

FOOD RECALL ATTITUDES AND BEHAVIORS OF
SCHOOL FOODSERVICE DIRECTORS

by

AMBER A. GRISAMORE

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Approved by:

Major Professor
Dr. Kevin R. Roberts

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Abstract

The purpose of this study was to explore United States school foodservice directors' attitudes about food recalls and to determine recall practices in school foodservice operations. An online survey was used for data collection and consisted of three sections: attitudes, self-reported behaviors, and demographics. Content validity of the instrument was measured by three experts who examined the survey prior to pilot testing. The survey was pilot tested with 14 school foodservice directors and state agency personnel. Statistical analysis was completed using SPSS (v. 20.0). Internal consistency of the attitude scale was measured using Cronbach's Alpha. All scales had a reliability coefficient greater than 0.70.

The survey was randomly distributed to 4,049 school foodservice directors across the U.S. A total of 690 school foodservice directors (17%) completed the survey, with 567 being usable. Respondents rated attitudes on a 5-point scale, strongly disagree (1) to strongly agree (5). Principle components factor analysis was used to identify two factors: perceived importance and perceived likelihood of possessing a recalled product. Perceived importance was rated very high ($M=4.8$, $SD=0.5$), while perceived likelihood of possessing a recalled product was rated much lower ($M=1.7$, $SD=0.8$). Self-reported behaviors were evaluated on a 5-point scale, never (1) to very often (5). Overall, respondents reported positive behaviors related to responding to a recall. When dividing behaviors into three factors, behaviors regarding communication with state agency and vendors about food recalls ($M=4.1$, $SD=0.6$), use of recall systems ($M=3.6$, $SD=1.0$), and practices of responding to a recall ($M=4.7$, $SD=0.4$) were frequently reported.

Multiple regression analysis was used to explore relationships between attitudes and behaviors of school foodservice directors towards food recalls, and their demographic

characteristics. Predictors of attitudes were found to be certification, work experience, and prior experience with a food recall. Predictors of behaviors were found to be perceived likelihood of possessing a recalled product, educational level, prior experience with a food recall, and size of district. Federal and state agency personnel can use the results of this study in developing programs to improve food recall practices as well as school foodservice directors for improving recall practices in schools.

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Dedication

I am dedicating this thesis to my son, Carter Willis Grisamore. You inspired me during this entire project. You have been so understanding to share my time and attention. I hope to make as much of a difference in your life as you have made in mine. I love you so much.

Chapter 1 - Introduction

There is an estimated 31.8 million lunches served daily in the United States (U.S.) through the National School Lunch Program (U.S. Department of Agriculture [USDA] Food and Nutrition Service [FNS], 2011a). As part of their participation in the National School Lunch Program, schools are offered the opportunity to receive foods through USDA (USDA FNS, 2011a). USDA Foods account for 15% to 20% of the food served in schools (USDA FNS, 2011b), while the remainder is purchased through the commercial market. With the sheer volume of food served in schools, a food recall could have a significant impact on the safety of food served to children.

A food recall is the voluntary process where manufacturers and distributors remove food products from the market that may violate U.S. Food and Drug Administration (FDA) or USDA regulations to protect consumers from potentially harmful products (USDA Food Safety and Inspection Service [FSIS], 2011; FDA Enforcement Policy Rule, 2000). While recalls are considered voluntary, bad press and potential liability often encourage the manufacturer or distributor to issue a recall (Gallozzi, Guggenheim, Charlton, Squires, & Pruitt, 2012). Recalls can be initiated by the manufacturer, distributor, or through the courts by the regulatory agency responsible for ensuring the safety of the product (FDA Enforcement Policy Rule, 2000). Meat, poultry, and processed egg product are regulated by the FSIS (USDA FSIS, 2011). All other products are regulated by the FDA (USDA FSIS, 2011).

There are three classes of food recalls outlined by USDA FSIS (2011). FDA uses a similar classification system (FDA, 2009a). A Class I recall is used for products for which consumption is likely to cause adverse health effects or death (USDA FSIS, 2011). A Class II

recall is for products that have the potential to cause adverse health effects after consumption (USDA FSIS, 2011). A Class III recall is used for products that will not cause adverse health effects after consumption, but does not meet company standards (USDA FSIS, 2011). In 2011, 62% of FSIS food recalls consisted of Class I recalls, 27% were Class II recalls, and only 11% were classified as a Class III recall (USDA FSIS, 2012e, 2012j).

