by foodservice-associated foodborne illness outbreaks is evident.

Food handled by infectious persons is a contributing factor in up to two-thirds of restaurant-related foodborne illnesses (Hedberg et al 2006) and norovirus and *Salmonella* were implicated in nearly 75% of foodborne disease outbreaks (CDC 2013b). In fact, of the 457 foodborne disease outbreaks reported in 2006 and 2007, 89% of norovirus and nearly half (45%) of *Salmonella* outbreaks had contributing factors related to food worker health and hygiene (Gould et al 2013). The ongoing and distinct role of infectious food handlers causing foodborne disease

outbreaks demonstrates that continued efforts are needed to mitigate this prominent food safety risk factor (Gould et al 2013; Hedberg et al 2006; Medus et al 2006; Sumner et al 2011; Todd et al 2007).

Since the turn of the 20th century, public health officials have recognized that effective foodborne disease prevention hinges upon the application of comprehensive food safety measures from production to consumption (FDA 2013d). In 1993, the first *FDA Food Code* was issued and today the FDA maintains an updated model food code that assists public health officials by providing them with an evidence-based technical and legal foundation for regulating the retail segment of the food industry (FDA 2013d). In order to reduce the likelihood that certain pathogens will be transmitted from infectious employees to consumers, the Employee Health section of the *Food Code* provides information designed to assist managers and public health officials in removing sick food handlers when they present the greatest risk of disease transmission (FDA 2013a). These recommendations are intended to be practical and enforceable while offering maximum protection to public health with minimal disruption to foodservice operations (FDA 2013a). Unfortunately, despite these recommendations, food handlers continue to work while ill and foodborne illness outbreaks commonly result from contamination introduced by an infected foodservice employee (Carpenter et al 2013; Cates et al 2009; Gould et al 2013; Green et al 2005; Hedberg et al 2006; Jones and Angulo 2006; Manes, Liu and Dworkin 2013; Sumner et al 2011; Todd et al 2007; Todd et al 2008).

Even though the foodservice industry has made significant improvements in controlling many foodborne illness risk factors (FDA 2010), eliminating the problem of food handlers working while ill may be one public health threat this is impossible to overcome (Todd et al 2007). Nevertheless, continued research along with environmental health assessments and

epidemiological investigations are essential for mitigating the risk of disease transmission from infectious foodservice employees to consumers (Gould et al 2013). Appropriately, exploration of the factors that influence compliance and enforcement of the FDA recommended employee health controls is needed in order to identify gaps and barriers that are preventing these intervention strategies from alleviating the burden of foodborne illness incited by sick food handlers.

Chapter II is a review of the literature outlining the epidemiological data concerning foodborne illness as it relates to the foodservice industry and the impact that infectious food handlers have on the prevalence of foodborne disease outbreaks. Also reviewed are the federal and state regulations and guidelines that are in place to protect consumers by ensuring that foodservice operations meet acceptable food safety standards. Because the research conducted for this dissertation focuses on employee health controls designed to prevent sick food handlers from transmitting disease, the role of foodservice managers and Environmental Health Specialists (EHS) in enforcing and monitoring compliance of these regulations are discussed in detail.

Chapter III describes a study designed to quantify the rate of non-compliance for food safety inspection items that are specific to employee health controls. Specifically, frequency data regarding non-compliance for items 2-1A "Proper use of restriction and exclusion" and 2-2A "Management awareness; policy present; reporting" are evaluated. All data used in this research represents foodservice inspections conducted in Georgia from October 1, 2012 – September 30, 2013.

Chapter IV is a cross-sectional study that explores the attitudes, beliefs, and practices of EHS specific to measuring compliance of employee health controls during routine inspections. This

chapter builds on the findings from Chapter III and explores how participants' self-reported actions compare with that of actual inspection data.

Chapter V presents research that investigates foodservice managers' beliefs and practices specific to enforcement of employee health policies and regulations. This chapter incorporates findings from Chapter IV to compare and contrast how managers and EHS contend with issues concerning employee health.

Chapter VI presents a summary of the major findings and conclusions from Chapters III, IV, and V. Collectively, these results provide important insight into the multiple factors that facilitate or compromise the ability of foodservice managers and EHS to enforce and monitor compliance of employee health policies. These findings can provide direction for future work focused on enhancing the efficacy of intervention strategies designed to mitigate the public health risk presented by food handlers working while ill.

CHAPTER II

LITERATURE REVIEW

Introduction

Every year, there are approximately 9.4 million foodborne illnesses in the United States caused by 31 major pathogens (Scallan et al 2011). While bacteria cause many (39%) of these illnesses, the majority (59%) are caused by viruses (Scallan et al 2011). Specifically, noroviruses are the leading cause of domestically acquired foodborne illness in which a single etiologic agent is identified (Bresee et al 2002; CDC 2013; Hall et al 2012; Koopmans and Duizer 2003; Painter et al 2013; Scallan et al 2011; Widdowson et al 2011).

Because only a small proportion of foodborne illnesses are diagnosed and reported, outbreak and surveillance data provide the most valuable information regarding the risk factors associated with foodborne disease. For instance, surveillance data from foodborne disease outbreaks in the United States (1998 – 2008) indicated that of 5,059 confirmed, single-etiology outbreaks, norovirus was the most common cause (39%), followed by *Salmonella* (26%), and Shiga toxin–producing *Escherichia coli* (6%) (CDC 2013a). Of particular relevance to the present study is that the data also suggested that when a single place of food preparation was identified, 68% of outbreaks were associated with food prepared in a restaurant or deli (CDC 2013a). Moreover, numerous documented norovirus outbreaks have been traced to an infected food handler and surveillance data suggests that infected food handlers may have contributed to 82% of all norovirus outbreaks during 2001 – 2008 (Hall et al 2012).

While research demonstrates a strong correlation between norovirus outbreaks and infectious foodservice employees (Bresee et al 2002; Hall et al 2012; Koopmans and Duizer 2004; Moe 2009; Painter et al 2013; Widdowson et al 2005; Zainazor et al 2010), other pathogens have also been transmitted through food prepared by a sick foodservice employee. Perhaps most notably, in 1907, Dr. George A. Soper proposed that a cook named Mary Mallon, or "Typhoid Mary," was responsible for an outbreak of *Salmonella* Typhi via food she had prepared for others. Since that time, it has been well established that a sick food worker can incite an outbreak of foodborne illness, even when the individual displays no signs of disease. For example, infectious food handlers have been implicated in outbreaks of *Salmonella* spp., Hepatitis A, *Shigella* spp., *Staphylococcus aureus* and Shiga toxin-producing *Escherichia coli* (Barrabeig et al 2010; Chapman et al 2010; Guzewich and Ross 1999; Hedberg et al 2006; Medus et al 2010; Todd et al 2008).

As revealed by epidemiological data, foodservice-associated foodborne illness outbreaks are a significant threat to public health and sick employees have been implicated in a number of these outbreaks. Thus, the aim of this dissertation is to explore whether food safety recommendations designed to mitigate this public health risk can be enforced and whether compliance with these recommendations can be measured. This research will help fill gaps about our knowledge regarding the factors that facilitate or compromise the practical application of interventions that are theoretically sound but particularly challenging to enforce. To provide a foundation for this dissertation research, this review is focused on the role of the infected food handler in the transmission of foodborne illness; the policies and recommendations that are in place to reduce the risk of sick food workers transmitting diseases; and previous research that investigates the characteristics of foodservice establishments associated with food handlers working while ill.

The Role of the Infected Food Handler in Transmission of Foodborne Illness

While the exact role of the infected food handler in disease transmission has been difficult to establish (Michaels et al 2004), the Centers for Disease Control and Prevention (CDC) has designated 6 pathogens as the most frequently transmitted by food contaminated by infected persons (CDC 2013a). Specifically, norovirus, Hepatitis A virus, *Shigella* spp., Shiga toxin-producing *Escherichia coli*, *Salmonella* Typhi and nontyphoidal *Salmonella* are pathogens that demonstrate high infectivity via contamination of food by infected food employees. Yet, even when a food handler is exposed to or infected with a known pathogen, the level of risk presented by the employee varies with different stages of clinical illness. Therefore, the natural history of disease and the dynamics of disease transmission are critical elements that need to be considered when designing effective intervention strategies.

Understanding the characteristic natural history of a disease allows food safety experts to design, implement, and evaluate recommendations aimed at removing highly infectious food employees from the work place. Of course, infectious food workers pose the greatest threat to consumers when they handle food while experiencing symptoms of disease such as vomiting, diarrhea, jaundice, or sore throat with fever. However, while the frank presentation of symptoms indicates a high level of infectiousness, disease transmission is possible during the incubation period and for a time after symptoms resolve. Likewise, even if an individual remains asymptomatic, there is a risk of disease transmission via food if he or she is exposed to or diagnosed with certain infectious diseases. Hence, understanding the natural history of disease is essential for determining the time frame when employees present a significant risk of transmitting pathogens so they can be excluded or restricted from working with food during this period.

The epidemiologic triad provides a model by which the role of the infected food handler in the transmission of foodborne pathogens can be illustrated and the complexity of controlling this risk factor can be discussed. In general, for any given infectious disease, the epidemiologic triad reflects the interaction among a human host, infectious agent, and the environment that promotes exposure (Gordis 2009). In the context of the present paper, the human host is the food handler, the infectious agent is a virus or bacterium capable of being transmitted indirectly, the environment is a foodservice establishment and the vehicle of transmission is food.

Ideally, in order to prevent an infected food handler from transmitting disease, the most effective element of control is to remove the host from the triad and not permit the employee to work while infected. However, research demonstrates that food handlers continue to work while ill and, because a sick worker may be asymptomatic or simply not report an active illness, there is little way for managers to intervene and prevent an infectious worker from handling food (Cates et al 2009; Green et al 2005; Hedberg et al 2006; Jones and Angulo 2006; Manes, Liu and Dworkin 2013; Sumner et al 2011; Todd et al 2007; Todd et al 2008). Therefore, if an infected individual remains in the foodservice establishment, proper hand hygiene and avoiding bare hand contact with ready-to-eat foods are essential interventions for preventing the transmission of pathogens to food. Yet, within the reality of the foodservice environment, employees frequently do not wash their hands or use/change gloves when indicated (Cates et al 2009; Chapman et al 2010; DeBess et al 2009; FDA 2010; Green et al 2005; Green et al 2006; Manes, Liu, and Dworkin 2013; Pragle, Harding, and Mack 2007). Paradoxically, because current hand hygiene guidelines are designed for the prevention of bacterial infections, even conscientious hand washing may be ineffective at preventing illness from highly infectious and relatively resistant pathogens such as norovirus (Boxman et al 2009; Koopmans and Duizer 2004; Michaels et al

2004). Furthermore, because many enteric viruses are variably resistant to heat and disinfectants and can remain infectious on surfaces for as long as 2 weeks, environmental contamination by a sick food handler can serve as an additional reservoir of infection (Breese et al 2002; Cheesbrough et al 1997; Hall et al 2012; Koopmans and Duizer 2004; Michaels et al 2004).

Whether or not a food handler will work while ill can depend on the individual's beliefs, attitudes, and education as well as the culture and characteristics of the foodservice environment. For example, lack of on-call workers, high volume of meals served, lack of manager experience, concern about job loss, not getting paid if not working, and being male are all factors positively associated with food handlers admitting to working while ill (Carpenter et al 2013; Sumner et al 2011). Also, the decision to work while ill is often influenced more by work ethic and a sense of responsibility toward the job as opposed to concerns about the spread of infection and making other people sick (Carpenter et al 2013).

Research indicates that asymptomatic food workers are implicated more frequently than symptomatic workers in outbreaks where an ill food handler is the identified source of disease transmission (Todd et al 2007). Thus, in the absence of routine diagnostic testing to identify infected food handlers, preventing disease transmission from asymptomatic or pre/post-symptomatic shedders may be a problem that is impossible to conquer. Nevertheless, because research indicates that food handlers will work while ill, efforts to identify symptomatic employees and restrict highly infectious individuals from the workplace must be a priority in the hierarchy of controls used to reduce the burden of foodborne illness caused by sick workers.

U.S. Food and Drug Administration Food Code

In collaboration with the Centers for Disease Control and Prevention (CDC) of the U.S. Department of Health and Human Services (HHS) and the Food Safety and Inspection Service of

the U.S. Department of Agriculture (USDA), the Food and Drug Administration (FDA) publishes the *FDA Model Food Code* (hereafter referred to as the *Food Code*). The *Food Code* is a model code and reference document for state, city, county and tribal agencies that regulate retail foodservice establishments and institutional foodservice operations. As defined by the FDA (2013d), the *Food Code* "establishes practical, science-based guidance for mitigating risk factors that are known to cause or contribute to foodborne illness outbreaks associated with retail and foodservice establishments and is an important part of strengthening our nation's food protection system."

The current, comprehensive model *Food Code* was first issued in 1993. New editions are released every 4 years and supplements are released every 2 years so that the *Food Code* recommendations reflect the most current food safety research. Although compliance with the *Food Code* is paramount for achieving uniform national food safety standards, adoption by state, city, county and tribal agencies is not mandatory. Nevertheless, as of 2012, all 50 states and 3 of 6 territories report having retail codes patterned after previous editions of the *Food Code* (FDA 2013d). Specific to the state of Georgia, the current *Georgia Food Code* was adopted in 2007 and is based on the 2005 *Food Code* (with the soon-to-be adoption of the 2009 *Food Code*). As such, the *Georgia Food Code* assumes the same purposes and goals as that of the FDA, which is to safeguard public health and provide food to consumers that is safe, unadulterated, and honestly presented (Georgia Department of Public Health 2011b).

The *Food Code*, thus the *Georgia Food Code*, incorporates 5 key public health interventions to protect the health of consumers (Georgia Department of Public Health 2011b). Specifically, food safety recommendations, and associated foodservice inspections, focus on the following: employee demonstration of knowledge; controlling hands as a vehicle of contamination; time

and temperature parameters for controlling pathogens; consumer advisory; and employee health controls (Georgia Department of Public Health 2011b). Of the 5 public health interventions, employee health controls are those which concentrate on reducing the likelihood that certain pathogens will be transmitted from infected workers into food.

Employee health controls include, but are not limited to, the implementation and enforcement of employee health policies. Employee health policies provide guidance to foodservice employees to preclude transmission of foodborne illness or communicable diseases from infectious food handlers. As explained by the FDA (2013c), health policies consider the degree of exclusion and restriction to the degree of risk that the infected food worker poses while promoting a balance between protecting public health and meeting the needs of the foodservice establishment. Therefore, it is the responsibility of the foodservice establishment to have health policies in place that require food employees to report information about their health as it relates to diseases that are transmissible through food. Explicitly, the *Food Code* requires foodservice employees to report any symptoms of vomiting, diarrhea, jaundice, sore throat with fever, or lesion containing pus such as a boil or infected wound (FDA 2013c, Georgia Department of Public Health 2011b). Also, foodservice employees are required to report past or present diagnoses or exposure to any of the following illnesses: norovirus, Hepatitis A virus, *Shigella* spp., Shiga toxin-producing *Escherichia coli*, *Salmonella* Typhi or nontyphoidal *Salmonella* (FDA 2013c, Georgia Department of Public Health 2011b). In turn, it is the responsibility of the person in charge of the foodservice establishment to either exclude the sick employee from the premises or restrict his or her duties as it relates to handling food. In this context, "exclude" means a food employee is not permitted to work in or enter a food establishment as a food

employee and "restrict" means a food employee's activities are limited to prevent the risk of spreading a disease that is transmissible through food (FDA 2013c).

As mentioned, *Food Code* recommendations are evidence-based and designed to be practical, manageable, and enforceable (FDA 2013d). Fittingly, recommendations regarding exclusion and restriction of sick foodservice employees consider the natural history of disease as it relates to the likelihood that an infected food handler is capable of transmitting illness and the recommendations provide specific instructions on how to mitigate this risk factor. However, as stated by Michaels and co-authors (2004), the intervention itself will not prevent food worker transmission of foodborne pathogens if the intervention is not conscientiously applied. Indeed, research suggests that application of exclude and restrict recommendations is dubious as demonstrated by data suggesting that, even when employee health policies are in place, food handlers continue to work while ill (Cates et al 2009; Green et al 2005; Hedberg et al 2006; Jones and Angulo 2006; Manes, Liu and Dworkin 2013; Sumner et al 2011; Todd et al 2007; Todd et al 2008). Thus, as indicated by Sumner and colleagues (2011), more research is needed to explore policies that encourage workers to tell managers when they are sick and help alleviate the pressures to work while ill.

Food Safety Management Systems

In the foodservice industry, "risk" is defined as the "likelihood that an adverse health effect will occur within a population as a result of a hazard in a food" (FDA 2013d). The concept of taking a risk-based approach to foodservice management and regulatory inspections was initiated by the FDA and was based on information gleaned from the CDC's *Surveillance for Foodborne-Disease Outbreaks - United States, 1993–1997* and the *Report of the FDA Retail Food Program Database of Foodborne Illness Risk Factors* (2000). In general, the CDC identified five broad

categories of foodborne illness risk factors directly contributing to food safety concerns within retail and foodservice establishments (CDC 2000). These five factors were and still are: food from unsafe sources; inadequate cooking; improper holding temperatures; contaminated equipment; and, poor personal hygiene. Subsequent to the CDC report, the FDA published the *Report of the FDA Retail Food Program Database of Foodborne Illness Risk Factors* (2000), which was a national study of the retail and foodservice industry to assess food safety procedures and practices as they relate to the CDC's foodborne illness risk factors. Collectively, the measurable trends identified in CDC's 1993 - 1997 *Surveillance Report* and the FDA's *Baseline Report* support the notion that the foodservice industry must be proactive and implement food safety management systems that will prevent, eliminate, or reduce the occurrence of foodborne illness risk factors (FDA 2013d).

Currently, the terms "active managerial control" and "risk-based approach" are two primary concepts used to encompass food safety management systems that are preventive, as opposed to reactive, with regard to controlling foodborne illness risk factors. Active managerial control is used to describe the purposeful incorporation of specific actions or procedures that allow foodservice establishments to achieve control over risk factors through a continuous system of monitoring and verification (FDA 2006). As such, foodservice managers (or other persons-in-charge) are responsible for the implementation and supervision of safe food preparation practices. Correspondingly, regulatory food safety inspections and follow-up activities are also proactive and employ a risk-based approach by which to evaluate the implementation of *Food Code* interventions and the degree of active managerial control an establishment has over foodborne illness risk factors (FDA 2006).

Specific to reducing the burden of foodborne illness caused by sick workers, achieving active managerial control requires establishments to have an employee health policy that encourages workers to tell managers when they are ill and provides managers with the means of monitoring employee health and knowing when to restrict or exclude an ill employee. Of course, these policies need to be understood and enforced by management to be effective. Yet, Hedberg and co-authors (2006) assert that commitment to enforce these policies is lacking and illnesses among food workers are not being monitored effectively. In fact, some workers who report having worked while ill indicate that their managers were not aware of their symptoms of illness and, when a manager did know about their symptoms, it was because the worker told them as opposed to the manager having asked or observed the symptoms (Carpenter et al 2013). As stated by Carpenter and colleagues (2013), the aforementioned observations suggest that employee health guidelines are not being followed in some foodservice establishments and that managers are not effectively monitoring employee health. Thus, it is possible that achieving active managerial control over this particular food safety risk factor is unattainable because of the elusive nature of identifying sick employees who do not self-report an illness. Because research strongly supports the notion that food handlers will work while ill (Carpenter et al 2013; Cates et al 2009; Green et al 2005; Hedberg et al 2006; Jones and Angulo 2006; Manes, Liu and Dworkin 2013; Sumner et al 2011; Todd et al 2007; Todd et al 2008), it is important to explore how managers can mitigate this risk factor proactively as opposed to relying on workers being forthright about their health status.

Risk-based routine inspections are the means by which public health inspectors evaluate the degree of active managerial control that operators have over foodborne illness risk factors (FDA 2013b). As such, risk-based routine inspections provide public health officials the opportunity to

assess foodborne illness risk factors by observing behaviors, practices, and procedures and asking management and employees questions to supplement actual observations (FDA 2013b). In relation to the proper use of restriction and exclusion of ill food workers, compliance is assessed by direct observation of employees' health (Georgia Department of Public Health 2011a). If an employee is observed experiencing symptoms requiring reporting or if there is reason for the person in charge to exclude or restrict an employee observed during the inspection, than an establishment will be deemed out of compliance (Georgia Department of Public Health 2011a). However, Petran and co-authors (2012a) assert that proper use of restriction and exclusion is one food safety criterion that may not be a focus during routine inspections because it is difficult to assess the illness status of food handlers given that inspections offer only a brief picture of the establishment at a specific point in time. Thus, because there is a strong correlation between foodborne illness outbreaks and infectious foodservice employees, further research is warranted to understand how inspectors (within the scope and confines of routine risk-based inspections) assess the health status of food handlers and determine whether employee health policies are being enforced.

Rationale, Specific Aims, and Hypotheses

As mentioned, foodservice-associated foodborne illness outbreaks are a significant threat to public health and infectious foodservice employees have been implicated in a number of documented foodborne illness outbreaks. Consequently, in an effort to lessen the risk of sick food handlers transmitting disease, the FDA requires foodservice establishments to have employee health policies that instruct management when to restrict or exclude employees from working with food if they have certain symptoms, injuries, and infectious diseases. Yet, there is strong evidence to support that even when health policies are in place, sick employees still come

to work and handle food (Carpenter et al 2013; Cates et al 2009; Green et al 2005; Hedberg et al 2006; Jones and Angulo 2006; Manes, Liu and Dworkin 2013; Sumner et al 2011; Todd et al 2007; Todd et al 2008). In fact, food safety experts state that ill food workers may represent the greatest risk for foodborne disease transmission and eliminating the motivations of workers to work while ill should be a priority (Carpenter et al 2013; Hall et al 2012).

While it is the responsibility of the manager or person in charge to monitor employee health and make decisions regarding the exclusion or restriction of ill employees, research suggests that managers may not be monitoring employee health effectively (Carpenter et al 2013). Still, evidence to confirm or refute this assertion is lacking; thus, the present study will fill a gap in the literature by exploring the factors that facilitate or prevent managers from identifying sick employees and preventing these employees from handling food. Also, because routine risk-based inspections are part of the verification process regarding food safety control systems, inspection data and exploration of how inspectors measure compliance of employee health policies will contribute to the understanding about the characteristics of the foodservice environment that influence enforcement of these policies.

The purpose of the studies in this dissertation is to answer the research question “Can foodservice worker health policies in Georgia be enforced and compliance measured?” The overall hypothesis is that, although health policies and associated regulations are theoretically sound, effective application and evaluation of these policies is challenging and, thus, lacking.

The first specific aim is to quantify the compliance rate of employee health policies as measured by Georgia foodservice inspection reports indicating "in compliance (IN)" or "out of compliance (OUT)" for items 2-1A “Proper use of restriction and exclusion” and 2-2A “Management awareness; policy present; reporting.” It is hypothesized that relatively few

incidences of out of compliance for items 2-1A and 2-2A will be observed suggesting that compliance of this policy is difficult to evaluate accurately during food safety inspections. This dissertation addresses this specific aim in Chapter III.

The second specific aim is to determine whether Environmental Health Specialists in Georgia evaluate compliance of employee health policies effectively during routine inspections and to identify the factors that influence evaluation practices. It is hypothesized that evaluation of compliance by Environmental Health Specialists is problematic due to the dynamics of the foodservice inspection process combined with the inherent barriers of identifying infectious food handlers. This dissertation addresses this specific aim in Chapter IV.

The third specific aim is to identify whether retail foodservice establishments in Georgia have employee health policies and, if present, determine how these policies are enforced by foodservice managers. It is hypothesized that foodservice establishments in Georgia have employee health policies in place but enforcement by managers is problematic due to the dynamics of the foodservice environment combined with the inherent barriers of identifying infectious food handlers. This dissertation addresses this specific aim in Chapter V.

The fourth specific aim is to compare and contrast the beliefs and knowledge of foodservice managers and Environmental Health Specialists regarding employee health and the degree in which infectious food handlers contribute to foodborne disease outbreaks. It is hypothesized that these two groups will differ in their beliefs and knowledge and that these differences will illuminate educational opportunities that exist between and among foodservice managers and Environmental Health Specialists. This dissertation addresses this specific aim in combination with the third aim presented in Chapter V.

Overall Methodology

The data collection and analysis methods applicable to each specific aim will be described in detail in the subsequent chapters. The total study approach involved analyzing 100% of Georgia foodservice inspections reports (59,007) for the time period October 1, 2012 through September 30, 2013. This review of inspection reports determined the frequency with which two items related to employee health were marked out of compliance. These two items were the basis for assessing the attitudes, beliefs and practices specific to employee health in independent surveys distributed to Environmental Health Specialists and foodservice managers.

An original survey (Appendix C) was developed and administered electronically to Environmental Health Specialists in the state of Georgia. The Food Service Program Director at the Georgia Department of Public Health forwarded the recruitment request (Appendix C) along with a link to the survey to approximately 250 Environmental Health Specialists (Cameron Wiggins, MPH, e-mail to author, February 3, 2014). This survey was used to collect data regarding their attitudes, beliefs, and practices specific to measuring compliance of foodservice worker health policies during routine food safety inspections.

A second original survey (Appendix D) was developed and administered electronically to foodservice managers employed in the state of Georgia. Multiple recruitment efforts were employed to reach school nutrition directors and managers as well as restaurant and retail managers. Due to participation of only 6 individuals in the latter category (restaurant and retail), the data for foodservice managers presented and discussed in Chapter V represents only that of an institutional sector (schools) of the foodservice industry. This survey provides a description of managers' beliefs and practices specific to employee health and the factors that influence enforcement of employee health policies and regulations.

CHAPTER III

GEORGIA FOODSERVICE INSPECTION REPORTS AND COMPLIANCE OF EMPLOYEE HEALTH POLICIES

Steinberg EK, Andress EL, Anderson AK, Fischer JG, Johnson MA. To be submitted to *Food Protection Trends.*

Abstract

Many foodborne disease outbreaks are incited by infectious food handlers even though foodservice establishments are required to have employee health policies that are intended to prevent food workers from working while ill. Data collected during inspections can reveal if foodservice establishments have employee health policies in place and whether these policies are being enforced by management. Research suggests that compliance of employee health policies may not be a focus during routine inspections because it is difficult to evaluate the health status of food handlers within the confines of the inspection process (Petran et al 2012a). To gain perspective about whether compliance of employee health policies is being monitored effectively during inspections in Georgia, data from 59,007 inspections performed from October 1, 2012 through September 30, 2013 were analyzed. Frequencies of non-compliance for items 2-1A "Proper use of restriction and exclusion" and 2-2A "Management awareness; policy present; reporting" were calculated. Frequency data indicated observations of non-compliance for items 2-1A and 2-2A were 0.02% and 1.16%, respectively. The low violation rate for item 2-1A "Proper use of restriction and exclusion" suggests that employee health may not be monitored reliably during inspections and comments from inspectors cast suspicion regarding the validity of most observations of non-compliance for this item. While the validity of observations of non-compliance for item 2-2A "Management awareness; policy present; reporting" was not in question, additional research is needed to determine if inspector bias and/or judgment could have influenced the relatively low violation rate indicated on the inspection reports or if establishments have become increasingly aware of and compliant with having employee health policies.

Introduction

In the United States, there are approximately 990,000 restaurants that generate about $683 billion dollars in annual sales (National Restaurant Association 2014). Unfortunately, while eating in restaurants is a routine convenience for many consumers, eating meals prepared outside the home may put individuals at an increased risk for foodborne illness (Jones et al 2006; Kwon et al 2014; Petran et al 2012a). For example, of the 766 outbreaks (attributable to single foodservice settings) reported to the Centers for Disease Control and Prevention (CDC) during 2009-2010, approximately 48% were associated with food prepared in a restaurant or deli as compared to only 21% being associated with food prepared in a private home (CDC 2013b). In general, noroviruses are the leading cause of foodborne illness in the United States and infectious food handlers are a contributing factor in up to two-thirds of all restaurant-associated foodborne illness outbreaks in the U.S. (Hedberg et al 2006). It is likely that a contributing factor in many of these outbreaks is that food handlers work while ill even when intervention strategies are in place to prevent such behavior (Carpenter et al 2013; Cates et al 2009; Green et al 2005; Hedberg et al 2006; Jones and Angulo 2006; Manes, Liu and Dworkin 2013; Sumner et al 2011; Todd et al 2007; Todd et al 2008). Not surprisingly, some researchers contend that keeping infectious food handlers out of the kitchen is one of the biggest challenges within the foodservice industry (Jones and Angulo 2006; Hedberg et al 2006).

In an effort to reduce the overall risk of foodborne disease transmission from the foodservice industry, more than 3,000 state, local and tribal agencies regulate and routinely inspect these establishments based on guidelines published by the U.S. Food and Drug Administration (FDA). In Georgia, there are more than 24,500 foodservice establishments that are inspected according to the current *Georgia Food Code* which was adopted in 2007 and created from the 2005 *Food*

Code (with the soon-to-be adoption of the 2009 *Food Code*) (Georgia Department of Public Health 2011b). The state requires that foodservice establishments be inspected 1 to 3 times per year based on the risk type of the operation which is determined by the menu items served, the food preparation processes involved, and the previous food safety history of the establishment (Georgia Department of Public Health 2011b). The basic purpose of the inspection process is to prevent foodborne illness by monitoring and enforcing compliance with food safety guidelines and regulations that are designed to protect food from contamination by food handlers, cross-contamination, and contamination from other sources in the establishment (FDA 2013d). During an inspection, food safety inspectors indicate whether an establishment is "in compliance (IN)" or "out of compliance (OUT)" with *Food Code* regulations.

Based on epidemiological outbreak data, the CDC identified five primary foodborne illness risk factors that contribute to retail and restaurant-associated foodborne illness in the United States. These risk factors are: food from unsafe sources; inadequate cooking; improper holding temperatures; contaminated equipment; and poor personal hygiene (CDC 2000; FDA 2000). Because the aforementioned risk factors are more likely than other violations to contribute to foodborne illness, they receive deliberate attention during regulatory inspections and occurrences of non-compliance are considered “critical violations” (FDA 2013d). For example, in foodborne illness outbreaks associated with infectious food handlers, poor hand hygiene or bare hand contact with ready-to-eat foods are the most frequently reported routes of transmission (Todd et al 2007) and there is strong evidence to suggest that food handlers frequently do not wash their hands or use/change gloves when indicated (Cates et al 2009; Chapman et al 2010; DeBess et al 2009; FDA 2010; Green et al 2005; Green et al 2006; Manes, Liu, and Dworkin 2013; Pragle, Harding, and Mack 2007). Hence, specific to preventing foodborne disease transmission from an

infectious employee, it is essential that foodservice establishments comply with *Food Code* regulations indicating when to exclude a sick employee from the premises or restrict his or her duties as it relates to handling food.

Because the ultimate goal of food safety inspections is to prevent foodborne disease, the ideal performance measure of this regulatory activity would be the occurrence of foodservice-associated foodborne illness. However, because cases of foodborne illness are grossly underreported and because sources of foodborne disease outbreaks are hard to confirm, the occurrence of disease is not a reliable performance measure (FDA 2010; Menachemi et al 2012; Murphree et al 2012; Yeager et al 2013). As cited by Yeager and colleagues (2013), most research investigating the validity and reliability of food safety inspections focuses on non-health outcomes such as the relationship between food safety inspections and the characteristics of restaurants associated with critical food safety violations and/or foodborne illness outbreaks (Menachemi et al 2012; Lee et al 2009; Newbold et al 20008; Petran 2012b; Sharkey et al 2012). Of note, previous research suggests that inspection scores are neither an accurate measure of restaurant safety nor a reliable predictor of whether a foodborne illness outbreak will occur in a particular establishment (Cruz et al 2001; Hedberg et al 2006; Jones et al 2004; Newbold et al 2008). Nevertheless, understanding specific violations can help foodservice managers and operators evaluate overall food safety practices and develop action plans for attaining managerial control of recurring risk factors (Petran 2012b; Yeager 2013).

The *FDA Retail Food Program Database of Foodborne Illness Risk Factors* (2010) is perhaps the most comprehensive collection of data regarding the occurrence of foodservice practices and behaviors that are associated with the foodborne disease risk factors identified by the CDC. Data in the FDA report, which were collected in 1998, 2003, and 2008, provide

baseline data and subsequent trend analyses regarding compliance with specific requirements of the *Food Code* that address these risk factors, which have a direct influence on the occurrence of foodborne illness (FDA 2010). The data in the report suggest that control of specific foodborne illness risk factors improved over the 10-year period in most facility types, but compliance with other requirements needs further improvement to adequately prevent foodborne illness outbreaks (FDA 2010). For example, while 6 of 9 facility types showed statistically significant improvement in the area of preventing bare hand contact with ready-to-eat foods only 4 of 9 facility types showed statistically significant improvement in the area of proper and adequate handwashing (FDA 2010). As indicated by the FDA (2010), there is a need for "similar studies that assess the impact of various industry and regulatory intervention strategies designed to enhance compliance and improve the managerial control of foodborne illness risk factors within retail and foodservice establishments." Indeed, compliance of regulations designed to control foodborne illness risk factors (as measured by routine inspections) is often the focus of food safety research (Lee et al 2009; Menachemi et al 2012).

Specific to preventing foodborne disease transmission from an infectious employee, foodservice establishments are required to have employee health policies in place and employees exhibiting symptoms of an illness transmissible by food are required to be excluded from the establishment or restricted in their duties related to handling food. In this context, "exclude" means a food employee is not permitted to work in or enter a food establishment as a food employee and "restrict" means a food employee's activities are limited to prevent the risk of transmitting a disease that is transmissible through food (FDA 2013c). During foodservice inspections, criteria 2-1A "Proper use of restriction and exclusion" indicates whether an establishment is in compliance with this regulation. Also, foodservice establishments are

required to have employee health policies that direct food employees to report information about their health as it relates to diseases that are transmissible through food. During foodservice inspections, criteria 2-2A “Management awareness; policy present; reporting” indicates whether an establishment has these policies in place.

Research suggests that application of exclude and restrict recommendations is questionable as demonstrated by data suggesting that, even when employee health policies are in place, food handlers continue to work while ill (Cates et al 2009; Green et al 2005; Hedberg et al 2006; Jones and Angulo 2006; Manes, Liu and Dworkin 2013; Sumner et al 2011; Todd et al 2007; Todd et al 2008). Yet, to this author’s knowledge, there is a void in the published literature regarding the feasibility of measuring compliance with the recommendations specific to employee health. Therefore, in an effort to gain insight into whether violations concerning employee health can be identified during inspections, the goal of this study was to quantify the compliance rate of foodservice establishments in Georgia regarding employee health regulations as measured by inspection reports indicating "in compliance (IN)" or "out of compliance (OUT)" for items 2-1A “Proper use of restriction and exclusion” and 2-2A “Management awareness; policy present; reporting.”

Methods

Sample

This survey utilized objective data available to the public and did not involve human subjects; hence, approval by the Institutional Review Board at the University of Georgia was not necessary. In total, data from 59,007 inspections were included in the sample, representing 100% of the inspections performed in Georgia for the one-year period October 1, 2012 through September 30, 2013.

Because the inspection form (Appendix A) and the process for inspecting foodservice establishments in Georgia are uniform, data collected from the reports is standardized (Georgia Department of Public Health 2011a). State inspection data are available to the public on the Georgia Department of Public Health website, although 27 of Georgia's 159 counties utilize electronic information systems outside of the state's health department data system network. As a result, state inspection data are stored and disseminated through multiple information systems and public access data varies with regard to data format, interactive capabilities, and level of detail. Thus, in order to obtain the information needed for the present research and to avoid researcher error from manually reviewing thousands of online inspection reports, open records requests were submitted and data were acquired directly from individual counties or public health districts. Seven sets of data were received and, cumulatively, inspection information from all 159 counties was obtained. At a minimum, data files included the total number of foodservice inspections conducted from October 1, 2012 to September 30, 2013; number of occurrences for out of compliance for item 2-1A (Proper use of restriction and exclusion); and number of occurrences for out of compliance for item 2-2A (Management awareness; policy present; reporting). The distribution of inspection records and the county/health district from which they were obtained is shown in Table 3.1.

Data analyses

Inspections were performed by Environmental Health Specialists (EHS) who conducted foodservice inspections in Georgia following the current *Georgia Food Code* which was adopted in 2007 and based on the 2005 *FDA Food Code.* A standardized *Food Service Establishment Inspection Report* issued by the Georgia Department of Public Health (formerly Department of

Human Resources) (Appendix A) was used to collect inspection data. The form included 56 scored items with a possible total score of 100.

Data from the 59,007 inspections performed statewide were analyzed to determine the absolute frequency in which items 2-1A "Proper use of restriction and exclusion" and 2-2A "Management awareness; policy present; reporting" were marked out of compliance. Relative frequencies were calculated using the following equation which was based on a similar equation used in the *FDA Retail Food Program Database of Foodborne Illness Risk Factors (*2000):

$$\frac{\text{FREQUENCY OF OUT OF COMPLIANCE OBSERVATIONS FOR ITEM 2-1A}}{\text{TOTAL NUMBER OF INSPECTION RECORDS (BOTH IN AND OUT)}}$$

$$\frac{\text{FREQUENCY OF OUT OF COMPLIANCE OBSERVATIONS FOR ITEM 2-2A}}{\text{TOTAL NUMBER OF INSPECTION RECORDS (BOTH IN AND OUT)}}$$

As mentioned, some data files received from individual counties and districts that utilized electronic information systems outside of the state's health department data system included only the total number of foodservice inspections and the number of occurrences for out of compliance of items 2-1A and 2-2A. However, data received from the state's system network (132 counties) contained comprehensive information for each inspection record including, but not limited to, establishment name and address, date of inspection, overall inspection score, specific violations cited, and inspector comments regarding violations cited. As such, further analyses were possible and associations among inspection violations were investigated. Because the purpose of these analyses was to investigate relationships among violations, establishments that received a perfect inspection score of 100 were not included. Of the 39,873 inspections conducted during the study period that were contained in the state's health department data system, 70.6% (N = 28,135) of the foodservice establishments had at least one violation resulting in a score of 99 or less (Figure 3.1). The absolute and relative frequency in which items 2-1A

"Proper use of restriction and exclusion" and 2-2A "Management awareness; policy present; reporting" were marked out of compliance were calculated for these 28,135 records. Chi-square test was used to conduct bivariate analyses to determine if non-compliance of item 2-2A "Management awareness; policy present; reporting" was associated with other violations that could further increase the risk of a sick food handler transmitting disease. Specifically, associations with the following violations regarding personal hygiene were investigated: 2-1B "Hands clean and properly washed"; 2-1C "No bare hand contact with ready-to-eat foods or approved alternate method properly followed"; and 2-2D "Adequate handwashing facilities supplied & accessible." *P*-values $\leq .05$ were considered statistically significant. Because only 2 (0.01%) out of compliance observations for criterion 2-1A"Proper use of restriction and exclusion" appeared to be valid, measures of association were not performed with this variable. Data were analyzed using the Statistical Analysis System (SAS) version 9.3 (SAS Institute, Cary, NC).

Results

From October 1, 2012 until September 30, 2013, there were a total of 59,007 inspections of all types (routine, initial, follow-up, temporary, pre-operational) conducted in the state of Georgia. Data from these 59,007 inspections revealed that out of compliance observations for items 2-1A "Proper use of restriction and exclusion" and 2-2A "Management awareness; policy present; reporting" were 0.02% (13 of 59,007 observations) and 1.16% (687 of 59,007 observations), respectively (Table 3.1). When considering only the establishments in the state's health department data system with an inspection score of 99 or less (N = 28,135), the out of compliance observations for items 2-1A and 2-2A were 0.04% (10 of 28,135 observations) and 0.69% (194 of 28,135 observations), respectively (Figure 3.1). However, as determined by

comparing the comments of EHS (Table 3.2) with the criteria of non-compliance set forth by the Georgia Department of Public Health (Appendix B), the validity of 7 of the 10 observations of non-compliance for item 2-1A "Proper use of restriction and exclusion" were in question.

Significantly positive associations ($p \leq .001$) were detected between item 2-2A "Management awareness; policy present; reporting" and each of the following personal hygiene-related violations: 2-1B "Hands clean and properly washed"; 2-1C "No bare hand contact with ready-to-eat foods or approved alternate method properly followed"; and 2-2D "Adequate handwashing facilities supplied & accessible" (Table 3.3). Summary data and test statistics for the chi-square tests used in these analyses are presented in Appendix F.

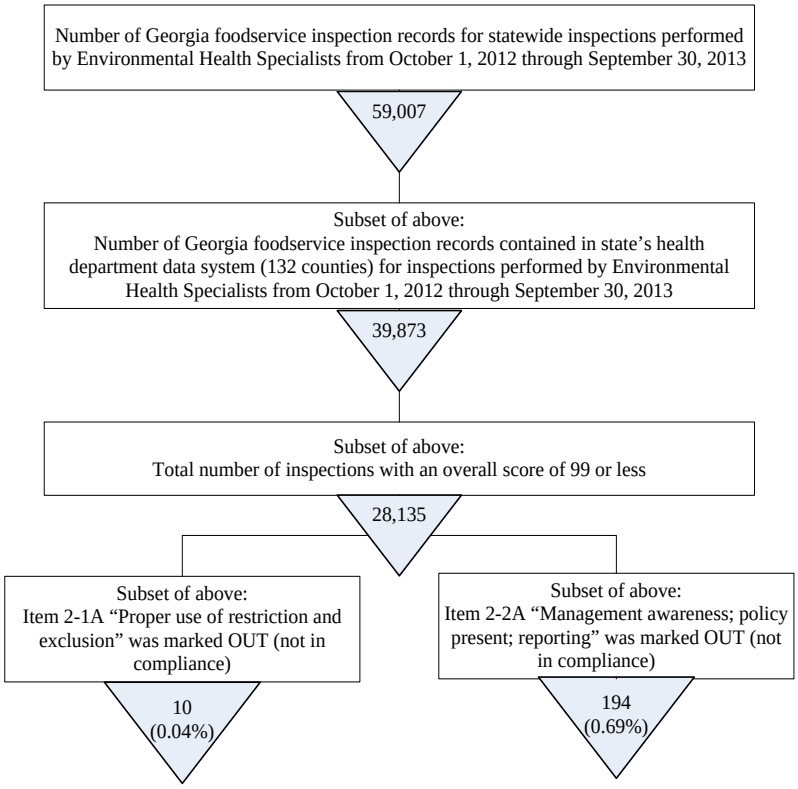


FIGURE 3.1 *Data collection scheme of foodservice inspection records from statewide inspections performed in Georgia*

Discussion

In 2007, EHS from all 159 counties in Georgia attended instructional classes and received training about how to perform risk-based inspections according to the 2005 *FDA Food Code* from which the *Georgia Food Code* was adopted (Georgia Department of Public Health 2011b). According to the Georgia Department of Public Health (2011b), training of EHS is continually re-evaluated and upgraded to provide EHS with the latest interpretations of the *Georgia Food Code* and with its standardization protocols. As such, interpretations regarding the results of the present study are based on the assumption that the participants received uniform training specific to the proper evaluation procedures for items 2-1A "Proper use of restriction and exclusion" and 2-2A "Management awareness; policy present; reporting."