During 2011, manufacturers issued 390 food recalls, including expanded recalls and market withdrawals. The five most common reasons for food recalls in 2011 included undeclared allergens (39%), *Salmonella* (17%), *Listeria monocytogenes* (15%), other (12%), and misbranding (5%). Other reasons for initiating a recall included extraneous material, processing defect, *Escherichia coli* (*Escherichia coli* O157:H7 and *Escherichia coli* 0145), decomposition and elevated histamine levels, *Staphylococcus aureus*, and both *Listeria monocytogenes* and *Staphylococcus aureus* (USDA FSIS, 2012e; USDA FSIS, 2012j; FDA, 2012f).

During 2007 to 2011, a total of 1,960 recalls occurred. Of these, 24% were due to undeclared allergens (USDA FSIS, 2012a, 2012b, 2012c, 2012d, 2012e, 2012f, 2012g, 2012h, 2012i, 2012j; FDA, 2012b, 2012c, 2012d, 2012e, 2012f). Given that Nowak-Wegrzyn, Conover-Walker, and Wood (2001) reported that 86% of schools surveyed had more than one child with a food allergy, the potential risk to school children due to recalled foods is evident.

During this 2007 to 2011 period, some of the largest recalls occurred. *Salmonella* was the reason for 42% of these recalls, with almost three quarters of those recalls occurring in 2009 (USDA FSIS, 2012a, 2012b, 2012c, 2012d, 2012e, 2012f, 2012g, 2012h, 2012i, 2012j; FDA, 2012b, 2012c, 2012d, 2012e, 2012f). During 2009, one of the largest recalls in U.S. history occurred due to *Salmonella* contamination at a peanut processor (Gallozzi et al., 2012). According to the Centers for Disease Control and Prevention (CDC) (2009a), 714 cases of

Salmonella were associated with the recall. There were at least 2,833 products connected to the recalled peanut products (CDC, 2009a).

Recalls will occur and are necessary to minimize the potential impact if an unsafe food is released on the market for public consumption (Gallozzi et al., 2012). The best defense against a recall is increased traceability (Gallozzi et al., 2012). Traceability uses identification and record keeping to obtain information on a product during any part of its processing, providing the capability to know exactly what product needs to be removed during a recall (Gallozzi et al., 2012; Olsen & Borit, 2012). Traceability of food products can be difficult due to factors such as further processing and batch separation (Saltini & Akkerman, 2012; Skoglund & Dejmek, 2007). There is also a need for improved traceability of spices and flavoring products (Donnelly, Karlsen, & Olsen, 2009).

Recalls can also have an impact on consumer buying decisions (Steelfisher, Weldon, Benson, & Blendon, 2010). In 2008, 71% of consumers avoided recalled foods. During the 2009 peanut product recall, 25% of consumers checked for peanut ingredients before purchasing food at the grocery store, and 41% stopped eating at least some foods containing the recalled peanut products (Steelfisher et al., 2010). Consumers often avoid all products of the type being recalled, not just the specific recalled brands or lot numbers. While past research has been consumer focused, there is a need to look at food recalls in school foodservice operations.

There are several formal notification systems in place for both USDA Foods and foods on the commercial market, such as Recalls.gov, FoodSafety.gov, and the USDA/FNS Commodity Alert System. School foodservice directors are notified about recalls for USDA Foods through USDA or state agency channels (USDA FSIS, 2011). While notifications for the other 80% to 85% of commercial foods purchased are sent from the vendor or media sources (National Food

Service Management Institute, n.d.). However, attitudes and behaviors of school foodservice directors in relation to food recalls have not been explored.

Justification

In the U.S., more than 31.8 million lunches are served daily through the National School Lunch Program. Should recalled product be handled inappropriately, the possibility for severe consequences is great (USDA FNS, 2011a). Previous research concerning food recalls has been consumer focused. There are several systems in place for both USDA food recalls and commercial food recalls; examining attitudes about recalls and behaviors, including the use of these systems by school foodservice directors, to further develop the recall process in schools is needed.

Purpose

The purpose of this study was to explore school foodservice directors' attitudes and behaviors about food recalls. This study evaluated variables that influenced attitudes and behaviors of school foodservice directors toward food recalls.

Research Questions

1. What is school foodservice directors' level of confidence in responding to a recall?
2. Is there a relationship between food recall attitudes and response behaviors?
3. Is there a relationship between operational demographics of school district size or number of children with food allergies in the district and food recall attitudes and behaviors of school foodservice directors?