Assessment of item 2-1A "Proper use of restriction and exclusion" is based on direct observation of whether an individual is working while experiencing an illness requiring reporting of symptoms (i.e. vomiting, diarrhea) or is observed with uncovered lesions containing pus on their hands, wrists, or exposed portions of their arms (Appendix B). Although direct observation of employees' health appears to be relatively straightforward, Petran and colleagues (2012a; 2012b) assert that proper use of restriction and exclusion is one food safety criterion that may not be a focus during routine foodservice inspections because it is difficult to assess reliably the health status of food handlers given that inspections offer only a brief picture of the establishment at a specific point in time. Data from the present research provided support for this assertion considering that, out of 59,007 state-wide inspections, only 13 (0.02%), out of compliance observations for item 2-1A were recorded (Table 3.1). When considering just the establishments in the state's health department data system (132 counties) with inspection scores of 99 or less (N = 28,135), only 10 (0.04%) out of compliance observations for item 2-1A were

recorded (Figure 3.1). However, the validity of 7 of the 10 out of compliance observations was questionable and raised concern as to whether the 2-1A criterion was selected in error or if inspectors misunderstood the marking instructions and code provisions for measuring the compliance status of this violation (Table 3.2). The specific details of the comments written by EHS regarding this violation will be addressed in the subsequent chapter. Yet, it is important to recognize that these comments cast suspicion about the validity of most out of compliance observations for item 2-1A leaving only 2 (0.01%) instances that appear to have been correctly identified and recorded. For the majority of foodborne illness risk factors, there are objective and tangible examples by which inspectors can access and provide demonstrative evidence of food safety compliance or violation. Contrariwise, evidence regarding the compliance status of proper use of restriction and exclusion is available only if a worker admits to being ill or if an inspector observes an employee with blatant signs of illness (ex. vomiting, skin infection). Hence, it is this author's opinion that the compliance status of item 2-1A "Proper use of restriction and exclusion" may not be indicative of actual compliance; rather, a reflection of the probability that an inspector will encounter a symptomatic employee or an employee who admits to be working while ill. Furthermore, because workers can be asymptomatic carriers or pre/post symptomatic shedders, there are no noticeable indicators of an infectious employee thereby any measurable means by which inspectors can assess the proper use of restriction and exclusion. Consequently, it seems misleading to give consumers and public health officials the impression that item 2-1A is being assessed reliably during inspections and that almost all establishments in the state of Georgia are in compliance. In other words, as criterion 2-1A is currently presented on the inspection form, the results of this study give the false impression that the use of restriction and exclusion is being enforced properly and the risk posed by sick food handlers is

being controlled. As a result, consumers may have a false sense of security and regulatory decision makers may lack the performance measures needed to justify allocation of the fiscal and human resources necessary to gain control of the food safety threat presented by infectious food handlers. Perhaps in the near future, non-invasive diagnostic assays will be developed and utilized routinely to identify sick employees whereby managers can enforce and inspectors can assess the proper use of restrict and exclude policies. Until that time, it seems prudent to redesign the current wording of item 2-1A "Proper use of restriction and exclusion" to create a meaningful and reliable performance indicator. For example, the only options for marking the compliance status of this item are IN Compliance and OUT of Compliance. Hence, the default option of IN Compliance may be a misrepresentation because, in truth, IN Compliance means the inspector did not observe evidence of a sick employee during the inspection as opposed to the inspector objectively measured and assessed proper use of restriction and exclusion and found the establishment to be in compliance. Perhaps if the "Not Observed" (N.O.) option was added or if the criterion was re-worded to describe only the elements of this risk factor that can be measured objectively, the rate of compliance would be a more accurate indicator of overall process control regarding exclusion and restriction of sick food handlers.

Inspectors can measure compliance of item 2-2A "Management awareness; policy present; reporting" objectively by gaining access to a written health policy or by asking the Person in Charge a series of questions to convey knowledge of an employee health policy (Appendix B). Data from the 59,007 inspection records revealed that out of compliance observations for item 2-2A was 1.16% (687 of 59,007) (Table 3.1). When considering only the establishments in the state's health department data system with an inspection score of 99 or less (N = 28,135), the out of compliance observations for this criterion was 0.69% (194 of 28,135) (Figure 3.1). These

results indicate frequencies of non-compliance that are much lower than those demonstrated in previous research. For example, the FDA assessed the prevalence of formal, written employee health policies implemented within the foodservice industry and found 76.7% (79 of 103 observations) of fast food restaurants and 86.5% (83 of 96 observations) of full service restaurants lacked evidence of these policies (FDA 2009). Also, Sumner and colleagues (2011) reported that 31.8% (151 of 475 respondents) of surveyed establishments indicated they did not have a policy requiring workers to report an illness and 53.1% (238 of 448 respondents) of these establishments reported they did not have a policy excluding employees with vomiting or diarrhea from working. While these comparisons are not meant to imply statistical significance or to suggest equal comparisons among these findings, data from previous research lends relative meaning to the results of the present study.

As determined by comparing the comments of EHS with the criteria of non-compliance set forth by the Georgia Department of Public Health (Appendix B), comments from EHS reflect an understanding of the marking instructions and code provisions for measuring the compliance status of this violation. For this reason, the validity of the out of compliance observations for item 2-2A was not in question. However, additional research is needed to determine if EHS bias and/or judgment could have affected the relatively low rate of non-compliance indicated in the inspection reports or if establishments have become increasingly aware of and compliant with having employee health policies. Although research suggests that food handlers will work while ill even when employee health policies are in place (Cates et al 2009; Green et al 2005; Hedberg et al 2006; Jones and Angulo 2006; Manes, Liu and Dworkin 2013; Sumner et al 2011; Todd et al 2007; Todd et al 2008), these policies are the prerequisite for achieving active managerial control of the food safety risk presented by sick food handlers. Suitably, the compliance status

of item 2-2A “Management awareness; policy present; reporting” is a logical indication of whether an establishment is at least aware of and possibly committed to controlling this food safety risk factor. Therefore, while these results appeared positive and indicated that the majority of foodservice establishments in Georgia had employee health policies in place, the relatively low frequency of non-compliance was intriguing and worthy of further investigation.

In the United States, infectious employees are the source of contamination in approximately 1 in 5 confirmed bacterial foodborne disease outbreaks (Todd et al 2008) and most documented foodborne viral outbreaks can be traced to an ill employee who handled food that was not heated after preparation (Koopmans and Duizer 2003). For these reasons, exclusion and restriction of sick food handlers is paramount and proper hand hygiene and avoiding bare hand contact with ready-to-eat foods are mandatory interventions that must be enforced to prevent the transmission of pathogens to food. Results of this study revealed a significant association ($p < .001$) between out of compliance observations for item 2-2A “Management awareness; policy present; reporting” and out of compliance observations for each of the following items: 2-1B “Hands clean and properly washed”; 2-1C “No bare hand contact with ready-to-eat foods or approved alternate method properly followed”; and 2-2D “Adequate handwashing facilities supplied & accessible” (Table 3.3) That is, when item 2-2A was out of compliance, the food safety risk factors concerning hygienic practices were more likely to be violated. These results were disconcerting in that they identified possible gaps within the managerial control systems designed to prevent sick employees from transmitting disease.

Even though research has illustrated that the presence of employee health policies does not prevent infectious employees from working (Cates et al 2009; Green et al 2005; Hedberg et al 2006; Jones and Angulo 2006; Manes, Liu and Dworkin 2013; Sumner et al 2011; Todd et al

2007; Todd et al 2008), at least establishments with health policies demonstrate a degree of due diligence relative to mitigating the food safety risk caused by sick food handlers. Nevertheless, assuming infectious food handlers will work despite the presence of health policies, proper hand hygiene and avoiding bare hand contact with ready-to-eat foods are critical interventions for preventing the transmission of pathogens to food. Here again, because research demonstrates that food handlers frequently do not wash their hands or use/change gloves when indicated (Cates et al 2009; Chapman et al 2010; DeBess et al 2009; FDA 2010; Green et al 2005; Green et al 2006; Manes, Liu, and Dworkin 2013; Pragle, Harding, and Mack 2007), managerial control of proper hygienic practices is mandatory. Not surprisingly, improper hand hygiene and bare-hand contact with ready-to-eat food is the most frequently reported failure associated with infected workers transmitting disease and lack of adequate hand hygiene supplies is a contributing factor in numerous instances of these failures (Todd et al 2007).

Beyond the fact that the present findings were consistent with previous research, they were unique in that they revealed a path of non-compliance along the hierarchy of controls designed to prevent disease transmission from sick food handlers and illustrated an association among multiple factors that could have a cumulative effect on the degree of risk caused by infectious workers. While inspection results may not be capable of predicting which establishments are more likely to be involved in an outbreak (Cruz et al 2001; Hedberg et al 2006; Jones et al 2004; Newbold et al 2008), the findings of this study helped illustrate that associations among specific violations can be foretelling in terms of the process control violations that are likely to incite a foodborne disease outbreak.

The primary strength of this study was that the data set was not a sample but rather a complete representation of the foodservice inspections conducted in the state of Georgia during a

calendar year. Some of the data were narrow in scope and detail, therefore statistical analyses and qualitative insight was limited. Furthermore, because this study only included inspection data from Georgia, the findings and interpretations of this data are bound to the restrictions associated with this state's food code regulations and may be incompatible with inspection data from other states.

Conclusion

One of the most challenging food safety issues within the foodservice industry is keeping infectious food handlers out of the kitchen (Carpenter et al 2013; Jones and Angulo 2006; Hedberg et al 2006). In an effort to mitigate this risk, most foodservice establishments have employee health policies that encourage workers to tell managers when they are ill and provide managers with the means of monitoring employee health and knowing when to restrict or exclude ill employees. Foodservice inspections are the primary means by which compliance of employee health controls are assessed. Yet, research suggests that proper use of restriction and exclusion is one food safety criterion that may not be a focus during inspections because it is difficult to evaluate the illness status of food handlers within the confines of this regulatory process (Petran et al 2012a). While additional research is needed to understand why so few observations of non-compliance were recorded on the inspection reports analyzed in the present study, the findings suggest that proper use of restriction and exclusion may not be evaluated accurately during food safety inspections.

Results of this study also indicate that the majority of foodservice establishments in Georgia had employee health policies; however, when these policies were not in place, food safety risk factors concerning hygienic practices were more likely to be violated. Even though this study reveals possible gaps in the food safety management systems specific to compliance and

evaluation of employee health controls, further research is necessary to determine if these breaches can be remedied via education and training or if the complexity of the issue makes it impossible to eliminate the risk of employees working while ill and transmitting disease via the food they prepare.

TABLE 3.1 *Number of county and district foodservice inspections performed in Georgia from October 1, 2012 through September 30, 2013*[a]

County	Inspections[b]	No. (%) of Inspections: 2-1A[c]	2-2A[d]
Cobb	3,240	0 (0.00)	82 (2.53)
DeKalb	3,339	1 (0.02)	191 (5.72)
District 10 (10 counties)	3,174	0 (0.00)	13 (0.40)
District 2 (13 counties)	3,342	0 (0.00)	0 (0.00)
Douglas	372	0 (0.00)	0 (0.00)
Gwinnett	5,667	2 (0.03)	207 (3.65)
State system (132 counties)	39,873	10 (0.02)	194 (0.48)
Total (159 counties)	59,007	13 (0.02)	687 (1.16)

[a] Georgia foodservice inspection records for inspections performed by Environmental Health Specialists from October 1, 2012 through September 30, 2013.

[b] Total number of inspections performed

[c] Total number where item 2-1A “Proper use of restriction and exclusion” was marked OUT (not in compliance)

[d] Total number where item 2-2A “Management awareness; policy present; reporting” was marked OUT (not in compliance)

TABLE 3.2 *Environmental Health Specialists' comments appearing on Georgia inspection reports regarding non-compliance of item 2-1A "Proper use of restriction and exclusion"*

EHS comments that were not congruent with marking instructions for item 2-1A set forth by the Georgia Department of Public Health (Appendix B)

- "Employees toothbrushes personal hygenic items stored in area with food and supplies."
- "Observed sleeping area behind storage rack used inside kitchen/food operation."
- "Observed an employee, with a beard longer than half of an inch, without a beard net."
- "Observed unnecessary persons in the food preparation, food storage, or warewashing area."
- "Children in prep area. PIC moved granddaughter to dining area at time of inspection"
- "Certified Food Manager failed to verify employee health, exclusions or restrictions."
- "Employee eating in work area."

EHS comments that were congruent with marking instructions for item 2-1A set forth by the Georgia Department of Public Health (Appendix B)

- "PIC admitted to being sick for the past several days. She said her symptoms included being queasy as well as vomiting and having diarrhea as recent as last night."
- "Observed food employee with open wound (cut) on finger covered with permeable cloth." [a]

[a] It should be noted that only lesions containing pus present on a food employee's hands represent a direct threat for introducing *Staphylococcus aureus* into food. Because the EHS did not indicate whether signs of infection were present, it is questionable whether item 2-1A should have been marked out of compliance.

TABLE 3.3 *Bivariate analyses of personal hygiene-related violations on Georgia inspection reports associated with non-compliance of 2-2A* [a]

	Inspections with a score of 99 or less (N=28,135)	
Food Code Violation	No. (%) of Violations	*P* value [e]
2-1B [b]	835 (2.97)	0.001
2-1C [c]	535 (1.90)	0.001
2-2D [d]	2,959 (10.50)	0.001

[a] Chi-square test was used to conduct bivariate analyses to determine if non-compliance of item 2-2A "Management awareness; policy present; reporting" was associated with personal hygiene-related violations

[b] 2-1B "Hands clean and properly washed"

[c] 2-1C "No bare hand contact with ready-to-eat foods or approved alternate method properly followed"

[d] 2-2D "Adequate handwashing facilities supplied & accessible"

[e] χ^2 (1, N = 28,135)

CHAPTER IV

ENVIRONMENTAL HEALTH SPECIALISTS AND EVALUATION OF EMPLOYEE HEALTH POLICIES

Steinberg EK, Andress EL, Anderson AK, Fischer JG, Johnson MA. To be submitted to *Food Protection Trends.*

Abstract

Although regulatory food safety inspections are the primary venue for identifying unsafe food handling practices in foodservice establishments, Environmental Health Specialists (EHS) face a number of barriers during inspections which may lead to inaccurate assessments of an establishment's overall safety (Bryan 2002; Selman and Green 2008). Infectious food handlers transmitting disease is a significant public health threat within the foodservice industry; therefore, eating establishments are required to have employee health controls that mitigate this risk and EHS must verify that foodservice managers are enforcing these policies. The purpose of this study was to determine whether EHS are evaluating compliance of employee health policies effectively during routine inspections and to identify the factors that influence evaluation practices. Online surveys were used to collect quantitative and qualitative data from EHS (N = 168) regarding their attitudes, beliefs and practices specific to employee health. Also, respondent's self-reported data were compared to inspection data (presented in the previous chapter) in order to assess discrepancies between perceived and actual capabilities of evaluating proper use of restriction and exclusion. The findings suggest that EHS employ reliable measures to determine whether establishments have employee health policies but EHS may lack the understanding and/or resources necessary to appraise the proper use of restriction and exclusion. Future research concerning the educational/training needs of EHS pertaining to the reliable assessment of employee health controls is recommended to ensure EHS are providing the oversight necessary to help foodservice managers gain control of the public health burden imposed by sick food handlers.

Introduction

Foodborne illness is a substantial and ongoing public health threat in the United States and there is a significant association between eating food prepared outside of the home and an increased risk of acquiring a foodborne disease (Cates et al 2009; CDC 2013). Specific to the foodservice industry, infected food workers were identified as the source of many viral and bacterial foodborne outbreaks associated with at least 14 etiologies (Carpenter et al 2013). More precisely, sick food handlers were implicated in half of foodborne norovirus outbreaks in the United States from 2001 through 2008 (Hall et al 2012) and some researchers believe that infectious food workers represent the greatest risk factor for disease transmission within the foodservice industry (Carpenter et al 2013; Jones and Angulo 2006; Hedberg et al 2006). Despite advances in food safety, effectiveness of disease barriers (bandages, gloves, handwashing) has proven inconsistent (Carpenter et al 2013) and intervention strategies are often ineffective because of the countless risk factors that can lead to the introduction or amplification of pathogens that contaminate food (Morris 2011). Yet, measuring the extent to which specific interventions are applied and monitored reliably can help determine feasibility and efficacy of these interventions.

Prevention, as opposed to reaction, is the key to reducing the occurrence of foodservice associated foodborne illness outbreaks. While operators, managers and employees of these establishments assume the ultimate responsibility for protecting customers from foodborne illness, Environmental Health Specialists (EHS) also play a pivotal role in this process. EHS are responsible for ensuring that these operations meet minimum food safety standards and comply with federal and/or local food safety regulations. Routine foodservice inspections are the primary mechanism by which EHS can identify unsafe foodservice establishments, correct risky

practices, encourage ongoing compliance, and evaluate the degree of active managerial control that operators have over foodborne illness risk factors. Yet, research suggests that EHS face a number of barriers during inspections which may lead to inaccurate assessments of an establishment's overall safety (Green and Selman 2005; Pham et al 2010). In fact, because foodservice-related foodborne outbreaks continue to occur, some public health researchers assert that routine inspections are ineffective and have limited ability to improve food safety (Bryan 2002). Thus, in-depth knowledge regarding the attitudes, beliefs, and practices of EHS is essential to understanding the characteristics of the inspection process that may influence its effectiveness in preventing foodborne disease.

There is limited research that pertains to the beliefs and practices of EHS who conduct foodservice inspections. Nonetheless, findings contained in the existing literature indicate consistently that EHS do not always enforce the same regulations in a constant manner (Green and Selman 2005; Jin and Lee 2011; Medeiros and Wilcock 2006). For example, Jin and Lee (2012) found that EHS heterogeneity regarding inspection outcomes of the same regulation may exist because EHS do not exert equal effort to detect violations, they perceive the relative importance of each regulation differently, and because they become more lenient over time as the relationship with the restaurant prolongs. Similarly, Medeiros and Wilcock (2006) found that multiple biases such as, length of relationship with operator, effects of intimidation, and favoritism, may produce inconsistencies in the way EHS enforce or judge compliance of the same food safety regulation. In addition to these subjective influences, objective barriers such as time constraints, language differences, and lack of cooperation from foodservice employees also limit the capabilities of EHS to conduct effective and reliable inspections (Green and Selman 2005).

Specific to reducing the burden of foodborne illness caused by sick workers, it is the role of EHS to ascertain whether employee health policies are in place and to determine compliance of restrict and exclude regulations. The EHS can assess the former criteria (2-2A "Management awareness; policy present; reporting") rather objectively by gaining access to a written health policy or by asking the Person in Charge a series of questions to convey knowledge of an employee health policy (Appendix B). In contrast, compliance of the latter criteria (2-1A "Proper use of restriction and exclusion") requires a more subjective approach and is based on direct observation of whether an individual is working while experiencing an illness requiring reporting of symptoms (i.e. vomiting, diarrhea, exposed lesions) (Appendix B).

Regardless of regulatory interventions designed to prevent foodservice employees from working while ill, epidemiological evidence and research data suggest that infectious workers still pose a substantial foodborne illness risk. Because foodservice inspections are the primary means of monitoring and ensuring compliance with food safety regulations, gaining a better understanding of how EHS determine compliance of these targeted interventions may help environmental health programs to bridge the gap between concept and execution of employee health policies. This study investigates the attitudes of EHS regarding employee health and explores the evaluation practices of EHS specific to determining compliance of regulations designed to prevent infectious food handlers from transmitting disease.

Methods

Sample

This study was cross-sectional in design and participants were Environmental Health Specialists in Georgia who perform foodservice inspections. The survey instrument and methods

developed and used in this study were approved for use with human subjects by the Institutional Review Board at the University of Georgia.

To recruit from this target population, a description of the study and a link to the online survey was sent to the Food Service Program Director of the Georgia Department of Public Health, Environmental Health Section. The Food Service Program Director forwarded the information along with an acknowledgment of support for participation in the research to EHS at the Georgia Department of Public Health. The e-mail request for participation reached approximately 250 EHS (Cameron Wiggins, MPH, e-mail to author, February 3, 2014) and this recruitment procedure yielded 168 participants (67% of EHS on the email recipient list).

The scope and voluntary nature of the study were explained in the recruitment e-mail and on the introductory page of the online survey (Appendix E). Potential participants were required to select a "continue button" in order to access the research survey questionnaire. Opting to "continue" the survey indicated informed consent and served as an agreement that the participant was over the age of 18 and employed in the state of Georgia. No incentive for participation was provided.

Survey

The survey instrument was developed by the researcher and reviewed for content validity and readability by an expert advisory board consisting of: the Southeast Region Retail Food Specialist of the FDA; the Director of Food and Product Safety of Chick-fil-A, Inc.; the Food Service Program Director of the Georgia Department of Public Health, Environmental Health Section; and the Director of Insurance Services for RQA, Inc., a national food safety auditing firm. The online survey was comprised of 15 open-ended and closed questions with response lists and write-in boxes for questions in which respondents could select "other" from a response

list (Appendix C). The survey contained four questions regarding demographics of participants including years of experience and types of certifications, six questions regarding inspection practices and perceived barriers, two questions regarding confidence in determining compliance of inspection criteria, two questions regarding opinions of foodborne illness risk factors; and one question regarding knowledge of foodborne pathogens (Appendix C). The survey was posted online using Qualtrics ©, a web-based survey software tool made available to the University of Georgia (www.qualtrics.com). The link to the survey was active for 12 weeks between January and March 2014. To increase the response rate, the Director of the Food Service Program sent one e-mail reminder in February.

Data Analyses

Univariate analyses were conducted to obtain descriptive statistics specific to frequency distributions. The Gamma statistic was used to measure ordinal associations between inspector confidence in determining compliance of violations 2-1A and 2-2A and the number of times the inspector marked the violations out of compliance. Also, the Gamma statistic was used to assess the association between inspector confidence in determining compliance of violations 2-1A and 2-2A and the inspector's years of work experience. *P*-values $\leq .05$ were considered statistically significant. Data were analyzed using the Statistical Analysis System (SAS) version 9.3 (SAS Institute, Cary, NC).

Qualitative analyses were conducted by comparing the respondent's self-reported data from the present study to actual inspection data (presented in the previous chapter) obtained from 59,007 inspections of all types (routine, initial, follow-up, temporary, pre-operational) conducted in the state of Georgia from October 1, 2012 until September 30, 2013.

Results

A total of 154 participants (92%) completed the survey in its entirety; however, responses from all 168 participants were included in the data analyses. The majority (75.3%) of respondents (N = 158) had over 5 years of experience conducting foodservice inspections in Georgia and 96% of respondents (N = 163) held at least one professional credential (Table 4.1). Almost all (99.4%) respondents (N = 161) agreed that, within the foodservice industry, sick food handlers pose a significant threat to public health and 61.4 % (N = 158) believed that sick food handlers are responsible for more foodservice associated foodborne illness outbreaks than other food safety risk factors (Figure 4.1). Also, 82% of respondents (N = 161) correctly identified norovirus as being the leading cause of foodservice associated foodborne illness outbreaks (Figure 4.2).

With regard to the practices of EHS assessing compliance of item 2-1A "Proper use of restriction and exclusion," the majority (68.1%) of respondents (N = 160) reported that, in the past year, they had never marked this item out of compliance while 28.8% reported they had marked it out of compliance 1 to 5 times (Table 4.2). As shown in Table 4.3, a positive association was found between the respondent's reported level of confidence in determining compliance of item 2-1A (Q3) and the number of times respondents claimed to have marked this violation out of compliance (Q1); however, this association was not statistically significant ($p > .05$). Also, while not statistically significant ($p > .05$), a positive association was found between the respondent's reported level of confidence in determining compliance of item 2-1A (Q3) and the respondent's years of experience conducting foodservice inspections in Georgia (Q13) (Table 4.3).

For criteria 2-2A "Management awareness; policy present; reporting," 41.5% of respondents (N = 159) reported that, in the past year, they had never marked this item out of compliance while 43.4% reported they had marked it out of compliance 1 to 5 times (Table 4.4). Bivariate analyses indicated a significantly positive association ($p \leq .05$) between respondents reported level of confidence in determining compliance of item 2-2A (Q7) and the number of times respondents claimed to have marked this violation out of compliance (Q5) (Table 4.3). Oddly, a negative association was found between the respondent's years of experience conducting foodservice inspections in Georgia (Q13) and the respondent's reported level of confidence in determining compliance of item 2-2A (Q7) although this association was not statistically significant (Table 4.3). Summary data and test statistics for the gamma tests used in these analyses are presented in Appendix G.

Discussion

In 2007, EHS from all 159 counties in Georgia attended instructional classes and received training about how to perform risk-based inspections according to the 2005 FDA Food Code from which the Georgia Food Code was adopted (Georgia Department of Public Health 2011b). According to the Georgia Department of Public Health (2011b), training of EHS is continually being re-evaluated and upgraded to provide EHS with the latest interpretations of Georgia's Food Code and with its standardization protocols. As such, interpretations regarding the results of the present study are based on the assumption that the participants received uniform training specific to the proper evaluation procedures needed for items 2-1A "Proper use of restriction and exclusion" and 2-2A "Management awareness; policy present; reporting."

When participants of the current study were asked how many times, in the past year, they had marked item 2-1A "Proper use of restriction and exclusion" out of compliance, the majority

(68.1%) of respondents (N = 160) reported they had never marked this criterion out of compliance and 28.8% reported they had marked it out of compliance 1 to 5 times (Table 4.2). Comparing these responses to inspection data and allowing for differences between the perceived timeframe of respondents and the actual timeframe the inspection data were collected, respondents were aware, and inspection data confirmed, that EHS rarely, if ever, marked this item out of compliance. It is not known, however, if this sample of EHS never or seldom marked this item out of compliance because: 1) they rarely, if ever, observed a sick employee in a foodservice establishment, 2) they did not understand or have confidence in their ability to measure compliance, or 3) they did not put forth the effort to assess compliance because of real or perceived barriers in evaluating the illness status of food workers.

According to the *Instructions for Marking the Georgia Food Establishment Inspection Report Form: Rules and Regulations for Food Service Chapter 290-5-14* (2011), assessment of item 2-1A "Proper use of restriction and exclusion" is based on direct observation of whether an individual is working while experiencing an illness requiring reporting of symptoms (i.e. vomiting, diarrhea) or is observed with uncovered lesions containing pus on their hands, wrists, or exposed portions of their arms (Appendix B). When respondents (N = 160) were asked to rate their confidence level regarding their ability to accurately determine compliance of proper use of restriction and exclusion, 4.4% indicated they were "not confident/I need more training," 36.3% were "somewhat confident/I need more practice," 45% were "confident/I understand how to determine compliance," and 14.4% were "very confident/I can teach this to others" (Table 4.2). Surprisingly, 40.6% of respondents revealed they lacked confidence and understanding regarding proper use of restriction which could be indicative of a training deficit or simply be reflective of the arbitrary nature of evaluating the illness status of food handlers in a brief period of time. On

the other hand, the majority (59.4%) of respondents felt confident in their ability to determine compliance of proper use of restriction and exclusion. Yet, when participants were asked to identify the methods they use to assess proper use of restriction and exclusion, over half (52.5%) of respondents indicated they reviewed the Employee Health Policy, which is not a consideration for 2-1A "Proper use of restriction and exclusion" but rather a measure of compliance for 2-2A "Management awareness; policy present; reporting" (Table 4.2). Because confidence is not a reliable measure of knowledge or ability (Heath, DeHoek and Loactelli 2012), bivariate measures of association should have been employed to connect respondents' level of confidence with direct measures of knowledge. Therefore, future research is needed to appraise possible discrepancies between perceived and actual capabilities of evaluating proper use of restriction and exclusion.

Comments from EHS that appeared on the inspection records referenced in the previous chapter (Table 3.2) illustrated a possible need for further training/education of EHS with regard to assessing compliance of item 2-1A "Proper use of restriction and exclusion." As illustrated in Table 3.2, the majority of comments written by EHS suggest the non-compliance status of item 2-1A was either selected in error or the inspector misunderstood the marking instructions and code provisions for measuring compliance of this violation (Appendix B). For example, one EHS wrote "Observed sleeping area behind storage rack used inside kitchen/food operation" which is a violation unrelated to proper use of restriction and exclusion. Another comment "Certified Food Manager failed to verify employee health, exclusions or restrictions" is related to compliance of employee health policies but is a measure used for item 2-2A "Management awareness; policy present; reporting." Of course, due to the confidentiality of research, it was not possible to determine if the EHS who wrote the comments on the inspection reports were

even participants in the present study. However, it was feasible because 85.4% of participants indicated they had conducted food safety inspections in Georgia for at least the past 3 years (within the time frame the inspections were performed). Nevertheless, even though the comments may not represent the actions of these participants, the findings strongly suggest that EHS may not be monitoring compliance of item 2-1A "Proper use of restriction and exclusion" in an accurate manner and that at least some of the inspection data regarding the violation frequency of this food safety risk factor may not represent the actual situation in the industry. Because foodservice-associated foodborne illness outbreaks are a significant threat to public health and sick employees have been implicated in a number of these outbreaks, it is imperative that the training needs of Georgia's EHS are evaluated to ensure they understand how to perform accurate assessments of proper use of restriction and exclusion.

Item 2-2A "Management awareness; policy present; reporting" is evaluated by gaining access to a written health policy or by asking the Person in Charge a series of questions to convey knowledge of an employee health policy (Appendix B). When participants of this study were asked how many times, in the past year, they had marked this item out of compliance, 41.5% of respondents (N = 159) reported they had never marked it out of compliance while 43.4% reported they had marked it out of compliance 1 to 5 times (Table 4.4). When respondents (N = 158) were asked to rate their confidence level regarding their ability to accurately determine compliance of item 2-2A, 1.9% indicated they were "not confident/I need more training," 30.4% were "somewhat confident/I need more practice," 43.7% were "confident/I understand how to determine compliance," and 24.1% were "very confident/I can teach this to others" (Table 4.4). Due to the relatively objective and straightforward marking instructions for measuring compliance of this regulation, it was somewhat surprising that 32.3% of respondents indicated

they felt less than confident in their ability to determine compliance (Table 4.4). Then again, the majority (67.7%) of respondents reported they were confident in their ability and a significantly positive association ($p \leq .05$) was found between respondent's level of confidence in determining compliance of item 2-2A and the number of times respondents claimed to have marked this criterion out of compliance. Indeed, upon reviewing comments written by EHS that appeared on the inspection records referenced in the previous chapter (Table 3.2), it seemed as though EHS understood the marking instructions and code provisions for measuring compliance of this violation (Appendix B). For example, variations of comments such as "Observed there not being an employee health policy, nor was PIC able to explain reporting procedures" and "Person in charge could not provide an employee health policy or show proof that employees are aware of policy" appeared on all 194 instances for which the criterion was determined to be out of compliance. Because it was not possible to determine if the EHS who wrote the comments on the inspection reports were participants in the present study, these comments may not represent the actions of respondents. However, the information gleaned from the comments on the inspection records was encouraging because it suggested that, when EHS marked this criterion out of compliance, they evaluated it correctly. Nevertheless, because almost one-third of respondents indicated they were not completely confident in their ability to determine compliance of item 2-2A (Table 4.4) and there was a positive association ($p \leq .05$) between respondent's level of confidence and the number of times he or she marked this item out of compliance (Table 4.3), further research is warranted to determine if additional training for EHS regarding evaluation of employee health policies will have an impact on the overall frequency that foodservice establishments are found to be out of compliance for this inspection item.

EHS encounter a substantial number of barriers during inspections which can compromise their ability to perform this task reliably (Green and Selman 2005; Jones et al 2004; Medeiros and Wilcock 2006, Petran et al 2012b; Pham et al 2010). To gain insight into the factors that may prohibit reliable evaluation of 2-1A "Proper use of restriction and exclusion" and 2-2A "Management awareness; policy present; reporting," participants were asked to identify which (if any) barriers interfered with their ability to determine compliance of these items. Tables 4.2 and 4.4 illustrate the barriers that were identified for both items 2-1A and 2-2A, respectively. Similar to previous research (Green and Selman 2005; Pham et al 2010), communication challenges and lack of cooperation on behalf of foodservice staff appeared to be primary barriers that hindered inspection activities. Surprisingly, even though EHS typically operate under time constraints, very few respondents considered limited time as a barrier when assessing compliance of either criterion. Specific to the barriers encountered when evaluating proper use of restriction and exclusion, 63.1% of respondents indicated they felt employees were not truthful about their health status and 38.1% reported it was difficult to determine if a food handler was sick (Table 4.2). The fact that EHS identified these factors as barriers for evaluating employee health further illustrates that the dynamics of the inspection process combined with the inherent barriers of identifying infectious food handlers make it difficult to determine if foodservice establishments have control over this food safety risk factor. As indicated by Green and Selman (2005), creating collaborative communication among EHS, managers, and employees regarding these barriers may be an important first step in addressing the problem.

Although this study provided insight about the beliefs and practices of EHS regarding evaluation of employee health policies in Georgia, it had several limitations. First, because inspector training and standardization practices differ among states, the present findings may not

be representative of inspectors outside of Georgia. Due to the voluntary nature of the study, participation bias may have been a factor; thus, these findings may not represent the total population of EHS employed in this state. Also, because this research utilized self-reported data, response bias and respondent's misinterpretation of survey questions could have influenced the validity and reliability of the results. Lastly, the cross sectional design and qualitative aspects of study did not allow for causal inferences. However, these findings provided the foundation for future research addressing how EHS can reliably monitor and enforce food safety regulations designed to prevent transmission of disease from infectious food handlers.

Conclusion

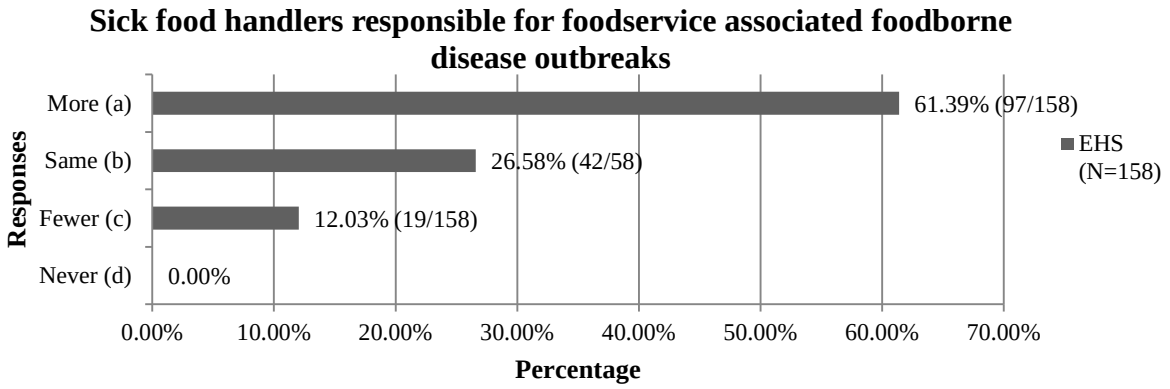
Foodborne illness outbreaks associated with the foodservice industry are a significant threat to public health and infectious employees have been implicated in a number of these outbreaks. In an effort to lessen the risk of sick food handlers transmitting disease, the FDA requires foodservice establishments to have employee health policies that instruct management when to restrict or exclude employees from working with food if they have certain infectious diseases. Even though the foodservice establishment assumes the ultimate responsibility for protecting customers from diseases transmitted by sick food handlers, EHS are responsible for ensuring that establishments have employee health policies in place and that these foodservice operations comply with proper use of restriction and exclusion. The findings of this study suggest that EHS execute reliable measures in determining whether establishments have implemented employee health policies but EHS may lack the understanding and/or resources necessary to appraise the proper use of restriction and exclusion. Undoubtedly, the first step in protecting consumers from infectious food handlers is ensuring that establishments have employee health policies. However, the public health impact of these policies is lost unless EHS can identify the

establishments that do not enforce proper use of restriction and exclusion and provide the feedback necessary to help operators achieve active managerial control over the risk presented by sick food handlers.

TABLE 4.1 *Demographic information of Georgia Environmental Health Specialists respondents*

Demographics of Study Participants	
Questions	
How long you have been an EHS [a]	**No. Responses (%) (N = 159)**
Less than 1 year	6 (3.77%)
1 - 2 years	15 (9.43%)
3 - 5 years	15 (9.43%)
6 - 10 years	46 (28.93%)
Over 10 years	77 (48.43%)
As an EHS, how long have you conducted studies in Georgia [b]	**No. Responses (%) (N = 158)**
Less than 1 year	7 (4.43%)
1 - 2 years	16 (10.13%)
3 - 5 years	16 (10.13%)
6 - 10 years	53 (33.54%)
Over 10 years	66 (41.77%)
Which of the following certifications do you have?	**No. Responses (%) [c] (N = 163)**
National Environmental Health Association (NEHA): registered environmental Health Specialist/registered Sanitarian	21 (13.46%)
National Environmental Health Association (NEHA): Certified professional - Food Safety	4 (2.56%)
National Restaurant Association (NRA): ServSafe ® Food Safety Certification	108 (69.23%)
U.S. Food and Drug Administration (FDA): Certified Inspection/Training Officer	14 (8.97%)
Georgia Standardized Food Service Establishment Inspection Officer	116 (74.36%)
Registered Sanitarian/Specialist in the state (state exam)	24 (15.38%)
I do not have any Environmental Health Specialist certifications	7 (4.49%)
Other certifications	3 (1.92%)

[a] Approximately how long have you been an Environmental Health Specialist?
[b] As an Environmental Health Specialist, approximately how long have you conducted food safety inspections in Georgia?
[c] Numbers do not equal *N* and percentages do not total 100% because multiple responses were allowed.



[a] Sick food handlers cause more outbreaks than other risk factors

[b] Sick food handlers cause the same number of outbreaks than other risk factors

[c] Sick food handlers cause fewer outbreaks than other risk factors

[d] Sick food handlers never cause outbreaks

Figure 4.1 *Responses of Georgia Environmental Health Specialists to the question: "As compared to other food safety risk factors, to what degree do you feel sick food handlers are responsible for foodservice associated foodborne disease outbreaks?"*

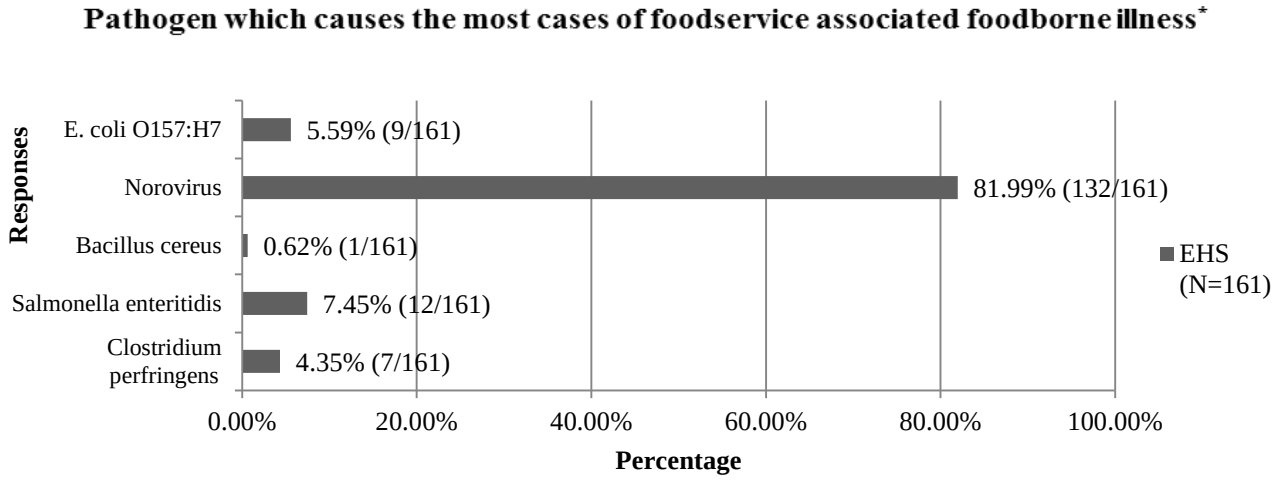


Figure 4.2 *Responses of Georgia Environmental Health Specialists to the question: "To your knowledge, which of the following pathogens cause the most cases of foodservice associated foodborne illness?"*

TABLE 4.2 *Survey responses from Georgia Environmental Health Specialists related to their practices and beliefs regarding item 2-1A "Proper use of restriction and exclusion"*

Survey Responses Related to item 2-1A "Proper use of restriction and exclusion" (N=168)	
Questions	**No. Responses (%)[a]**
Marked establishment out of compliance [b]	
0 times	109 (68.12%)
1 to 5 times	46 (28.75%)
6 to 10 times	2 (1.25%)
More than 10 times	3 (1.88%)
Methods used to assess compliance [c]	
Observation of employee behavior	136 (85.00%)
Interview employee(s)	75 (46.88%)
Interview manager	125 (78.12%)
Review Employee Health Policy	84 (52.50%)
None of the above	1 (0.62%)
Confidence in determining compliance [d]	
Not confident/I need more training	7 (4.38%)
Somewhat confident/I need more practice	58 (36.25%)
Confident/I understand how to determine compliance	72 (45.00%)
Very Confident/I can teach this to others	23 (14.38%)
Barriers in determining compliance [e]	
Lack of time	25 (15.62%)
Exclude/Restrict Policy is difficult to assess	34 (21.25%)
Lack of cooperation on behalf of the Manager or Person In Charge	38 (23.75%)
It is difficult to determine if a food handler is sick	61 (38.12%)
Employees are not truthful about their health status	101 (63.12%)
Communication challenges with foodservice employees	75 (46.88%)
There are no barriers	25 (15.62%)

[a] Numbers do not always equal *N* and percentages do not total 100% because of non-responses and multiple responses where allowed.
[b] In the past year, approximately how many times have you marked a foodservice establishment out of compliance (OUT) for item 2-1A?
[c] Which of the following methods do you use to assess compliance of item 2-1A?
[d] During routine food safety inspections, how confident are you in your ability to accurately determine compliance of item 2-1A?
[e] During routine food safety inspections, which (if any) of the following barriers interfere with your ability to assess compliance of item 2-1A?

TABLE 4.3 *Bivariate associations among survey responses of EHS related to confidence, years of experience and frequency of marking items 2-1A and 2-2A out of compliance* [a]

	Gamma Value	95% Confidence Limits		P-value
Q1 **Q3**	0.2158	-0.0468	0.4784	0.10
Q5 **Q7**	0.5054	0.3234	0.6873	0.05[b]
Q3 **Q13**	0.0034	-0.2134	0.2202	0.98
Q7 **Q13**	-0.0726	-0.2764	0.1312	0.49

[a] Gamma statistic, *P*-values ≤ .05 considered statistically significant

[b] There was a positive association ($p \leq .05$) between respondent's level of confidence and the number of times he or she marked 2-2A item out of compliance

Q1. In the past year, approximately how many times have you marked a foodservice establishment out of compliance (OUT) for item 2-1A "Proper use of restriction and exclusion"?

Q3. During routine food safety inspections, how confident are you in your ability to accurately determine compliance of item 2-1A "Proper use of restriction and exclusion"?

Q5. In the past year, approximately how many times have you marked a foodservice establishment out of compliance (OUT) for item 2-2A "Management awareness; policy present; reporting"?

Q7. During routine food safety inspections, how confident are you in your ability to accurately determine compliance of item 2-2A "Management awareness; policy present; reporting"?

Q13.As an Environmental Health Specialist, approximately how long have you conducted food safety inspections in Georgia?

TABLE 4.4 *Survey responses from Georgia Environmental Health Specialists related to their practices and beliefs regarding item 2-2A "Management awareness; policy present; reporting"*

Survey Responses Related to item 2-2A "Management awareness; policy present; reporting" (N=168)	
Questions	**No. Responses (%)[a]**
Marked establishment out of compliance [b]	
0 times	66 (41.51%)
1 to 5 times	69 (43.40%)
6 to 10 times	18 (11.32%)
More than 10 times	6 (3.77%)
Methods used to assess compliance [c]	
Observation of employee behavior	92 (57.50%)
Interview employee(s)	64 (40.00%)
Interview manager	144 (90.00%)
Review Employee Health Policy	122 (70.00%)
None of the above	2 (1.25%)
Confidence in determining compliance [d]	
Not confident/I need more training	3 (1.90%)
Somewhat confident/I need more practice	48 (30.38%)
Confident/I understand how to determine compliance	69 (43.67%)
Very Confident/I can teach this to others	38 (24.05%)
Barriers in determining compliance [e]	
Lack of time	25 (15.72%)
Employee Health Policies are difficult to assess	34 (21.38%)
Lack of cooperation on behalf of the Manager or Person In Charge	55 (34.59%)
Communication challenges with foodservice employees	78 (49.06%)
There are no barriers	43 (27.04%)

[a] Percentages do not always total 100% because of non-responses and multiple responses where allowed.
[b] In the past year, approximately how many times have you marked a foodservice establishment out of compliance (OUT) for item 2-2A? (N = 159)
[c] Which of the following methods do you use to assess compliance of item 2-2A?
[d] During routine food safety inspections, how confident are you in your ability to accurately determine compliance of item 2-2A? (N = 158)
[e] During routine food safety inspections, which (if any) of the following barriers interfere with your ability to assess compliance of item 2-2A?