4. Is there a relationship between individual demographics of prior experience with a food recall, completion of food safety certification, educational level, or work experience and food recall attitudes and behaviors of school foodservice directors?
5. How many school foodservice directors are signed up for Recalls.gov, FoodSafety.gov, and USDA/FNS Commodity Alert System?

Significance of Study

A large number of food recalls occur in any given year. The attitudes of school foodservice directors towards recalls may have an effect on their response to a food recall. Therefore, an analysis of school foodservice directors' food recall attitudes will assist federal and state agencies in developing programs to improve food recall practices. There is a lack of research regarding the handling of food recalls in schools. Therefore, this study will be beneficial for improving practices and possible outcomes for children.

Limitations of Study

This study focuses on food recalls in school foodservice operations. Because other commercial foodservice operations were not examined in this study, recommendations can only be made for better food recall practices in schools. A limited sample size may not represent all school foodservice directors in the U.S. The response rate was less than 100% and respondents may differ from non-respondents.

Definition of Terms

Food Recall – The process for voluntarily removing a food product from commerce for reasons of contamination, adulteration, or misbranding (USDA FSIS, 2011).

National School Lunch Program – A meal program that provides healthy, free or reduced price lunches to children each school day (USDA FNS, 2011a).

State Distributing Agency (SDA) – Agency responsible for administering Food Distribution Programs and communicating with SFAs during a recall (“USDA Commodity,” 2001).

School Food Authority (SFA) – Person responsible for overseeing food distributed to a school district (National Food Service Management Institute, n.d.).

Regulatory Agency – Agency responsible for the safety of a product. FSIS regulates meat, poultry, and egg products, while FDA regulates all other products (“USDA Commodity,” 2001).

Processor – Company that further processes a food ingredient into another food item (“USDA Commodity,” 2001).

Chapter 2 - Review of Literature

More than 31.8 million lunches are served daily in the United States (U.S.) through the National School Lunch Program (USDA Food and Nutrition Service [FNS], 2011a).

Participation in the National School Lunch Program allows schools to receive U.S. Department of Agriculture (USDA) Foods, which account for 15% to 20% of all food served (USDA FNS 2011a, 2011b). The other 80% to 85% of foods are purchased through the commercial market (National Food Service Management Institute, n.d.). With a large number of children being served daily, a recalled food product served through the National School Lunch Program could impact a large number of children. Serving recalled products in schools could expose children to pathogens or allergens that could be harmful.

Foodborne Illness

Each year 9.4 million foodborne illnesses occur in the U.S. due to 31 major pathogens, resulting in 55,961 hospitalizations and 1,351 deaths (Scallan et al., 2011). Norovirus was responsible for the most (58%) illnesses and nontyphoidal *Salmonella* ssp. was responsible for the most hospitalizations (35%) and deaths (28%) (Scallan et al., 2011). Hoffmann, Batz, and Morris (2012) explored the cost of the 14 most common foodborne pathogens. Among these, nontyphoidal *Salmonella* and *Toxoplasma gondii* had the highest annual mean costs at \$3.3 and \$3.0 billion, respectively. *Listeria monocytogenes* had the third highest cost, with an annual mean cost of \$2.6 billion (Hoffmann et al., 2012). Hoffmann et al. estimated the mean cost of these 14 pathogens to exceed \$14 billion yearly. These pathogens account for a significant number of food recalls annually.

Food Recalls

A food recall is the voluntary process used by manufacturers and distributors to remove food products from the market that may violate U.S. Food and Drug Administration (FDA) or USDA regulations. Recalls are done to protect consumers from potentially harmful products (USDA Food Safety and Inspection Service [FSIS], 2011; FDA Enforcement Policy Rule, 2000).

Recalls can be initiated by the manufacturer, distributor, or through the courts by the regulatory agency responsible for overseeing the safety of a particular product (FDA Enforcement Policy Rule, 2000). Meat, poultry, and processed egg products are regulated by FSIS within the USDA (USDA FSIS, 2011). All other products are regulated by the FDA (USDA FSIS, 2011).