CHAPTER V

FOODSERVICE MANAGERS AND ENFORCEMENT OF EMPLOYEE HEALTH POLICIES

Steinberg EK, Andress EL, Anderson AK, Fischer JG, Johnson MA. To be submitted to *Food Protection Trends.*

Abstract

In order to prevent foodborne illness caused by sick food handlers, managers in retail and institutional foodservice establishments must be capable of monitoring employee health and taking appropriate actions when dealing with a sick employee. Previous research suggests that lack of manager experience, managers not knowing that workers are sick, and lack of commitment enforcing health policies all contribute to food workers working while ill (Hedberg et al 2006; Sumner et al 2011; Todd et al 2007). Yet, after an extensive literature review, there appeared to be little information about the personal and external factors that influence a manager's ability to effectively control the risk of food handlers working while ill. The goal of this study was to investigate managers' beliefs and knowledge about employee health and explore how characteristics of their respective establishments influence how they enforce employee health policies. While the intended study sample was to include managers representing a variety of sectors within the foodservice industry (restaurants, retail establishments, schools), only school foodservice managers were successfully recruited. Online surveys were used to collect quantitative and qualitative data from participants (N = 132). The Gamma statistic was used to measure relationships among managers' responses and to compare data between these managers and a separate sample of Environmental Health Specialists (EHS) regarding their beliefs and knowledge concerning employee health. Results from this study suggest that even when managers work in establishments that have employee health policies and provide workers with paid sick leave, there are additional motivational strategies that can be utilized to help alleviate the pressures of employees working while ill. Also, when compared to EHS, managers may not realize or appreciate the actual health burden imposed by sick food handlers.

Introduction

Each year in the United States, there are approximately 1,000 foodborne disease outbreaks causing over 20,000 illnesses reported to the Centers for Disease Control and Prevention (CDC) (Murphree et al 2012). However, because most foodborne illnesses occur in individuals who are not part of recognized outbreaks, epidemiological outbreak data are a gross underestimation of the actual burden of disease. Even so, outbreak surveillance data are paramount for identifying causes of illness, vehicles of transmission, and settings of exposure (Jones, Imhoff, and Samuel 2004). For example, epidemiological data from outbreak investigations indicates that restaurants are associated with substantial proportions of outbreaks associated with all etiologies (Jones and Angulo 2006) and infectious food handlers are a contributing factor in many of these outbreaks (Lynch et al 2002). Of particular relevance to the present study is that almost 25% of foodborne outbreaks in Georgia from 2000 to 2001, were associated with ill food handlers and, in half of those cases, the workers admitted to working while ill (Widdowson et al 2011).

While the precise role of the infectious food worker in the transmission of foodborne illness is difficult to quantify (Michaels et al 2004), research strongly supports the notion that, even when interventions designed to prohibit this behavior are in place, foodservice employees will continue to work while ill (Carpenter et al 2013; Cates et al 2009; Green et al 2005; Hedberg et al 2006; Jones and Angulo 2006; Manes, Liu and Dworkin 2013; Sumner et al 2011; Todd et al 2007; Todd et al 2008). Of course, food handlers are accountable for their own behavior; however, foodservice managers are in a position to have a significant impact on the food safety practices of employees. As defined by the *Georgia Food Code* (2011), the term "foodservice manager" means any person who supervises /trains a food service worker to follow all food safety regulations. Appropriately, (with regard to employee health) it is the manager's responsibility to

educate employees about the food safety risks associated with working while ill and ensure that employees are aware of the reporting requirements for foodborne illness symptoms and diagnoses. It is also the responsibility of management to establish employee health policies and enforce these policies by monitoring employee health and determining whether an ill employee should be excluded or restricted from work. Hence, to enforce these policies effectively, managers require science based knowledge regarding employee health as it relates to food safety and should possess the leadership and human resource skills necessary to persuade employees to comply with these health policies.

Many states (including Georgia) require that establishments employ a Certified Food Safety Manager (CFSM) who has completed an approved food safety training program and has passed a professionally validated food safety examination. While the FDA's 2009 R*isk Factor Study* indicates that the presence of a CFSM is positively correlated to improved food safety compliance in certain facility types, other research is inconclusive with regard to whether a manager's training and certification impacts the risk of foodborne disease (Kassa, Silverman, and Baroudi 2010; Cates et al 2009). Specific to the association between the presence of a CFSM and whether a food handler will work while ill, Hedberg and co-authors (2006) found that neither the presence of a CFSM nor the existence of employee health policies appear to reduce the likelihood of ill food handlers being a contributing factor in foodborne illness outbreaks. The authors state that lack of effective monitoring of employee health and a manager's lack of commitment in enforcing health policies may explain the aforementioned findings. Also, Sumner and colleagues (2011) found an inverse relationship between the manager's level of experience and the frequency with which food workers admit to working while ill. Paradoxically, the manager's level of food safety education did not produce the same effect.

Thus, the authors concluded that a manager's level of foodservice experience, as opposed to the degree of food safety education, has more of an influence on whether or not a food handler will report to work while ill (Sumner et al 2011).

There are external factors that also influence a manager's ability to successfully prohibit sick employees from reporting to work and/or handling food. Considering 9 in 10 restaurants have fewer than 50 employees (National Restaurant Association 2013) many foodservice establishments are often understaffed. Therefore, if an employee is ill, it is not possible for management to find someone to cover the shift; thus, sick employees will report to work because of their concerns about leaving coworkers short staffed (Carpenter et al 2013; Sumner et al 2011). In addition, many foodservice establishments do not offer paid sick leave or health insurance to employees. In fact, the Georgia Restaurant Association opposes legislative bills that would mandate employers to offer paid sick leave and supports flexibility for restaurants to determine their own benefits for employees. However, research suggests that the presence or absence of paid sick leave might be a pivotal determinant of whether food employees will work while ill (Patil et al 2004) and this position is supported by the fact that 43% of surveyed food handlers admit to working while ill because they will not get paid if they miss work (Carpenter et al 2013). Certainly, limited financial and human resources that exist within the foodservice industry make it difficult for managers to enforce policies that encourage sick food employees to stay home and not report to work.

Despite evidence that transmission of pathogens from infectious food workers is a significant contributing factor in foodborne illness outbreaks, little is known about the factors that influence a manager's ability to effectively control this risk factor. Such information would be helpful in developing appropriate strategies for foodservice managers to employ to decrease the likelihood

that employees will work while ill. Thus, this study investigates managers' beliefs and practices specific to employee health and the factors that influence enforcement of employee health policies and regulations.

Methods

Sample

This study was cross-sectional in design and participants were school foodservice managers in Georgia. The survey instrument and methods developed and used in this study were approved for use with human subjects by the Institutional Review Board at the University of Georgia.

To recruit foodservice managers, several strategies were employed. To reach school foodservice managers, a description of the study and a link to the online survey was sent to the State Director of the School Nutrition Division at the Georgia Department of Education. The Director provided the researcher with an acknowledgment of support and provided e-mail addresses of appropriate nutrition personnel throughout the state (Nancy Rice, M.Ed., RD, LD, SNS, e-mail to author, September 23, 2013). An e-mail request for participation reached 205 school nutrition directors and managers and this recruitment procedure yielded 132 participants (64% of individuals on the e-mail recipient list). To recruit restaurant and retail foodservice managers, the following recruitment procedures were utilized: recruitment letters were sent via e-mail to 150 prospective participants who were identified from a purchased marketing list developed by a commercial marketing service; a request for participation was placed in a single edition of an electronic newsletter of the Georgia Restaurant Association which represents almost 4,000 restaurants; a copy of the recruitment statement was posted on a social media site (Facebook); and, recruitment statements were delivered personally to a convenience sampling of approximately 50 foodservice establishments. These combined recruitment efforts yielded 6

participants, which is a clear underrepresentation of the population and is an issue that will be addressed in the discussion of the present study.

The scope and voluntary nature of the study were explained in the recruitment statements and on the introductory page of the online survey (Appendix E). Potential participants were required to select a "continue button" in order to access the research survey questionnaire. Opting to "continue" the survey indicated informed consent and served as an agreement that the participant was over the age of 18 and employed in the state of Georgia. No incentive for participation was provided.

Foodservice Managers Survey

The survey instrument was developed by the researcher and reviewed for content validity and readability by an expert advisory board consisting of: the Southeast Region Retail Food Specialist of the FDA; the Director of Food and Product Safety of Chick-fil-A, Inc.; the Food Service Program Director of the Georgia Department of Public Health, Environmental Health Section; and the Director of Insurance Services for RQA, Inc., a national food safety auditing firm. The online survey was comprised of 17 open-ended and closed questions with response lists and write-in boxes for questions in which respondents could select "other" from a response list (Appendix D). The survey contained five questions regarding demographics of participants including characteristics of the establishment where employed; three questions regarding the establishment's inspection outcomes; one question regarding presence or absence of an employee health policy; one question regarding the presence or absence of employee sick leave; two questions regarding confidence in enforcing the restrict and exclude regulation; two questions regarding managerial approaches to facilitate compliance of health policies; two questions regarding opinions of foodborne illness risk factors; and one question regarding

knowledge of foodborne pathogens (Appendix D). The survey was posted online using Qualtrics©, a web-based survey software tool made available to the University of Georgia (www.qualtrics.com). The link to the survey was active for 20 weeks between January and May 2014.

Environmental Health Specialists (EHS) Survey

EHS from Georgia were also surveyed regarding their attitudes and practices concerning employee health and associated inspection practices. Similar to the survey distributed to managers, the EHS survey was online and included open-ended and closed questions with response lists and write-in boxes for questions in which respondents could select "other" from a response list (Appendix C). For details about this survey refer to the survey description presented in Chapter IV (pages 44 -45).

Data Analyses

Univariate analyses were conducted to obtain descriptive statistics specific to frequency distributions. The Gamma statistic was chosen as the statistical tool for all measures of association due to its appropriateness when working with ordinal level data that is ranked in a small number of response categories. Using the Gamma statistic, the following bivariate associations were assessed: the relationship between the certification status of a foodservice manager and the individual's perceived ability to determine the appropriate course of action when dealing with sick employees; the relationship between the certification status of a manager and whether the individual correctly identified norovirus as the primary cause of foodservice associated foodborne illness; and, to compare data between managers and EHS regarding their beliefs and knowledge concerning employee health and the degree in which infectious food handlers contribute to foodborne disease outbreaks. *P*-values $\leq .05$ were considered statistically

significant. Data were analyzed using the Statistical Analysis System (SAS) version 9.3 (SAS Institute, Cary, NC).

Results

The intended sample of the target population was to include foodservice managers representing a variety of sectors within the foodservice industry (primarily restaurants, retail establishments, schools). Yet, despite the use of numerous recruitment strategies, a viable sample of restaurant and retail foodservice managers was not established. With regard to the school sector of the foodservice industry, 132 foodservice directors and managers agreed to participate in this study. As a result of the described recruitment outcome, the sample of foodservice managers included in this study was homogenous with regard to employer; hence, employee health policies and provisions that exist within the foodservice establishment were similar for the majority of respondents. For example, 96.9% of respondents (N = 127) reported that their establishment offered paid sick leave to employees and 89.9% of respondents (N = 129) reported that their establishment had employee health policies in place. Not surprisingly, 100% of respondents (N = 128) and 99% of respondents (N = 126) claim that items 2-1A and 2-2A, respectively, were marked in compliance during the establishment's last routine food safety inspection.

Almost all (97.7%) participants (N = 128) agreed that, within the foodservice industry, sick food handlers pose a significant threat to public health. When asked to consider the relative risk posed by sick food handlers, 38.3 % of respondents (N = 128) believed that sick food handlers cause more foodborne illness outbreaks than other food safety risk factors while 37.5% believed sick food handlers cause the same number and 23.4% believed they caused fewer outbreaks than other food safety risk factors (Figure 5.1). When these responses were compared to those of

EHS (presented in the previous chapter), a statistically significant difference (37.5% vs. 61.4%, $p \leq 0.01$) was found between the two groups in that EHS were more likely to believe that sick food handlers cause more foodborne illness outbreaks than other food safety risk factors (Figure 5.1)

The majority (88.1%) of respondents (N = 126) were Certified Food Safety Managers. Almost all (96.9%) respondents (N = 128) were confident in their ability to determine if an employee is working while ill and about two-thirds (65.9%) of respondents (N = 129) were confident in their ability to take the appropriate actions when dealing with a sick employee (Table 5.1). No statistically significant association was observed between the managers' certification status and confidence in dealing with sick employees (Table 5.1). When asked to identify the pathogen that is the leading cause of foodborne illness, less than half (42.4%) of respondents (N = 125) correctly identified norovirus (Figure 5.2). No statistically significant association was observed between the managers' certification status and the correct identification of norovirus as the primary cause of foodborne illness. However, when compared to the responses of EHS, a statistically significant negative association ($p < .001$) was found between the two groups. While 82% of the EHS answered correctly (norovirus), less than half (42%) of the managers answered this question correctly (Figure 5.2). Summary data and test statistics for the gamma tests used in these analyses are presented in Appendix G.

Discussion

Although it is not typical to begin a discussion regarding the limitations of research, the failure to recruit a representative sample of foodservice managers must be acknowledged in order to account for the focus and direction of the present discussion. Perhaps central to the recruitment failure of restaurant and retail foodservice managers was the lack of opportunity to develop trust and connections with potential participants. Attempts were made to overcome this

obstacle by seeking participants through a trusted source (Georgia Restaurant Association), utilizing social media to reach an established network of peers (Facebook), and visiting foodservice establishments in person to explain the research project directly to the person-in-charge. In contrast, the State Director of the School Nutrition Division at the Georgia Department of Education allowed her name to be included in the recruitment e-mail sent to school foodservice managers and the response rate was markedly higher than when the same e-mail (without a name of reference) was sent to foodservice managers outside of the school sector. Certainly, the response rate disparity may be reflective of inherent differences between respondents and non-respondents as opposed to the mere reference of a known individual in the recruitment letter. However, studies show that linking a research project to an individual who is already known by potential participants can boost recruitment rates (Namageyo-Funa et al 2014; Patel, Doku, and Tennakoon 2003). Because human subjects take part in research voluntarily, successful recruitment often hinges on minimizing the personal investment required by individuals and maximizing the real or perceived benefit of participation (Namageyo-Funa et al 2014; Patel, Doku, and Tennakoon 2003). Thus, even though participation in the present study required no travel and minimal time and effort, the lack of a monetary incentive could have decreased an individual's willingness to participate especially if the person did not find the project particularly interesting, meaningful, or beneficial.

Other factors that could have contributed to the failure of recruiting restaurant and retail foodservice managers was that potential participants may have feared self-incrimination or their places of employment may have had company policies or legal restrictions which prohibited involvement in such activities. Lastly, failure to identify and collaborate with gatekeepers and deficits in researcher experience, funds, and time also contributed to the degree in which the

aforementioned challenges influenced the recruitment outcome. While not an intended goal of the current study, the recruitment challenges described can be a valuable resource for individuals wishing to conduct research with this target population.

Restaurants, private residences, and schools are the top three food preparation sites associated with foodborne illness outbreaks (Lynch et al 2006). While the number of foodborne illness outbreaks associated with schools (4.3%) is low compared to restaurants (50.2%) and private residences (19.5%), the public health impact is profound considering the average number of cases per outbreak from 2002 to 2011 was higher for outbreaks associated with schools (mean = 48.1) than for those associated with restaurants (mean = 14.1) (Kwon et al 2014). Because school cafeterias serve primarily children, unique safeguards have been incorporated into this sector of the foodservice industry in an effort to protect this vulnerable population from foodborne illness. For example, all schools participating in a state-approved nutrition program were required by the Child and Nutrition WIC Reauthorization Act of 2004 to have a fully implemented food safety program, based on Hazard Analysis and Critical Control Point (HACCP) principles, no later than the end of the 2005-2006 school year (USDA 2005). In addition, the National School Lunch Act Section 9(h) 7CFR 210.13(b) required schools in state-approved nutrition programs to obtain a minimum of two food safety inspections each school year. Yet, despite these added regulations, between 2010 and 2012 there were approximately 32 confirmed and 16 suspected foodborne illness outbreaks associated with schools nationwide (CDC, Foodborne Outbreak Online Database).

Norovirus is the leading cause of foodborne disease in the United States (Hall et al 2012) and, similar to foodborne outbreak trends seen among the general population, the health burden of norovirus is significant in school settings and predominant when compared to outbreaks of

bacterial etiology (Kwon et al 2014; Venuto et al 2010). Because infected food workers are the primary source of contamination, interventions targeting foodservice employees have considerable potential for preventing norovirus transmission (Hall et al 2012). Specifically, supervision by certified kitchen managers, promotion of food safety educational campaigns, and exclusion of ill staff members are among the primary interventions aimed at reducing the incidence of foodborne norovirus disease (Hall et al 2012; Venuto et al 2010).

The *Georgia Food Code* requires that foodservice establishments have a CFSM on staff and the State Board of Education Rule 160-5-6-.01(2002) takes this regulation one step further by requiring that all schools within the Georgia School Nutrition Program have at least one CFSM on site who is designated for that one site. Indeed, the present study revealed that the majority (88.1%) of respondents (N = 126) were CFSM (Table 5.1) and of the 11.9% of respondents (n = 15) who indicated they were not certified, 62.5% reported there was a CFSM employed at their facility. When participants were asked to identify the pathogen responsible for most cases of foodservice associated foodborne illness, less than half (42.4%) of respondents (n = 125) correctly identified norovirus while 29.6% and 23.2% selected *Salmonella* and *E. coli*, respectively (Figure 5.2). Even though *Salmonella* and *E. coli* O157:H7 are often cited in foodborne illness outbreaks and food recalls, each of these bacterial pathogens cause fewer foodborne illnesses than norovirus. Despite a lack of significance between the managers' certification status and the correct identification of norovirus, these results were surprising considering the majority (88.1%) of respondents were CFSM and prior research shows that supervision by CFSM is associated with fewer norovirus outbreaks (Cates et al 2009; Hedberg et al 2006). Granted, enforcing stringent hygienic controls and educating employees about the general risk of working while ill can help prevent disease transmission of most pathogens.

However, because managers are responsible for educating employees about the food safety risks associated with working while ill, these results reveal a possibility that misinformation is being conveyed from managers to employees regarding the relative likelihood of transmitting norovirus, as opposed to transmitting a bacterial illness such as *Salmonella* or *E. coli.* (Refer to Figure 5.4 regarding how respondents' inform employees of the health risks associated with working while ill).

Because norovirus is highly infectious, exhibits variable levels of resistance to heat and disinfection agents, and is the single most common cause of gastroenteritis, it is essential that managers are aware of the public health threat posed by norovirus and, in turn, educate food handlers about the guidelines specifically aimed at reducing the transmission of this prevalent foodborne disease (Koopmans and Duizer 2002). As presented in the previous chapter, when surveyed EHS were asked to identify the leading cause of foodservice associated foodborne illness outbreaks, 82% of respondents (N = 161) correctly identified norovirus and, when compared to managers, EHS chose this correct response at a significantly ($p < .001$) higher rate than managers (Figure 5.2). Considering these results and the fact that schools receive food safety inspections twice per school year, an educational gap may exist between EHS and managers with regard to employee health and the prevention of disease from sick food handlers. Thus, targeted educational campaigns delivered by EHS or even increased dialogue during inspections would be a practical and effective route by which to increase manager's awareness about the public health threat of norovirus.

While almost all (97.7%) participants (N = 128) agreed that, within the foodservice industry, sick food handlers pose a significant threat to public health, only 38.3 % of respondents (N = 128) believed that sick food handlers cause more foodborne illness outbreaks than other food

safety risk factors (Figure 5.1). When these responses were compared to those of EHS (presented in the previous chapter), a statistically significant difference (38.3% vs. 61.4%, $p \leq 0.01$) was found between the two groups in that EHS were more likely to believe that sick food handlers cause more foodborne illness outbreaks than other food safety risk factors (Figure 5.1). In fact, two-thirds of restaurant-related foodborne illness outbreaks are associated with food handled by an infectious person (Koopmans and Duizer 2004) and researchers believe that infectious food workers represent the greatest risk factor for disease transmission within the foodservice industry (Carpenter et al 2013; Jones and Angulo 2006; Hedberg et al 2006). Thus, the results from this study suggest that managers may not realize or appreciate the food safety risk presented by sick employees as compared to other food safety infractions.

Given that an individual's beliefs are often predictors of intentions to perform a behavior (for instance, monitoring employee health), the manager's risk perception described in this study may, in part, explain the lack of commitment in enforcing employee health policies described in previous studies (Carpenter et al 2013; Hedberg et al 2006). Furthermore, because managers are responsible for educating employees about the food safety risks associated with working while ill, it is possible that managers are not emphasizing this risk to employees during food safety training programs. Considering that risk perception is a product of internal and external factors, such as the individual's experiences, attitudes, and information resources (Machado et al 2014), the results from the current study are incomplete because the antecedents to the manager's perception of risk are unknown. However, recognizing that some managers may have an inaccurate assessment of the relative risk posed by sick employees provides a starting point for future research that explores the precautionary actions of managers regarding employee health.

Because federal and state laws do not require small businesses to offer paid sick leave, a reported 87.7% of foodservice workers nationwide do not get financial compensation if they miss work (Restaurant Opportunities Centers United 2011). As mentioned, the Georgia Restaurant Association opposes legislative bills that would mandate employers to offer sick leave even though research suggests consistently that the presence or absence of paid sick leave might be a major determinant of whether food employees will work while ill (Carpenter et al 2013; Patil et al 2004; Sumner et al 2011). In contrast, according to Georgia Code O.C.G.A. 20-2-850 (2010), each person employed in any public school system in the state is entitled to sick leave with full pay. Moreover, the sick leave policy for the Georgia Department of Education states that accrued sick leave can be used if an individual has been exposed to a contagious disease when attendance would endanger the health of others (Georgia Department of Education 1999). Thus, considering all participants in the present study worked within the Georgia school system, it was not surprising that the majority (96.9%) of respondents (N = 127) reported that their establishments offered paid sick leave to employees.

While providing paid sick leave to employees undoubtedly provides incentive for ill workers to stay home, research suggests that lost wages may not be the primary motivator regarding decisions about working while ill (Carpenter et al 2013). Social and personal concerns, such as not wanting to leave co-workers understaffed or dedication to the job, are also factors that influence whether employees will work while sick (Carpenter et al 2013; Sumner et al 2011). Therefore, in an effort to assess whether establishments have employee incentives or motivators in place to address these social and personal concerns, managers in this study were asked how their respective establishments encourage employees to stay home if they are experiencing reportable symptoms or illnesses. Curiously, only 83.7% and 67.4% of respondents reported that

their establishment offered paid sick leave or health insurance, respectively (Figure 5.3). Because all respondents worked for the Georgia Department of Education which offers sick leave and health insurance to all persons employed in the public school system, these results could indicate some respondents did not read or understand the question or they did not consider these benefits to be sources of encouragement for ill employees to stay home. With regard to alleviating the pressures of leaving co-workers understaffed, 57.3% of respondents indicated that "on-call" staff was available if a person called out sick (Figure 5.3). Because back-up staff could mitigate the pressures ill employees might feel to work or managers might feel to encourage ill employees to work (Sumner et al 2011), the present finding reveals an opportunity for improvement within the school foodservice system to lessen the burden created when employees cannot work due to illness. Perhaps if a pool of eligible foodservice employees within each school district were available to fill-in for sick employees, even workers with a strong sense of responsibility toward their work and co-workers would be more inclined to stay home if they were ill.

Research shows that when policies are in place requiring food workers to tell managers when they are ill, fewer surveyed employees report having worked while experiencing vomiting or diarrhea (Sumner et al 2011). Yet, in the present study, only 23.3% of respondents indicated that their establishment requires employees to inform management if they are ill (Figure 5.3). This finding reveals an opportunity for improvement regarding motivational factors that could be implemented to encourage workers to be forthright and accountable for health issues that could put others at risk for disease. Admittedly, in the present study, the wording of the response option could have biased the results in that the response indicated employees sign an agreement to inform management if they are ill as opposed to simply telling management if they are ill.

Therefore, this particular result indicating 23.3% of respondents reported that their establishments require employees to inform management of their health status, may be biased due to the word selection of the response option. Nonetheless, these results reveal that even when monetary incentives are not in place (specifically, paid sick leave) there are additional methods by which foodservice establishments can alleviate the pressures to work while ill and encourage employees to acknowledge their illness.

The majority (96.8%) of respondents (N = 128) indicated they felt confident in their ability to determine if an employee is working while ill (Table 5.1). On the surface, this result appears positive in that managers believe they are capable of identifying sick employees. However, this level of confidence may be overly optimistic considering that previous research reveals that almost half of surveyed workers, who admitted having worked while ill, stated that managers were not aware of their illness symptoms and they made the decision to work without managers' input (Carpenter et al 2013). Similarly, Sumner and colleagues (2011) found that almost 12% of interviewed food handlers said they had worked two or more shifts while experiencing vomiting or diarrhea. Without knowledge of these previous research findings, it is possible that managers in this study have a false sense of security in terms of their capability of identifying sick workers. Alternatively, these managers may have worked with their employees for an extended period of time which they felt provided them with the insight necessary to recognize uncharacteristic behaviors that could indicate whether an employee was sick. Unfortunately, while the overall findings of this research provided information regarding the beliefs and practices that influence how managers address the risk created by sick food handlers, the specific means by which managers identify ill employees was not obtained. Taking into account the elusive nature of identifying sick employees who do not self-report an illness, more research is needed to ascertain

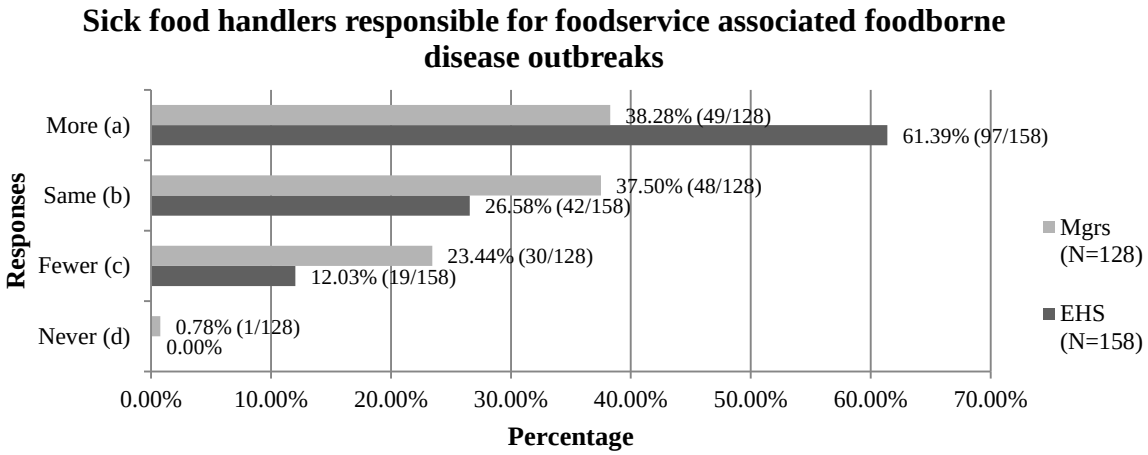
how managers identify ill workers and then determine whether manager confidence is justified or if continued training regarding ill workers is warranted.

In addition to the limitations already discussed, the cross-sectional study design utilized in this study prohibited causal inferences and findings may not apply to foodservice managers outside of the sample population. Because the study collected self-reported data, these data are susceptible to bias and, due to the recruitment challenges already presented, non-response bias is likely. Lastly, this study included only English speaking managers. Future research should investigate how English speaking managers communicate with non-English speaking employees because this population of workers represents a large portion of the foodservice workforce and collaborative communication is essential for preventing sick employees from handling food.

Conclusion

Although food handlers are accountable for their own behavior, foodservice managers are in a position to have a significant impact on the food safety practices of employees. However, the findings from this study suggest that managers may not realize or appreciate the actual health burden imposed by sick food handlers and they may also have a false sense of security in terms of their ability to determine if an employee is working while ill. In addition, this study reveals that even when managers work in establishments that have employee health policies in place and provide workers with paid sick leave and health insurance, there are additional motivational strategies that can be utilized to help alleviate the pressures to work while ill and encourage workers to acknowledge and report illnesses to management. Until prospective methods of foodborne disease detection (ex. diagnostic assays) and prevention (ex. norovirus vaccine) become feasible resources available to the foodservice industry, behavioral interventions

enforced and supported by managers must be the primary means by which foodservice establishments prevent foodborne illness outbreaks incited by sick workers.



[a] Sick food handlers cause more outbreaks than other risk factors

[b] Sick food handlers cause the same number of outbreaks than other risk factors

[c] Sick food handlers cause fewer outbreaks than other risk factors

[d] Sick food handlers never cause outbreaks

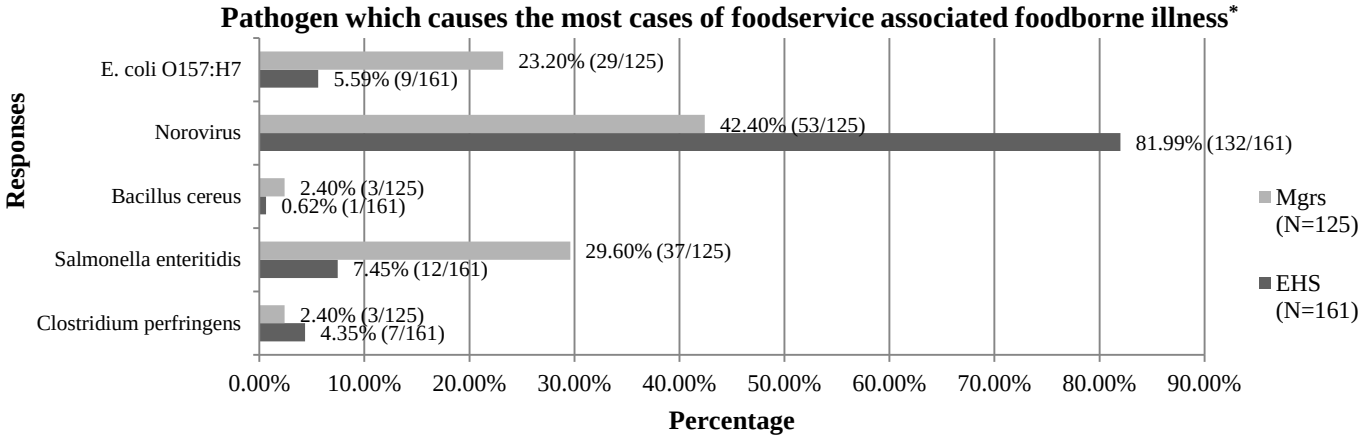
[*] There was a statistically significant difference between EHS and manager responses (37.5% vs. 61.4%, $p \leq 0.01$). EHS were more likely than managers to believe that sick food handlers cause more foodborne illness outbreaks than other food safety risk factors.

FIGURE 5.1 *Comparison of responses between Georgia Environmental Health Specialists and school nutrition managers to the question: As compared to other food safety risk factors, to what degree do you feel sick food handlers are responsible for foodservice associated foodborne disease outbreaks?*[*]

TABLE 5.1. *Association between Georgia school nutrition food safety manager certification status and confidence in determining course of action when dealing with sick employees* [a]

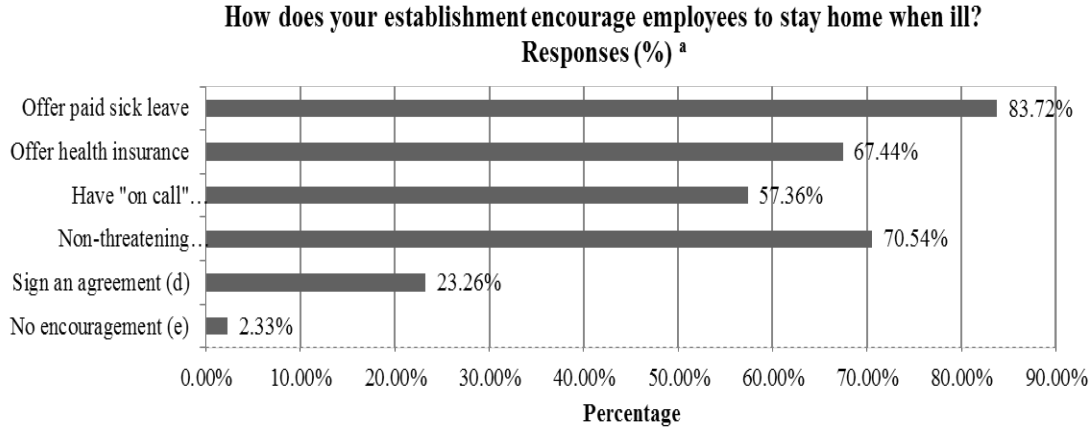
Worker Certification Status and Confidence	
Questions	
Are you a Certified Food Safety Manager?	**No. Responses (%) (N = 126)**
Yes	111 (88.10%)
No	15 (11.90%)
Do you feel confident in your ability to determine if an employee is working while ill?	**No. Responses (%) (N = 128)**
Yes	124 (96.88%)
No	4 (3.12%)
How confident are you in your ability to determine the appropriate course of action when dealing with a sick employee?	**No. Responses (%) (N = 129)**
Not confident/I need more training	0
Somewhat confident/I need more practices	12 (9.30%)
Confident/I understand how to determine appropriate course of action	85 (65.89%)
Very Confident/I can teach this to others	32 (24.81%)

[a] No statistically significant association was observed between managers' certification status and confidence in dealing with sick employees. Gamma statistic, *P*-values $\leq .05$ considered statistically significant.



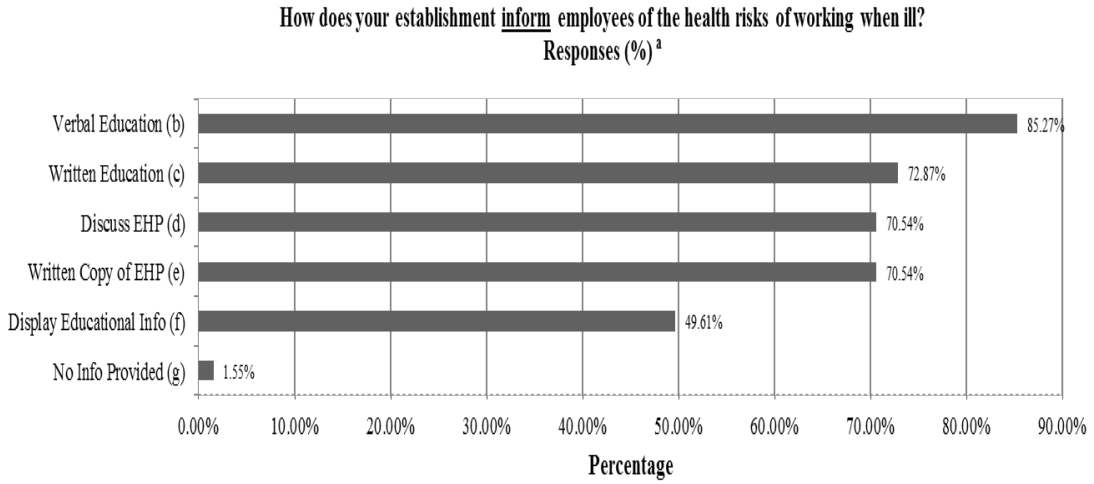
* There was a statistically significant difference between EHS and manager responses (82% vs. 42%, $p \leq 0.01$). EHS chose the correct response (norovirus) at a significantly higher rate than managers.

FIGURE 5.2 *Comparison of responses between Georgia Environmental Health Specialists and school nutrition managers to the question: "To your knowledge, which of the following pathogens cause the most cases of foodservice associated foodborne illness?"**



[a] Non-responses and multiple responses allowed (N = 132)
[b] Have "on call" employees to cover shifts when someone calls out sick
[c] Maintain a non-threatening environment in which employees feel safe stating they are ill
[d] Have employees sign an agreement to inform management if they are ill
[e] No encouragement to stay home is provided

FIGURE 5.3 *Georgia school nutrition manager survey responses related to how establishments encourage employees to stay home if they are experiencing reportable symptoms (such as vomiting or diarrhea) or a reportable illness (such as Hepatitis A)*



[a] Non-responses and multiple responses allowed (N = 132)
[b] Provide verbal education
[c] Provide written educational materials
[d] Discuss the Employee Health Policy
[e] Provide a written copy of the Employee Health Policy
[f] Display educational information (ex. Posters)
[g] No information is provided

FIGURE 5.4 *Georgia school nutrition manager survey responses related to how establishments inform employees about the public health risk of working while experiencing reportable symptoms (such as vomiting or diarrhea) or a reportable illness (such as Hepatitis A)*

CHAPTER VI

SUMMARY AND CONCLUSIONS

As a former food safety inspector and as one who has an ongoing interest in foodborne disease and associated food handling practices, I often review restaurant inspection reports. The idea for this dissertation began with a casual observation that one particular food safety regulation (proper use of restriction and exclusion) was never indicated to be out of compliance on inspection reports which were posted at establishments I frequented. This observation led to further review of additional online reports and, here again, I realized that this food safety criterion was consistently marked in compliance. Intuitively, this did not make sense considering almost 25% of foodborne outbreaks in Georgia from 2000 to 2001, were associated with ill food handlers and, in half of those cases, the workers admitted to working while ill (Widdowson et al 2011). Similarly, multiple restaurant-associated foodborne illness outbreaks have been traced back to infected food handlers (Barrabeig et al 2010; Chapman et al 2010; Guzewich and Ross 1999; Hedberg et al 2006; Medus et al 2010; Todd et al 2008) and research strongly suggests that food handlers will work while ill even when intervention strategies are in place to prevent such behavior (Carpenter et al 2013; Cates et al 2009; Green et al 2005; Hedberg et al 2006; Jones and Angulo 2006; Manes, Liu and Dworkin 2013; Sumner et al 2011; Todd et al 2007; Todd et al 2008). Thus, the disconnect between what I observed on foodservice inspection reports and what I read in the literature, led me to question whether employee health can be evaluated reliably by Environmental Health Specialists (EHS) during routine inspections.

As stated by the U.S. Food and Drug Administration (FDA), food safety regulations are designed to be practical, manageable, and enforceable (FDA 2013d). This intention proves true for the majority of FDA regulations because, for the most part, food safety practices can be easily observed and objectively measured (i.e. food temperature, hand washing practices, food from unsafe sources). Yet, when one considers employee health, unknown and uncontrollable factors (disease transmission from asymptomatic or pre/post-symptomatic shedders) must also be considered. This is not to say that employee health regulations do not help mitigate the risk of disease transmission from sick employees; rather, that performance indicators do not represent the actual state of affairs. Because inspection *violations* get the attention of customers and public health officials, default judgments of compliance (regarding employee health) give the false impression that this food safety risk factor is being controlled when epidemiological evidence and surveys with foodservice employees clearly indicates otherwise. Thus, acknowledging that foodservice employees will work while ill, the intent of this dissertation was to determine whether this food safety violation is observed by EHS during inspections and to investigate how managers and EHS enforce and determine compliance of employee health policies. The overall hypothesis was that, although health policies and associated regulations are theoretically sound, effective application and evaluation of these policies is challenging and, thus, lacking.

The first specific aim was to quantify the compliance rate of employee health policies as measured by Georgia foodservice inspection reports indicating "in compliance (IN)" or "out of compliance (OUT)" for items 2-1A “Proper use of restriction and exclusion” and 2-2A “Management awareness; policy present; reporting.” It was hypothesized that relatively few incidences of out of compliance for items 2-1A and 2-2A would be observed suggesting that compliance of this policy is not evaluated accurately during food safety inspections. Indeed, data

from 59,007 inspection reports revealed out of compliance observations for items 2-1A and 2-2A were 0.02% and 1.16%, respectively (Table 3.1). The low violation rate for item 2-1A indicated that employee health may not be monitored reliably during inspections and comments written by EHS cast suspicion regarding the validity of most observations of non-compliance for this item. While the validity of observations of non-compliance for item 2-2A was not in question, additional research is needed to determine if inspector bias and/or judgment could have influenced the relatively low violation rate indicated in the inspection reports or if establishments have become increasingly aware of and compliant with regulations addressing employee health policies.

The second specific aim was to determine whether EHS in Georgia evaluate compliance of employee health policies effectively during routine inspections and to identify the factors that influence evaluation practices. It was hypothesized that evaluation of compliance by EHS is problematic due to the dynamics of the foodservice inspection process combined with the inherent barriers of identifying infectious food handlers. The findings suggested that EHS employ reliable measures for determining whether establishments have employee health policies but they may lack the understanding and/or resources necessary to appraise the proper use of restriction and exclusion. Similar to previous research (Green and Selman 2005; Pham et al 2010), communication challenges and lack of cooperation on behalf of foodservice staff appeared to be primary barriers that hindered inspection activities. Future research concerning the educational/training needs of EHS pertaining to the reliable assessment of employee health controls is recommended to ensure EHS are providing the oversight necessary to help foodservice managers gain control of the public health burden imposed by sick food handlers.

The third specific aim was to identify whether retail foodservice establishments in Georgia have employee health policies and, if present, determine how these policies are enforced by foodservice managers. It was hypothesized that foodservice establishments in Georgia have employee health policies in place but enforcement by managers is problematic due to the dynamics of the foodservice environment combined with the inherent barriers of identifying infectious food handlers. Analyses of survey data suggested that managers may not realize or appreciate the actual health burden imposed by sick food handlers and they may also have a false sense of security in terms of their ability to determine if an employee is working while ill. Results from this study showed that even when managers work in establishments that have employee health policies and provide workers with paid sick leave, there are additional motivational strategies that can be utilized to help alleviate the pressures of employees working while ill.