Classes of Recalls

Both USDA and FDA have their own definitions for the classifications of a food recall. While each set of classifications is unique, both have very similar characteristics. This study focuses on the National School Lunch Program and because USDA oversees this program, USDA classifications of food recalls will be utilized for this study. Recalls are categorized on a three-class system, and can be defined as follows:

Class I

A Class I recall is used when a food product is likely to cause adverse health effects or death after consumption (USDA FSIS, 2011). In 2011, a Class I recall was issued when 144,633 pounds of frozen meat and poultry tamale products were recalled because whey, an undeclared allergen, was not included on the label (USDA FSIS, 2012e). Another Class I recall in 2011 was

initiated for 36 million pounds of ground turkey products that may have been contaminated with *Salmonella* Heidelberg (USDA FSIS, 2012e).

Class II

A Class II recall is used when a food product has the potential to cause adverse health effects after consumption (USDA FSIS, 2011). In 2011, a Class II recall was issued for 161,000 pounds of frozen stuffed pasta products that were produced without a federal inspection (USDA FSIS, 2012e). Another 2011 Class II recall was initiated for 131,000 pounds of pizza products that did not include “wheat,” an undeclared allergen, on the label (USDA FSIS, 2012e).

Class III

A Class III recall is used when a food product contains an adulterant, but consumption will not cause adverse health effects (USDA FSIS, 2011). In 2011, a Class III recall was initiated for 1,642 pounds of ground beef products because blue plastic pieces were found by a consumer in the product (USDA FSIS, 2012e). Also in 2011, a food preservative, sodium benzoate, was not included on the label of 8,888 frozen meat and poultry pie products, which resulted in a Class III recall (USDA FSIS, 2012e).

Causes of Recalls

There are several reasons for initiating a food recall. Table 2.1 presents the most common reasons for recalls during the years 2007 to 2011 (USDA FSIS, 2012a, 2012b, 2012c, 2012d, 2012e, 2012f, 2012g, 2012h, 2012i, 2012j; FDA, 2012b, 2012c, 2012d, 2012e, 2012f). This table was compiled by tallying each recall that occurred, including expanded recalls and

Table 2.1. Number of FSIS and FDA Food Recalls: 2007 – 2011

Reason	2007		2008		2009		2010		2011		Total
	FDA	FSIS	FDA	FSIS	FDA	FSIS	FDA	FSIS	FDA	FSIS	
Undeclared allergen	63	12	64	7	71	13	67	14	113	41	465
Misbranding ^b	25	2	33	--	18	5	15	2	10	8	118
<i>Listeria monocytogenes</i> (<i>L. monocytogenes</i>)	22	12	14	15	24	8	32	8	48	12	195
<i>Salmonella</i>	15	1	22	--	605	6	103	6	53	12	823
Other ^a	12	2	9	10	14	16	9	15	29	16	132
Processing defect	10	6	10	--	2	--	6	3	9	1	47
Extraneous material	9	2	6	5	2	5	2	5	10	5	51
<i>Escherichia coli</i> (<i>E. coli</i>) ^c	1	25	1	20	2	16	9	17	4	14	109
<i>Staphylococcus aureus</i> (<i>S. aureus</i>)	1	1	1	--	--	--	3	--	1	1	8
<i>Shigella</i>	1	--	--	--	--	--	--	--	--	--	1
Decomposition and elevated histamine levels	--	--	--	--	1	--	2	--	2	--	5
<i>L. monocytogenes</i> and <i>S. aureus</i>	--	--	--	--	--	--	2	--	1	--	3
Undeclared allergen and <i>L. monocytogenes</i>	--	--	--	--	--	--	1	--	--	--	1
<i>L. monocytogenes</i> and <i>E. coli</i>	--	--	--	--	--	--	2	--	--	--	2
Total	159	63	160	57	739	69	253	70	280	110	1960
Yearly Total	222		217		808		323		390		

^aOther includes adulteration, manufacturing defect, norovirus, labeling issues, chemicals, residue, unviscerated fish, ineligible import, lack of inspection, lack of HACCP verification, specified risk material, and chronic wasting disease.

^bMisbranding includes undeclared ingredients such as sulfites, other preservatives, and other non-allergens.

^c*Escherichia coli* includes *Escherichia coli* O157:H7 and *Escherichia coli* O145.

Note. For the purposes of this study market withdraws, voluntary recalls, and notifications were recorded as a recall when not duplicated. Only expanded recalls were recorded in addition to the initial recall. These food recalls do not include vitamins, dietary supplements, pills, pet food, or animal feed. Data was pulled from the following citations: USDA FSIS, 2012a, 2012b, 2012c, 2012d, 2012e, 2012f, 2012g, 2012h, 2012i, 2012j; FDA, 2012b, 2012c, 2012d, 2012e, 2012f.

market withdrawals, and grouping them into 14 different categories. Vitamins, dietary supplements, pills, pet food, and animal feed were not included in the tabulated results. Expanded recall and market withdrawals were included to encompass the number of times that school food service directors need to check or remove product from their shelves.