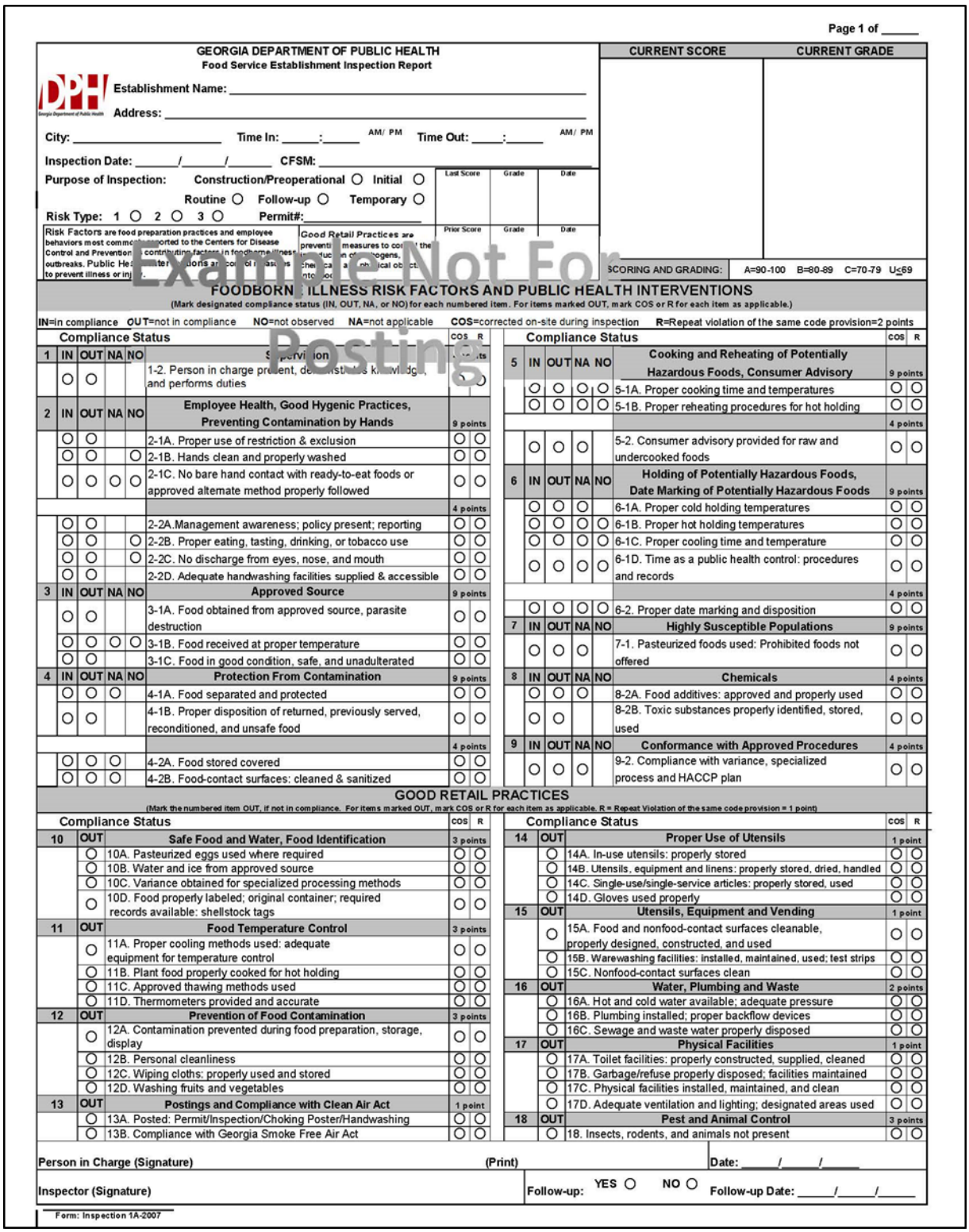
The fourth specific aim was to compare and contrast the beliefs and knowledge of foodservice managers and EHS regarding employee health and the degree in which infectious food handlers contribute to foodborne disease outbreaks. It was hypothesized that these two groups would differ in their beliefs and knowledge and that these differences would illuminate educational opportunities that exist between and among foodservice managers and EHS. Results of bivariate analyses comparing responses from EHS and managers revealed that EHS were more likely to believe that sick food handlers cause more foodborne illness outbreaks than other food safety risk factors (Figure 5.1). When EHS and managers were asked to identify the pathogen (norovirus) that causes the most cases of foodborne disease, a significant negative association ($p < .001$) was found between the two groups indicating that EHS answers (norovirus) tended to be correct while manager's answers tended to be incorrect (Figure 5.2). Thus, targeted educational

campaigns delivered by EHS or even increased dialogue during inspections would be a practical and effective route by which to increase managers' awareness and knowledge regarding the degree of risk posed by sick food handlers relative to other food safety risk factors.

Perhaps in the absence of the resources necessary to identify infectious food handlers (non-invasive diagnostic tools and/or environmental swabs capable of identifying viruses and bacteria), it may impossible to provide a definitive answer to the research question, "Can foodservice worker health policies in Georgia be enforced and compliance measured?" Until that time, researchers and public health officials must have accurate inspection data to investigate possible correlations between the occurrence of violations regarding employee health and the actual incidence of foodborne disease. Because regulatory decision makers depend on valid data to justify allocation of program resources, it is imperative that performance indicators regarding employee health are accurate. The findings of this dissertation provided insight into how managers enforce and EHS assess compliance of employee health controls and inspection data revealed rates of non-compliance that are incompatible with epidemiological evidence showing that sick food handlers are a burden to public health. Collectively, this information can be used by foodservice managers, EHS, and public health officials to help develop performance plans that include measurable goals and feasible methods of assessing compliance of employee health policies. This information will be especially useful to food safety educators and public health officials in Georgia who rely on regional data to identify strengths and weaknesses of program services and to help allocate the educational/fiscal/ and human resources necessary to help foodservice managers gain control of the risk presented by infectious food handlers.

APPENDIX A

Food Service Establishment Inspection Report



Page 1 of _____

GEORGIA DEPARTMENT OF PUBLIC HEALTH
Food Service Establishment Inspection Report

CURRENT SCORE	CURRENT GRADE

Establishment Name: _____
Address: _____
City: _____ Time In: _____:_____ AM/ PM Time Out: _____:_____ AM/ PM
Inspection Date: _____/_____/_____ CFSM: _____
Purpose of Inspection: Construction/Preoperational ○ Initial ○ Routine ○ Follow-up ○ Temporary ○
Risk Type: 1 ○ 2 ○ 3 ○ Permit#: _____

Last Score	Grade	Date
Prior Score	Grade	Date

Risk Factors are food preparation practices and employee behaviors most commonly reported to the Centers for Disease Control and Prevention as contributing factors in foodborne illness outbreaks. Public Health interventions are control measures to prevent illness or injury.

Good Retail Practices are preventive measures to control the introduction of pathogens, chemicals, and physical objects into food.

SCORING AND GRADING: A=90-100 B=80-89 C=70-79 U<69

FOODBORNE ILLNESS RISK FACTORS AND PUBLIC HEALTH INTERVENTIONS
(Mark designated compliance status (IN, OUT, NA, or NO) for each numbered item. For items marked OUT, mark COS or R for each item as applicable.)

IN=in compliance OUT=not in compliance NO=not observed NA=not applicable COS=corrected on-site during inspection R=Repeat violation of the same code provision=2 points

Compliance Status						COS	R
1	IN	OUT	NA	NO	Supervision		
	○	○			1-2. Person in charge present, demonstrates knowledge, and performs duties	○	○
2	IN	OUT	NA	NO	Employee Health, Good Hygenic Practices, Preventing Contamination by Hands	9 points	
	○	○			2-1A. Proper use of restriction & exclusion	○	○
	○	○		○	2-1B. Hands clean and properly washed	○	○
	○	○	○	○	2-1C. No bare hand contact with ready-to-eat foods or approved alternate method properly followed	○	○
						4 points	
	○	○			2-2A.Management awareness; policy present; reporting	○	○
	○	○		○	2-2B. Proper eating, tasting, drinking, or tobacco use	○	○
	○	○		○	2-2C. No discharge from eyes, nose, and mouth	○	○
	○	○			2-2D. Adequate handwashing facilities supplied & accessible	○	○
3	IN	OUT	NA	NO	Approved Source	9 points	
	○	○			3-1A. Food obtained from approved source, parasite destruction	○	○
	○	○	○	○	3-1B. Food received at proper temperature	○	○
	○	○			3-1C. Food in good condition, safe, and unadulterated	○	○
4	IN	OUT	NA	NO	Protection From Contamination	9 points	
	○	○	○		4-1A. Food separated and protected	○	○
	○	○			4-1B. Proper disposition of returned, previously served, reconditioned, and unsafe food	○	○
						4 points	
	○	○	○		4-2A. Food stored covered	○	○
	○	○	○		4-2B. Food-contact surfaces: cleaned & sanitized	○	○

Compliance Status						COS	R
5	IN	OUT	NA	NO	Cooking and Reheating of Potentially Hazardous Foods, Consumer Advisory	9 points	
	○	○	○	○	5-1A. Proper cooking time and temperatures	○	○
	○	○	○	○	5-1B. Proper reheating procedures for hot holding	○	○
						4 points	
	○	○	○		5-2. Consumer advisory provided for raw and undercooked foods	○	○
6	IN	OUT	NA	NO	Holding of Potentially Hazardous Foods, Date Marking of Potentially Hazardous Foods	9 points	
	○	○	○		6-1A. Proper cold holding temperatures	○	○
	○	○	○	○	6-1B. Proper hot holding temperatures	○	○
	○	○	○	○	6-1C. Proper cooling time and temperature	○	○
	○	○	○	○	6-1D. Time as a public health control: procedures and records	○	○
						4 points	
	○	○	○	○	6-2. Proper date marking and disposition	○	○
7	IN	OUT	NA	NO	Highly Susceptible Populations	9 points	
	○	○	○		7-1. Pasteurized foods used: Prohibited foods not offered	○	○
8	IN	OUT	NA	NO	Chemicals	4 points	
	○	○	○		8-2A. Food additives: approved and properly used	○	○
	○	○			8-2B. Toxic substances properly identified, stored, used	○	○
9	IN	OUT	NA	NO	Conformance with Approved Procedures	4 points	
	○	○	○		9-2. Compliance with variance, specialized process and HACCP plan	○	○

GOOD RETAIL PRACTICES
(Mark the numbered item OUT, if not in compliance. For items marked OUT, mark COS or R for each item as applicable. R = Repeat Violation of the same code provision = 1 point)

Compliance Status			COS	R
10	OUT	Safe Food and Water, Food Identification	3 points	
	○	10A. Pasteurized eggs used where required	○	○
	○	10B. Water and ice from approved source	○	○
	○	10C. Variance obtained for specialized processing methods	○	○
	○	10D. Food properly labeled; original container; required records available: shellstock tags	○	○
11	OUT	Food Temperature Control	3 points	
	○	11A. Proper cooling methods used: adequate equipment for temperature control	○	○
	○	11B. Plant food properly cooked for hot holding	○	○
	○	11C. Approved thawing methods used	○	○
	○	11D. Thermometers provided and accurate	○	○
12	OUT	Prevention of Food Contamination	3 points	
	○	12A. Contamination prevented during food preparation, storage, display	○	○
	○	12B. Personal cleanliness	○	○
	○	12C. Wiping cloths: properly used and stored	○	○
	○	12D. Washing fruits and vegetables	○	○
13	OUT	Postings and Compliance with Clean Air Act	1 point	
	○	13A. Posted: Permit/Inspection/Choking Poster/Handwashing	○	○
	○	13B. Compliance with Georgia Smoke Free Air Act	○	○

Compliance Status			COS	R
14	OUT	Proper Use of Utensils	1 point	
	○	14A. In-use utensils: properly stored	○	○
	○	14B. Utensils, equipment and linens: properly stored, dried, handled	○	○
	○	14C. Single-use/single-service articles: properly stored, used	○	○
	○	14D. Gloves used properly	○	○
15	OUT	Utensils, Equipment and Vending	1 point	
	○	15A. Food and nonfood-contact surfaces cleanable, properly designed, constructed, and used	○	○
	○	15B. Warewashing facilities: installed, maintained, used; test strips	○	○
	○	15C. Nonfood-contact surfaces clean	○	○
16	OUT	Water, Plumbing and Waste	2 points	
	○	16A. Hot and cold water available; adequate pressure	○	○
	○	16B. Plumbing installed; proper backflow devices	○	○
	○	16C. Sewage and waste water properly disposed	○	○
17	OUT	Physical Facilities	1 point	
	○	17A. Toilet facilities: properly constructed, supplied, cleaned	○	○
	○	17B. Garbage/refuse properly disposed; facilities maintained	○	○
	○	17C. Physical facilities installed, maintained, and clean	○	○
	○	17D. Adequate ventilation and lighting; designated areas used	○	○
18	OUT	Pest and Animal Control	3 points	
	○	18. Insects, rodents, and animals not present	○	○

Person in Charge (Signature) (Print) Date: _____/_____/_____

Inspector (Signature) Follow-up: YES ○ NO ○ Follow-up Date: _____/_____/_____

Form: Inspection 1A-2007

APPENDIX B

Instructions for Marking the Georgia Food Establishment Inspection Report Form Rules and Regulations for Food Service Chapter 290-5-14

2-1A. Proper use of restriction and exclusion

IN/OUT This item should be marked IN or OUT of compliance based on direct observations. To be marked IN there must be no ill employees, employees experiencing symptoms requiring reporting, or reason for the PIC to exclude or restrict an employee observed at the time of the inspection. This item should be marked OUT of compliance if there is an employee observed experiencing illness requiring reporting of symptoms to the PIC justifying the exclusion or restriction of the employee. For example, if item 2-2C has been marked OUT of compliance when a food employee has persistent coughing, sneezing, runny nose, or watery eyes subjecting food and food-contact surfaces to potential contamination, the PIC should immediately restrict the affected employee in their duties. This item should be marked OUT of compliance if there if there is an employee with an uncovered lesion containing pus on their hands, wrists, or exposed portions of their arms.

N.A. **Do Not Mark** this item N.A.
N.O. **Do Not Mark** this item N.O.

2-2A. Management awareness, policy present, reporting

IN/OUT This item must be marked IN or OUT of compliance. This item is marked IN compliance when all of the following criteria are met:

1. The PIC is aware of the Code provisions that conditional or food employees are required to report certain symptoms or diagnosed illnesses to the person in charge and that the PIC is required to report certain symptoms or diagnosed illnesses to the regulatory authority.

2. The PIC can convey knowledge of an employee health policy **or** have access to an employee health policy.

The policy must reflect the current Food Code provisions. Verbal communication of the employee health policy must be specific to the types of illnesses and symptoms that require reporting. Nonspecific statements such as, "sick or ill employees are not allowed to work," are not acceptable as meeting this requirement.

N.A. **Do Not Mark** this item N.A.
N.O. **Do Not Mark** this item N.O.

APPENDIX C

Instruments for Environmental Health Specialists

Survey: Environmental Health Specialists

1. In the past year, approximately how many times have you marked a foodservice establishment out of compliance (OUT) for item 2-1A "Proper use of restriction and exclusion"?

   - o 0 times
   - o 1 to 5 times
   - o 6 to 10 times
   - o More than 10 times

2. Which of the following methods do you use to assess compliance of item 2-1A "Proper use of restriction and exclusion"? (Select all that apply)

   - o Observation of employee behavior
   - o Interview employee(s)
   - o Interview manager
   - o Review Employee Health Policy
   - o None of the above
   - o Other _____

3. During routine food safety inspections, how confident are you in your ability to accurately determine compliance of item 2-1A "Proper use of restriction and exclusion"?

   - o Not confident/I need more training
   - o Somewhat confident/I need more practice
   - o Confident/I understand how to determine compliance
   - o Very Confident/I can teach this to others

4. During routine food safety inspections, which (if any) of the following barriers interfere with your ability to assess compliance of item 2-1A "Proper use of restriction and exclusion"? (Select all that apply)

   - o Lack of time
   - o Exclude/Restrict Policy is difficult to assess
   - o Lack of cooperation on behalf of the Manager or Person In Charge
   - o It is difficult to determine if a food handler is sick
   - o Employees are not truthful about their health status
   - o Communication challenges with foodservice employees
   - o There are no barriers
   - o Other_____

5. In the past year, approximately how many times have you marked a foodservice establishment out of compliance (OUT) for item 2-2A "Management awareness; policy present; reporting"?

   - o 0 times
   - o 1 to 5 times
   - o 6 to 10 times
   - o More than 10 times

6. Which of the following methods do you use to assess compliance of item 2-2A "Management awareness; policy present; reporting"? (Select all that apply)

   - o Observation of employee behavior
   - o Interview employee(s)
   - o Interview manager
   - o Review Employee Health Policy
   - o None of the above
   - o Other _____

7. During routine food safety inspections, how confident are you in your ability to accurately determine compliance of item 2-2A "Management awareness; policy present; reporting"?

   - o Not confident/I need more training
   - o Somewhat confident/I need more practice
   - o Confident/I understand how to determine compliance
   - o Very Confident/I can teach this to others

8. During routine food safety inspections, which (if any) of the following barriers interfere with your ability to assess compliance of item 2-2A "Management awareness; policy present; reporting"? (Select all that apply)

   - o Lack of time
   - o Employee Health Policies are difficult to assess
   - o Lack of cooperation on behalf of the Manager or Person In Charge
   - o Communication challenges with foodservice employees
   - o There are no barriers
   - o Other_____

9. Do you agree or disagree with the following statement? Within the foodservice industry, sick food handlers pose a significant threat to public health.

   - o Agree
   - o Disagree

10. To your knowledge, which of the following pathogens cause the most cases of foodservice associated foodborne illness?

    - o *Escherichia coli* O157:H7
    - o Norovirus
    - o *Bacillus cereus*
    - o *Salmonella* Enteritidis
    - o *Clostridium perfringens*

11. As compared to other food safety risk factors, to what degree do you feel sick food handlers are responsible for foodservice associated foodborne disease outbreaks?

    - o Sick food handlers cause more outbreaks than other risk factors.
    - o Sick food handlers cause the same number of outbreaks as other risk factors.
    - o Sick food handlers cause fewer outbreaks than other risk factors.
    - o Sick food handlers never cause outbreaks.

12. Approximately how long have you been an Environmental Health Specialist?

    - o Less than one year
    - o 1 – 2 years
    - o 3 – 5 years
    - o 6 – 10 years
    - o Over 10 years

13. As an Environmental Health Specialist, approximately how long have you conducted food safety inspections in Georgia?

    - o Less than one year
    - o 1 – 2 years
    - o 3 – 5 years
    - o 6 – 10 years
    - o Over 10 years

14. In which Georgia Public Health District are you employed?

15. Which of the following certifications do you have? (Select all that apply)

    - o National Environmental Health Association (NEHA): Registered Environmental Health Specialist/Registered Sanitarian
    - o National Environmental Health Association (NEHA): Certified Professional - Food Safety
    - o National Restaurant Association (NRA): ServSafe® Food Safety Certification
    - o U.S. Food and Drug Administration (FDA): Certified Inspection/Training Officer
    - o Georgia Standardized Food Service Establishment Inspection Officer
    - o Registered Sanitarian/Specialist in state (state exam)
    - o I do not have any Environmental Health Specialist certifications
    - o Other Certifications _____

Survey with Authorship References: Environmental Health Specialists

Unless otherwise indicated, questions were developed solely by the researcher.

1. In the past year, approximately how many times have you marked a foodservice establishment out of compliance (OUT) for item 2-1A "Proper use of restriction and exclusion"?*

    - o 0 times
    - o 1 to 5 times
    - o 6 to 10 times
    - o More than 10 times

** Question developed with Cameron Wiggins, Food Service Program Director, Environmental Health Section, Georgia Department of Public Health*

2. Which of the following methods do you use to assess compliance of item 2-1A "Proper use of restriction and exclusion"? (Select all that apply)*

    - o Observation of employee behavior
    - o Interview employee(s)
    - o Interview manager
    - o Review Employee Health Policy
    - o None of the above
    - o Other _____

** Question developed with Chris Smith, Regional Retail Food Specialist, U.S. Food and Drug Administration*

3. During routine food safety inspections, how confident are you in your ability to accurately determine compliance of item 2-1A "Proper use of restriction and exclusion"?*

    - o Not confident/I need more training
    - o Somewhat confident/I need more practice
    - o Confident/I understand how to determine compliance
    - o Very Confident/I can teach this to others

** Question developed with Cameron Wiggins, Food Service Program Director, Environmental Health Section, Georgia Department of Public Health*

4. During routine food safety inspections, which (if any) of the following barriers interfere with your ability to assess compliance of item 2-1A "Proper use of restriction and exclusion"? (Select all that apply)

   - o Lack of time
   - o Exclude/Restrict Policy is difficult to assess
   - o Lack of cooperation on behalf of the Manager or Person In Charge
   - o It is difficult to determine if a food handler is sick
   - o Employees are not truthful about their health status
   - o Communication challenges with foodservice employees
   - o There are no barriers
   - o Other_____

** Question developed with Chris Smith, Regional Retail Food Specialist, U.S. Food and Drug Administration*

5. In the <u>past year</u>, approximately how many times have you marked a foodservice establishment out of compliance (OUT) for item 2-2A "Management awareness; policy present; reporting"?*

   - o 0 times
   - o 1 to 5 times
   - o 6 to 10 times
   - o More than 10 times

** Question developed with Cameron Wiggins, Food Service Program Director, Environmental Health Section, Georgia Department of Public Health*

6. Which of the following methods do you use to assess compliance of item 2-2A "Management awareness; policy present; reporting"? (Select all that apply)*

   - o Observation of employee behavior
   - o Interview employee(s)
   - o Interview manager
   - o Review Employee Health Policy
   - o None of the above
   - o Other _____

** Question developed with Chris Smith, Regional Retail Food Specialist, U.S. Food and Drug Administration*

7. During routine food safety inspections, how confident are you in your ability to accurately determine compliance of item 2-2A “Management awareness; policy present; reporting”?*

    - o Not confident/I need more training
    - o Somewhat confident/I need more practice
    - o Confident/I understand how to determine compliance
    - o Very Confident/I can teach this to others

** Question developed with Cameron Wiggins, Food Service Program Director, Environmental Health Section, Georgia Department of Public Health*

8. During routine food safety inspections, which (if any) of the following barriers interfere with your ability to assess compliance of item 2-2A “Management awareness; policy present; reporting”? (Select all that apply)*

    - o Lack of time
    - o Employee Health Policies are difficult to assess
    - o Lack of cooperation on behalf of the Manager or Person In Charge
    - o Communication challenges with foodservice employees
    - o There are no barriers
    - o Other_____

** Question developed with Chris Smith, Regional Retail Food Specialist, U.S. Food and Drug Administration*

9. Do you agree or disagree with the following statement? Within the foodservice industry, sick food handlers pose a significant threat to public health.

    - o Agree
    - o Disagree

10. To your knowledge, which of the following pathogens cause the most cases of foodservice associated foodborne illness?

    - o *Escherichia coli* O157:H7
    - o Norovirus
    - o *Bacillus cereus*
    - o *Salmonella* Enteritidis
    - o *Clostridium perfringens*

11. As compared to other food safety risk factors, to what degree do you feel sick food handlers are responsible for foodservice associated foodborne disease outbreaks?*

    - o Sick food handlers cause more outbreaks than other risk factors.
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    - o Sick food handlers cause fewer outbreaks than other risk factors.
    - o Sick food handlers never cause outbreaks.

** Question developed with Chris Smith, Regional Retail Food Specialist, U.S. Food and Drug Administration and Cameron Wiggins, Food Service Program Director, Environmental Health Section, Georgia Department of Public Health*

12. Approximately how long have you been an Environmental Health Specialist?

    - o Less than one year
    - o 1 – 2 years
    - o 3 – 5 years
    - o 6 – 10 years
    - o Over 10 years

13. As an Environmental Health Specialist, approximately how long have you conducted food safety inspections in Georgia?

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15. Which of the following certifications do you have? (Select all that apply)*

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    - o National Environmental Health Association (NEHA): Certified Professional - Food Safety
    - o National Restaurant Association (NRA): ServSafe® Food Safety Certification
    - o U.S. Food and Drug Administration (FDA): Certified Inspection/Training Officer
    - o Georgia Standardized Food Service Establishment Inspection Officer
    - o Registered Sanitarian/Specialist in state (state exam)
    - o I do not have any Environmental Health Specialist certifications
    - o Other Certifications _____

    ** Question developed with Chris Smith, Regional Retail Food Specialist, U.S. Food and Drug Administration*

Participation Request: Environmental Health Specialists

To: Environmental Health Specialists

From: Ellen Steinberg MS, RD, LD

Subject: Foodservice Worker Health Policies

Hello,

My name is Ellen Steinberg and I am a PhD candidate at the University of Georgia. I am conducting a research study entitled "Statewide evaluation of foodservice worker health policies in Georgia: Can policies be enforced and compliance measured?"