Recalls were classified as an undeclared allergen if the recalled product were mislabeled, where at least one of the missing ingredients contained a major allergen. Undeclared allergens accounted for 24% of total recalls during the years 2007 to 2011. Recalls due to *Salmonella* included all types and infections caused by *Salmonella* and totaled 42% of all recalls during the years 2007 to 2011. *Listeria monocytogenes* recalls, including listeriosis, totaled 10% of all recalls during the years 2007 to 2011 (USDA FSIS, 2012a, 2012b, 2012c, 2012d, 2012e, 2012f, 2012g, 2012h, 2012i, 2012j; FDA, 2012b, 2012c, 2012d, 2012e, 2012f).

The “other” category included several miscellaneous recalls. These included adulteration, manufacturing defect, norovirus, labeling issues such as how to use the product, chemicals, residue, uneviscerated fish, ineligible import, lack of inspection, lack of HACCP verification, specified risk material, and chronic wasting disease (USDA FSIS, 2012a, 2012b, 2012c, 2012d, 2012e, 2012f, 2012g, 2012h, 2012i, 2012j; FDA, 2012b, 2012c, 2012d, 2012e, 2012f).

There were three categories for recalls where more than one reason was identified as the cause of the recall. *L. monocytogenes* and *S. aureus*, undeclared allergen and *L. monocytogenes*, and *L. monocytogenes* and *E. coli* were classified as pairs (USDA FSIS, 2012a, 2012b, 2012c, 2012d, 2012e, 2012f, 2012g, 2012h, 2012i, 2012j; FDA, 2012b, 2012c, 2012d, 2012e, 2012f).

In 2011, 390 food recalls were issued by the manufacturers (USDA FSIS, 2012e, 2012j; FDA, 2012f). The most common reasons for initiating the recall included undeclared allergens

(39%), *Salmonella* (17%), and *L. monocytogenes* (15%) (USDA FSIS, 2012e, 2012j; FDA, 2012f). Undeclared allergens and *Salmonella* make up nearly two thirds of the total recalls over the years 2007 to 2011. A significantly greater number of recalls occurred in 2009 than in any of the years from 2007 to 2011 tallied with 41% of the total from 2009 (USDA FSIS, 2012a, 2012b, 2012c, 2012d, 2012e, 2012f, 2012g, 2012h, 2012i, 2012j; FDA, 2012b, 2012c, 2012d, 2012e, 2012f). The higher number of recalls in 2009 was a result of a large *Salmonella* Typhimurium outbreak traced back to products containing peanuts (Centers for Disease Control and Prevention [CDC], 2009a).

Outbreaks

Outbreaks associated with recalled foods can affect a large number of people. Significant outbreaks from 2007 through 2012 have been examined. In April 2012, an outbreak of Shiga toxin-producing *E. coli* O145 occurred in nine states (CDC, 2012c). This outbreak, caused by an unidentified source, affected 18 people, resulted in four hospitalizations and one death, and could not be traced back to a specific product (CDC, 2012c). An outbreak of *Listeria monocytogenes*, caused by ricotta salata cheese, affected 22 people, resulting in four deaths and one miscarriage (CDC, 2012a). Of the four deaths reported, at least two were contributed to listeriosis. A voluntary recall was initiated by the distributor, followed by an expanded recall of all lots and production codes four days later (CDC, 2012a).

In 2011, 15% of recalls were due to *Listeria* (USDA FSIS, 2012e, 2012j; FDA, 2012f). One of these recalls occurred as a result of an outbreak of *Listeria* connected to cantaloupe (CDC, 2012b). Twenty-eight states in were involved in this recall. The outbreak resulted in 147 reported illnesses, including 43 deaths, and one miscarriage (CDC, 2012b).

In 2010, an outbreak of *Salmonella* Enteritidis caused approximately 1,939 illnesses. The source of this outbreak was traced back to shell eggs. Three recalls occurred due to this outbreak from two different sources of contaminated shell eggs (CDC, 2011b).

In 2009, an outbreak of *Salmonella* Saintpaul affected 228 people in 13 states (CDC, 2009c). This outbreak, traced back to alfalfa sprouts, originated from one company's alfalfa seeds (CDC, 2009c). A large *Salmonella* Typhimurium outbreak in 2009 originating from a peanut processor infected 714 people across 46 states, with a possible nine deaths (CDC, 2009a). This resulted in a large number of recalls because the peanut products went into 2,833 different products, including cookies, crackers, ice cream, cereal, and other products that might not obviously contain peanut products (CDC, 2009a).

In 2009, two outbreaks occurred due to *E. coli* (CDC, 2009b, 2011d). One of these outbreaks resulted in 10 cases of Hemolytic Uremic Syndrome, a type of kidney failure caused by *E. coli* O157:H7 (CDC, 2011d). At least 51 cases were associated with this outbreak caused by raw prepackaged cookie dough, and 21 more cases were linked to this outbreak, but could not be confirmed. Of these 72 cases, 34 people were hospitalized (CDC, 2011d). A voluntary recall of a variety of cookie dough products was initiated by the manufacturer as a result of this outbreak (FDA, 2009b). The other outbreak of *E. coli* O157:H7 occurred from ground beef (CDC, 2009b). Twenty-six people were affected, resulting in 19 hospitalizations, five cases of Hemolytic Uremic Syndrome, and two deaths. Approximately 545,699 pounds of ground beef were recalled related to this outbreak (CDC, 2009b).

In 2008, an outbreak of *Salmonella* Agona resulted in 28 illnesses in 15 states (CDC, 2011a). Those affected by this outbreak were as young as four months through 95 years of age. These illnesses resulted in eight reported hospitalizations. The outbreak was traced back to two

types of cereal recalled by the manufacturer in April 2008. The resulting recall included cereal that was manufactured the previous year (CDC, 2011a).

In 2007, an outbreak of *Salmonella* Tennessee originated from two brands of peanut butter produced at the same facility (CDC, 2007b). This outbreak resulted in 425 reported cases in 44 states, with 71 known hospitalizations (CDC, 2007b). Another outbreak of *Salmonella* originated from pot pies (CDC, 2007a). This outbreak resulted in at least 272 illnesses in 35 states, of which at least 65 people were hospitalized and a voluntary recall was issued by the company (CDC, 2007a). In 2007, an *E. coli* O157:H7 outbreak resulted in 21.7 million pounds of frozen beef patties being recalled (CDC, 2011c). This recalled product was connected to seven confirmed cases and a total of 40 possible cases (CDC, 2011c). A known 21 people were hospitalized, two cases of Hemolytic Uremic Syndrome, and no deaths reported from this outbreak (CDC, 2011c).

Undeclared Allergens

In 2011, 39% of food recalls were due to undeclared allergens (USDA FSIS, 2012e, 2012j; FDA, 2012f). In three of the five years tallied from 2007 to 2011, undeclared allergens were the top reason for recalled product (USDA FSIS, 2012a, 2012b, 2012c, 2012d, 2012e, 2012f, 2012g, 2012h, 2012i, 2012j; FDA, 2012b, 2012c, 2012d, 2012e, 2012f). Nowak-Wegrzyn, Conover-Walker, and Wood (2001) explored food allergy occurrences in schools and found that 86% of schools and 100% of preschools participating in the survey reported to have more than one child with a food allergy. Among the preschools surveyed, none had a nurse or health technician present for treating allergic reactions (Nowak-Wegrzyn et al., 2001). Given the significant number of foods recalled due to undeclared allergens (USDA FSIS, 2012a, 2012b, 2012c, 2012d, 2012e, 2012f, 2012g, 2012h, 2012i, 2012j; FDA, 2012b, 2012c, 2012d, 2012e,

2012f), if schools received recalled food products containing undeclared allergens and unknowingly served these products to students, the results could be devastating.

Awareness of Food Recalls

Steelfisher, Weldon, Benson, and Blendon (2010) used two telephone surveys to examine food recall responses among U.S. consumers. The two surveys were designed to analyze public response during and after a food crisis. These researchers examined awareness of recalls and found that in 2008, 90% of those surveyed had been aware of a food recall within the last two years. In 2009, 93% of consumers were aware of a peanut product recall, while only 55% of those surveyed in 2008 were aware of a peanut butter recall over the recent two years. Concerning the various peanut product recalls in 2009, consumers were unaware of certain foods being impacted by the recall. Only 39% were aware that some candy was affected and 27% were aware that ice cream was affected. Only 1% reported knowing of a *Listeria* recall in 2009 and 9% of an *E. coli* recall (Steelfisher et al., 2010).