With your help, I hope to better understand your attitudes, beliefs, and practices specific to measuring compliance of foodservice worker health policies during routine food safety inspections. Participation is voluntary and will only require 10 – 15 minutes of your time to complete a brief on-line survey.

If you are willing to participate, please click the link below and you will be directed to the survey. Participants must be 18 years or older and be employed in the state of Georgia.

Please know, your time and effort is greatly appreciated.

Questions about this research should be addressed to Ellen Steinberg MS, RD, LD, at The University of Georgia, 328 Hoke Smith Annex, Athens, GA 30602; telephone (706) 583-0345; email ellenks@uga.edu.

This email message is an approved request for participation in research that has been approved by the University of Georgia Institutional Review Board (IRB).

APPENDIX D

Instruments for Foodservice Managers

Survey: Foodservice Managers

1. Does your establishment have an Employee Health Policy?

   - o Yes
   - o No
   - o I do not know

2. Does your establishment offer paid sick leave to employees?

   - o Yes
   - o No

3. At your last routine food safety inspection, what was the inspection score? _____

4. At your last routine food safety inspection, was your establishment marked in compliance (IN) or out of compliance (OUT) for item 2-1A “Proper use of restriction and exclusion”?

   - o IN
   - o OUT

5. At your last routine food safety inspection, was your establishment marked in compliance (IN) or out of compliance (OUT) for item 2-2A “Management awareness; policy present; reporting”?

   - o IN
   - o OUT

6. How does your establishment encourage employees to stay home if they are experiencing reportable symptoms (such as vomiting or diarrhea) or a reportable illness (such as Hepatitis A)? (Select all that apply)

   - o Offer paid sick leave
   - o Offer health insurance
   - o Have “on call” employees to cover shifts when someone calls out sick
   - o Maintain a non-threatening environment in which employees feel safe stating they are ill
   - o Have employees sign an agreement to inform management if they are ill
   - o No encouragement to stay home is provided
   - o Other _____

7. How does your establishment inform employees about the public health risk of working while experiencing reportable symptoms (such as vomiting or diarrhea) or a reportable illness (such as Hepatitis A)? (Select all that apply)

   - o Provide verbal education
   - o Provide written educational materials
   - o Discuss the Employee Health Policy
   - o Provide a written copy of the Employee Health Policy
   - o Display educational information (ex. Posters)
   - o No information is provided
   - o Other _____

8. Do you feel confident in your ability to determine if an employee is working while ill?

   - o Yes
   - o No

9. How confident are you in your ability to determine the appropriate course of action when dealing with a sick employee?

   - o Not confident/I need more training
   - o Somewhat confident/I need more practice
   - o Confident/I understand how to determine the appropriate course of action
   - o Very Confident/I can teach this to others

10. Do you agree or disagree with the following statement: Within the foodservice industry, sick food handlers pose a significant threat to public health.

    - o Agree
    - o Disagree

11. To your knowledge, which of the following pathogens cause the most cases of foodservice associated foodborne illness?

    - o *Escherichia coli* 0157:H7
    - o Norovirus
    - o *Bacillus cereus*
    - o *Salmonella* Enteritidis
    - o *Clostridium perfringens*

12. As compared to other food safety risk factors, to what degree do you believe sick food handlers are responsible for foodservice associated foodborne disease outbreaks?

    - o Sick food handlers cause more outbreaks than other risk factors.
    - o Sick food handlers cause the same number of outbreaks as other risk factors.
    - o Sick food handlers cause fewer outbreaks than other risk factors.
    - o Sick food handlers never cause outbreaks.

13. Are you a Certified Food Safety Manager?

- o Yes
- o No

13b. If the answer to the previous question is no: Is there a Certified Food Safety Manager employed at your establishment?

- o Yes
- o No

14. Which of the following best describes the foodservice establishment where you work?

- o Fast-food restaurant chain
- o Fast-food restaurant independently owned/operated
- o Full-service restaurant chain
- o Full-service restaurant independently owned/operated
- o School
- o Correctional Facility
- o Hospital or Extended Care Facility
- o Other _____

15. Which of the following best describes your role at the foodservice establishment where you work?

- o Owner/Operator
- o Regional Manager
- o Store/Cafeteria Manager
- o Shift Supervisor
- o Other: _____

16. In which county is your foodservice establishment? _____

17. On average, approximately how many customers do you serve per day?

- o Less than 100
- o 101 - 300
- o 301 – 500
- o 501 - 1000
- o Over 1000

Survey with Authorship References: Foodservice Managers

Unless otherwise indicated, questions were developed solely by the researcher.

1. Does your establishment have an Employee Health Policy?*

    - o Yes
    - o No
    - o I do not know

* *Question developed with Hal King, Director, Food and Product Safety, Chick-fil-A, Inc.*

2. Does your establishment offer paid sick leave to employees?*

    - o Yes
    - o No

* *Question developed with Hal King, Director, Food and Product Safety, Chick-fil-A, Inc.*

3. At your last routine food safety inspection, what was the inspection score? _____

4. At your last routine food safety inspection, was your establishment marked in compliance (IN) or out of compliance (OUT) for item 2-1A "Proper use of restriction and exclusion"?

    - o IN
    - o OUT

5. At your last routine food safety inspection, was your establishment marked in compliance (IN) or out of compliance (OUT) for item 2-2A "Management awareness; policy present; reporting"?

    - o IN
    - o OUT

6. How does your establishment encourage employees to stay home if they are experiencing reportable symptoms (such as vomiting or diarrhea) or a reportable illness (such as Hepatitis A)? (Select all that apply)*

    - o Offer paid sick leave
    - o Offer health insurance
    - o Have "on call" employees to cover shifts when someone calls out sick
    - o Maintain a non-threatening environment in which employees feel safe stating they are ill
    - o Have employees sign an agreement to inform management if they are ill
    - o No encouragement to stay home is provided
    - o Other _____

** Question developed with Chris Smith, Regional Retail Food Specialist, U.S. Food and Drug Administration*

7. How does your establishment inform employees about the public health risk of working while experiencing reportable symptoms (such as vomiting or diarrhea) or a reportable illness (such as Hepatitis A)? (Select all that apply)*

    - o Provide verbal education
    - o Provide written educational materials
    - o Discuss the Employee Health Policy
    - o Provide a written copy of the Employee Health Policy
    - o Display educational information (ex. Posters)
    - o No information is provided
    - o Other _____

** Question developed with Chris Smith, Regional Retail Food Specialist, U.S. Food and Drug Administration*

8. Do you feel confident in your ability to determine if an employee is working while ill?

    - o Yes
    - o No

9. How confident are you in your ability to determine the appropriate course of action when dealing with a sick employee?*

    - o Not confident/I need more training
    - o Somewhat confident/I need more practice
    - o Confident/I understand how to determine the appropriate course of action
    - o Very Confident/I can teach this to others

** Question developed with Cameron Wiggins, Food Service Program Director, Environmental Health Section, Georgia Department of Public Health*

10. Do you agree or disagree with the following statement: Within the foodservice industry, sick food handlers pose a significant threat to public health.

    - o Agree
    - o Disagree

11. To your knowledge, which of the following pathogens cause the most cases of foodservice associated foodborne illness?

- o *Escherichia coli* 0157:H7
- o Norovirus
- o *Bacillus cereus*
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12. As compared to other food safety risk factors, to what degree do you believe sick food handlers are responsible for foodservice associated foodborne disease outbreaks?*

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- o Sick food handlers cause the same number of outbreaks as other risk factors.
- o Sick food handlers cause fewer outbreaks than other risk factors.
- o Sick food handlers never cause outbreaks.

* *Question developed with Chris Smith, Regional Retail Food Specialist, U.S. Food and Drug Administration and Cameron Wiggins, Food Service Program Director, Environmental Health Section, Georgia Department of Public Health*

13. Are you a Certified Food Safety Manager?*

- o Yes
- o No

13b. If the answer to the previous question is no: Is there a Certified Food Safety Manager employed at your establishment?*

- o Yes
- o No

* *Question developed with Chris Smith, Regional Retail Food Specialist, U.S. Food and Drug Administration and Hal King, Director, Food and Product Safety, Chick-fil-A, Inc.*

14. Which of the following best describes the foodservice establishment where you work?*

- o Fast-food restaurant chain
- o Fast-food restaurant independently owned/operated
- o Full-service restaurant chain
- o Full-service restaurant independently owned/operated
- o School
- o Correctional Facility
- o Hospital or Extended Care Facility
- o Other _____

** Question developed with Chris Smith, Regional Retail Food Specialist, U.S. Food and Drug Administration*

15. Which of the following best describes your role at the foodservice establishment where you work?

    - o Owner/Operator
    - o Regional Manager
    - o Store/Cafeteria Manager
    - o Shift Supervisor
    - o Other: _____

16. In which county is your foodservice establishment? _____

17. On average, approximately how many customers do you serve per day?

    - o Less than 100
    - o 101 - 300
    - o 301 – 500
    - o 501 - 1000
    - o Over 1000

Participation Request: Foodservice Managers

To: Foodservice Managers

From: Ellen Steinberg MS, RD, LD

Subject: Foodservice Worker Health Policies

Hello,

My name is Ellen Steinberg and I am a PhD candidate at the University of Georgia. I am conducting a research study entitled "Statewide evaluation of foodservice worker health policies in Georgia: Can policies be enforced and compliance measured?"

With your help, I hope to better understand your attitudes, beliefs, and practices specific to enforcing foodservice worker health policies. Participation is voluntary and will only require 10 – 15 minutes of your time to complete a brief on-line survey.

If you are willing to participate, please click the link below and you will be directed to the survey. Participants must be 18 years or older and be employed in the state of Georgia.

Please know, your time and effort is greatly appreciated.

Questions about this research should be addressed to Ellen Steinberg MS, RD, LD, at The University of Georgia, 328 Hoke Smith Annex, Athens, GA 30602; telephone (706) 583-0345; email ellenks@uga.edu.

This email message is an approved request for participation in research that has been approved or declared exempt by the University of Georgia Institutional Review Board (IRB).

APPENDIX E

Participant Consent Script

This consent script appeared on the initial screen of the manager and EHS online surveys.

Thank you for agreeing to participate in this study entitled **Statewide Evaluation of Foodservice Worker Health Policies in Georgia: Can Policies be Enforced and Compliance Measured?** This research is being conducted by Ellen Steinberg MS, RD, LD, a PhD candidate at The University of Georgia, to fulfill the requirements for Doctoral Dissertation Research.

The purpose of this survey is to help us understand how foodservice worker health policies are enforced by foodservice managers and how compliance of these policies is measured by Environmental Health Specialists. As such, this project will provide beneficial information which can be used to design more effective foodservice worker health policies that can be implemented, enforced, and monitored.

Your participation will involve completing this survey and should only take approximately 10-15 minutes of your time. Your participation is voluntary. You may choose not to participate or to stop participating at anytime without penalty or loss of benefits to which you are otherwise entitled.

> There are no known risks or discomforts associated with this research. Your participation will be confidential and no individually identifiable information will be collected with your responses. Only the Principal Investigator and one academic advisor will have access to the raw data; no information that will personally identify any responses will published with the survey results. Internet communications are insecure and there is a limit to the confidentiality that can be guaranteed due to the technology itself. Once the information is received by the researcher, standard confidentiality procedures will be employed.

If you have any questions about the research, please contact the researcher conducting this study, Ellen Steinberg MS, RD, LD, at The University of Georgia, 328 Hoke Smith Annex, Athens, GA 30602; telephone (706) 583-0345; email ellenks@uga.edu. Questions or concerns about your rights as a research participant should be directed to The Chairperson, University of Georgia Institutional Review Board, 629 Boyd GSRC, Athens, Georgia 30602-7411; telephone (706) 542-3199; email address irb@uga.edu.

By completing this survey you are confirming that you are 18 years or older, employed in the state of Georgia and are agreeing to participate in the above described research project.

Begin Survey

APPENDIX F

Summary Data and Test Statistics for Chi-square Analyses

The following data and test statistics are an expansion of the data presented in Chapter III (Georgia Foodservice Inspection Reports and Compliance of Employee Health Policies). The Chi-square test was used to conduct bivariate analyses to determine if non-compliance of item 2-2A "Management awareness; policy present; reporting" was associated with the following violations regarding personal hygiene: 2-1B "Hands clean and properly washed"; 2-1C "No bare hand contact with ready-to-eat foods or approved alternate method properly followed"; and 2-2D "Adequate handwashing facilities supplied & accessible." P-values ≤ .05 were considered statistically significant.

2-2A "Management awareness; policy present; reporting" and 2-1B "Hands clean and properly washed"

Table of 2-2A by 2-1B

2-2A	2-1B		
	No	**Yes**	**Total**
No	27106 97.01	835 2.99	27941
Yes	168 86.6	26 13.4	194
Total	27274	861	28135

Statistic	DF	Value	P-value
Chi-Square	1	70.4275	<.0001

2-2A "Management awareness; policy present; reporting"
and 2-2D "Adequate handwashing facilities supplied & accessible"

Table of 2-2A by 2-2D			
2-2A	**2-2D**		
	No	**Yes**	**Total**
No	24982	2959	27941
	89.41	10.59	
Yes	134	60	194
	69.07	30.93	
Total	25116	3019	28135

Statistic	**DF**	**Value**	**P-value**
Chi-Square	1	83.1915	<.0001

2-2A "Management awareness; policy present; reporting"
and 2-1C "No bare hand contact with ready-to-eat foods"

Table of 2-2A by 2-1C			
2-2A	**2-1C**		
	No	**Yes**	**Total**
No	27406	535	27941
	98.09	1.91	
Yes	180	14	194
	92.78	7.22	
Total	27586	549	28135

Statistic	**DF**	**Value**	**P-value**
Chi-Square	1	28.3053	<.0001

APPENDIX G

Summary Data and Test Statistics for Gamma Analyses

The following data and test statistics are an expansion of the data presented in Chapter IV (Environmental Health Specialists and Evaluation of Employee Health Policies) and Chapter V (Foodservice Managers and Enforcement of Employee Health Policies). In Chapter IV, the gamma test was used to measure associations among survey responses of EHS related to confidence, years of experience and frequency of marking items 2-1A and 2-2A out of compliance. In Chapter V, the gamma test was used to measure associations among survey responses of foodservice managers related to certification status, knowledge of norovirus, and confidence in dealing with sick employees. Also, associations between EHS and managers' responses were analyzed. For all tests, P-values $\leq .05$ were considered statistically significant.

Environmental Health Specialists (EHS) Data

The following analysis compares self-reported frequency of marking item 2-1A out of compliance (Q1) with EHS confidence in his or her ability to determine compliance (Q3).

Q1. In the past year, approximately how many times have you marked a foodservice establishment out of compliance (OUT) for item 2-1A "Proper use of restriction and exclusion"?

Q3. During routine food safety inspections, how confident are you in your ability to accurately determine compliance of item 2-1A "Proper use of restriction and exclusion"?

Table of Q1 by Q3					
Q1	**Q3**				
	Not confident	**Somewhat confident**	**confident**	**Very confident**	**Total**
0 time	5	42	55	11	113
	4.42	37.17	48.67	9.73	
>0 times	2	18	22	14	56
	3.57	32.14	39.29	25	
Total	7	60	77	25	169

Frequency Missing = 29

Statistic	**Value**	**ASE**	**95%**		**P-value**
			Confidence Limits		
Gamma	0.2158	0.134	-0.0468	0.4784	0.1073

Q1 and Q3 in the EHS data have a positive association, but this association is not significant at the 5% level.

The following analysis compares self-reported frequency of marking item 2-2A out of compliance (Q5) with EHS confidence in his or her ability to determine compliance (Q7).

Q5. In the past year, approximately how many times have you marked a foodservice establishment out of compliance (OUT) for item 2-2A “Management awareness; policy present; reporting”?

Q7. During routine food safety inspections, how confident are you in your ability to accurately determine compliance of item 2-2A “Management awareness; policy present; reporting”?

Table of Q5 by Q7					
Q5	**Q7**				
	Not confident	**Somewhat confident**	**Confident**	**Very confident**	**Total**
0 time	2	28	28	7	65
	3.08	43.08	43.08	10.77	
1-5 times	1	15	39	18	73
	1.37	20.55	53.42	24.66	
>5 times	0	4	7	15	26
	0	15.38	26.92	57.69	
Total	3	47	74	40	164

Frequency Missing = 34

Statistic	**Value**	**ASE**	**95%**		**P-value**
			Confidence Limits		
Gamma	0.5054	0.0928	0.3234	0.6873	5.1480E-08

The association between Q5 and Q7 is positive and the association is significant at the 5% level.

The following analysis compares EHS confidence in his or her ability to determine compliance of item 2-1A (Q3) with the length of time the EHS has conducted inspections in Georgia (Q13).

Q3. During routine food safety inspections, how confident are you in your ability to accurately determine compliance of item 2-1A “Proper use of restriction and exclusion”?

Q13. As an Environmental Health Specialist, approximately how long have you conducted food safety inspections in Georgia?

Table of Q3 by Q13					
Q3	**Q13**				
	<1 year	**1-2 years**	**3-5 years**	**6-10 years**	**>10 years**
Not confident	1	1	1	0	4
	14.29	14.29	14.29	0	57.14
Somewhat confident	4	6	5	21	22
	6.9	10.34	8.62	36.21	37.93
Confident	1	6	7	29	33
	1.32	7.89	9.21	38.16	43.42
Very Confident	2	4	3	6	9
	8.33	16.67	12.5	25	37.5
Total	8	17	16	56	68

Frequency Missing = 33

Statistic	**Value**	**ASE**	**95%**		**P-value**
			Confidence Limits		
Gamma	0.0034	0.1106	-0.2134	0.2202	0.9755

The association between Q3 and Q13 is positive, but this association is not significant at the 5% level.

The following analysis compares EHS confidence in his or her ability to determine compliance of item 2-2A (Q7) with the length of time the EHS has conducted inspections in Georgia (Q13).

Q7. During routine food safety inspections, how confident are you in your ability to accurately determine compliance of item 2-2A “Management awareness; policy present; reporting”?

Q13. As an Environmental Health Specialist, approximately how long have you conducted food safety inspections in Georgia?

Table of Q7 by Q13					
Q7	**Q13**				
	<1 year	**1-2 years**	**3-5 years**	**6-10 years**	**>10 years**
Not confident	1	1	1	0	0
	33.33	33.33	33.33	0	0
Somewhat confident	2	5	5	13	22
	4.26	10.64	10.64	27.66	46.81
Confident	4	6	3	28	33
	5.41	8.11	4.05	37.84	44.59
Very confident	1	5	7	15	11
	2.56	12.82	17.95	38.46	28.21
Total	8	17	16	56	66

Frequency Missing = 35

Statistic	**Value**	**ASE**	**95%**		**p-value**
			Confidence Limits		
Gamma	-0.0726	0.104	-0.2764	0.1312	0.4851

The association between Q7 and Q13 is negative, but this association is not significant at the 5% level.

Manager Data

The following analysis compares school nutrition managers' knowledge of norovirus (Q11) with managers' certification status (Q13).

Q11. To your knowledge, which of the following pathogens cause the most cases of foodservice associated foodborne illness?

Q 13. Are you a Certified Food Safety Manager?

Table of Q13 by Q11			
Q13	**Q11**		
	Incorrect	**Correct**	**Total**
Yes	64	47	111
	57.66	42.34	
No	7	9	16
	43.75	56.25	
Total	71	56	127

Frequency Missing = 5

Statistic	**Value**	**ASE**	**95%**		**P-value**
			Confidence Limits		
Gamma	0.2729	0.2496	-0.2162	0.7621	0.2742

The association between Q11 and Q13 is positive, but this association is not significant at the 5% level.

The following analysis compares school nutrition managers' confidence in dealing with sick employees (Q9) with managers' certification status (Q13)

Q9. How confident are you in your ability to determine the appropriate course of action when dealing with a sick employee?

Q13. Are you a Certified Food Safety Manager?

Table of Q9 by Q13			
Q9	**Q13**		
	Yes	**No**	**Total**
Somewhat Confident	9	3	12
	75	25	
Confident	76	9	85
	89.41	10.59	
Very confident	28	4	32
	87.5	12.5	
Total	113	16	129

Frequency Missing = 3

Statistic	**Value**	**ASE**	**95% Confidence Limits**		**P-value**
Gamma	-0.1452	0.2658	-0.6661	0.3757	0.5849

The association between Q9 and Q13 is negative, but this association is not significant at the 5% level.

Comparisons between EHS and Managers

The following analysis compares the number of correct responses between EHS and school nutrition managers regarding the following question:

"To your knowledge, which of the following pathogens cause the most cases of foodservice associated foodborne illness?"

	Data		
	EHS	**Mngr**	**Total**
Incorrect	29	72	101
	28.71	71.29	
Correct	139	56	195
	71.28	28.72	
Total	168	128	296

Frequency Missing = 34

Statistic	**Value**	**ASE**	**95%**		**P-value**
			Confidence Limits		
Gamma	-0.7208	0.0651	-0.8484	-0.5932	1.7115E-28

The association between EHS and manager data are highly negative, and this association is significant at the 5% level.

The following analysis compares the responses of EHS and school nutrition managers to the Following question: "As compared to other food safety risk factors, to what degree do you feel sick food handlers are responsible for foodservice associated foodborne disease outbreaks?"

Q11	Data		
	EHS	**Mngr**	**Total**
More outbreaks	100	49	149
	67.11	32.89	
Same number	44	51	95
	46.32	53.68	
fewer outbreaks	21	31	52
	40.38	59.62	
Total	165	131	296

Statistic	**Value**	**ASE**	**95%**		**P-value**
			Confidence Limits		
Gamma	0.3841	0.0873	0.2129	0.5552	1.0837E-05

The association between EHS and manager responses is positive and this association is significant at the 5% level.

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