Patrick, Griffin, Voetsch, and Mead (2007) examined knowledge and attitudes for a specific hot dog and deli meat recall using a telephone survey of consumers in Connecticut, Georgia, Minnesota, Oregon, California, Maryland, and New York. Using weighted percentages for a single-stage survey sampling design, 45% had heard about the recall. Of those who had heard about the recall before major newspaper notices, TV was the most common (60%) way of first hearing of the recall followed by radio (24%) and newspaper or magazine (11%). Of those who had heard about the recall after major newspaper notices, TV was still the most common (71%) way of first hearing about the recall followed by radio (12%) and newspaper or magazine (10%) (Patrick et al., 2007).

Communication of a Food Recall

Methods of Delivering Recall Notifications

According to USDA FNS (2011b), USDA Foods account for 15% to 20% of the food served in schools. Schools are notified of recalls involving these products through the USDA or state agency channels (USDA FSIS, 2011). However, notifications for the 80% to 85% of commercial foods are either sent directly from the vendor, by public press releases, or provided by state agencies (National Food Service Management Institute, n.d.). There are several systems in place for both USDA and commercial food recalls, such as Recalls.gov, FoodSafety.gov, and USDA/FNS Commodity Alert System.

Recalls.gov

Recalls.gov was developed by the U.S. Consumer Product Safety Commission, the National Highway Traffic Safety Administration, the U.S. Coast Guard, the FDA, the USDA, and the U.S. Environmental Protection Agency. The purpose of the website is to alert U.S. citizens of recalled products. Recalls.gov provides consumers the ability to view recent recalls or sign-up for e-mail notifications from each of the government agencies. Recalls.gov also allows users to receive recall notifications via an Android phone by downloading the application to the device (“Recalls.gov,” n.d.).

FoodSafety.gov

FoodSafety.gov is a website where both the USDA and FDA recalls and alerts can be viewed. FoodSafety.gov provides a list of recalls, which link to the USDA and FDA websites that provides more information about the recall. FoodSafety.gov can be used to obtain a recall notification on a mobile device by downloading an app to an Android phone. FoodSafety.gov

also offers a widget that allows anyone quick access to recall notification from their computer desktop or for posting to their websites (U.S. Department of Health and Human Services, n.d.).

USDA/FNS Commodity Alert System

The USDA/FNS Commodity Alert System delivers email notifications of recalls and holds for USDA Foods. These notifications are provided at no cost to any consumer who signs up to receive them (USDA FNS, 2012).

Recall Notification Process

When a recall involving USDA Foods occur, regulatory agencies communicate with FNS and procurement agencies to determine the flow of the product (“USDA Commodity,” 2001). Regulatory agencies provide the recall notification and news release information to FNS (FDA, 2012a; “USDA Commodity,” 2001). For USDA Foods that are recalled, FNS alerts state distributing agencies of the recall and provides information regarding the recalled product (“USDA Commodity,” 2001). The state distributing agencies will notify all school food authorities affected by the recall (“USDA Commodity,” 2001). The state distributing agencies will then distribute all information needed for tracking and reimbursement of the affected product (“USDA Commodity,” 2001).

Procedures for responding to both USDA and FDA regulated food recalls are similar for school foodservice administrators. Standards are outlined for USDA products (National Food Service Management Institute, n.d.) and are intended to prepare school foodservice directors for a potential recall. The standards require recall notifications to be immediately reviewed and communicated to proper locations in the school district once health related information is available. The recalled product is located and inventory taken in order to account for all product in the school. Once the recalled product is removed, proper channels are informed of possession

and instructions are given for proper return or disposition. Documents are collected for reimbursement procedures to be implemented; all documentation pertaining to the recall is kept for three subsequent years, not including the current year (National Food Service Management Institute, n.d.).

Several common processing practices can make the recall process more challenging. Further processing often occurs when using USDA Foods to make other products. Processors may use substitution (swapping out equivalent commercial product for USDA Foods) during processing. A recalled product may be contaminated at the processing plant and not by the USDA food used for processing, giving the processor all responsibility associated with the recalled product (“USDA Commodity,” 2001).

Traceability

Within the recall process, traceability of the product is vital to ensure public safety. Traceability is using identification and record keeping in order to locate information on a product, or the product itself, during any part of its processing and distribution (Olsen & Borit, 2012). Traceability of food products can be difficult, as products go through further processing after being manufactured (Saltini & Akkerman, 2012). Traceability can also be difficult due to batch separation. Batches can also become intermixed because of ineffective cleaning of equipment between batches, resulting in rejected product and decreased traceability (Skoglund & Dejmek, 2007).

Donnelly, Karlsen, and Olsen (2009) followed a lamb meat product throughout production and found that even though the meat itself was traceable, additives such as salt, onions, pepper, and sausage casings were not. The authors noted that increased traceability is needed for ingredients used in the production of a larger product (Donnelly et al., 2009).

Impact of a Food Recall

Attitudes

Hallman, Cuite, and Hooker (2009) sampled 1,101 consumers across the U.S. to explore consumer perceptions of importance, relevance, frequency, personal experience, knowledge, awareness, preference, and actions related to specific food recalls. Results indicated that consumers acknowledge the importance of recalls and recognize that recalls help save lives. Consumers were most concerned with a food recall when a large number of people had become ill. Results showed the majority of consumers (59%) check for recalled products in their home and 73% expressed interest in obtaining recall information from previous purchases on their grocery receipt. The authors noted that consumers have an 83% likelihood of checking for a recalled product at home after seeing notification of the recall in a retail store (Hallman et al., 2009).

Onyango et al. (2008) interviewed 1,200 consumers across the U.S. Interviews explored awareness and safety perceptions related to the 2006 spinach recall. Their findings revealed that those with lower than a high school education had a higher perception of risk when compared to those who attended at least four years of college (Onyango et al., 2008).

Stinson, Ghosh, Kinsey, and Degeneffe (2008) reported the results from three internet surveys taken before and after major food and pet food recalls. A significant difference was found in respondents' food safety confidence from 2005 to 2007, where consumers were less confident in 2007 (Stinson et al., 2008). Attitudes toward the safety of recalled hot dog and deli meats showed that 5% of consumers believed the product was safe to eat and 23% were unsure (Patrick et al., 2007).

When consumers ranked areas of being most or second most responsible for food safety, government was chosen by nearly 25% of respondents in 2007. Government was second to

manufacturers and processors, which were ranked at most or second most responsible by over 28% in 2007. The amount of food safety responsibility consumers give to both the government and the manufacturers and processors stress the importance of food recalls (Stinson et al., 2008).

In 2000, numerous high-profile recalls resulted in increased distrust with the food industry. The Consumer Goods Forum brought together CEOs worldwide to address the concern for food safety and resulted in the creation of the Global Food Safety Initiative to address food safety standards and increase cost efficiency. The initiative continues to promote unified food safety standards and approaches through international experts across the industry (“About GSFI,” n.d.).

Buying Decisions

The affect a recall has on buying decisions can be examined by consumer responses. Consumer response to a recall was examined by Steelfisher et al. (2010) concerning two major recalls. This study showed 25% of the people surveyed checked for peanuts as an ingredient when purchasing food at the grocery store in 2009 during the peanut product recall. In 2009, 41% of the surveyed consumers reported to have stopped eating at least some foods containing the recalled peanut products. Only 14% of consumers, however, reported to have stopped eating all foods containing peanuts during the 2009 recall (Steelfisher et al., 2010).

Steelfisher et al. (2010) also examined consumers’ concerns about becoming ill from eating contaminated foods and other contaminants. Sixty-four percent were concerned about food contaminated with bacteria or viruses. When looking at specific contaminants, *E. coli* and *Salmonella* caused the most worry at 37% each, over mad cow disease and botulism. Concern for contaminated peanut products was shown in 36% of those surveyed in 2009 during the major peanut product recall (Steelfisher et al., 2010).

By looking at which types of food have the most recalls, we can predict the products that will have the most concern based on increased public awareness. Potter, Murray, Lawson, and Graham (2012) compiled food recalls in the U.S., United Kingdom, and Republic of Ireland from 2004 to 2010 and broke them down into product categories. In the U.S., processed foods were recalled the most (24%) followed by meat and meat products (15%) and fruit, vegetables, and salads (13%) of all U.S. recalls. The least recalled products in the U.S. were honey, food contact materials, food supplements, alcoholic beverages, and fats and oils, which were all nearly 0% of all U.S. recalls (Potter et al., 2012). Buying decisions on the types of food that have the most recalls may be impacted because of the increased public awareness.

Bruhn and Schutz (1999) examined consumers' perceived food risk by means of a mail survey sent to 1,000 California consumers. Consumers were asked to rate their confidence in food safety for different types of food. Next to tap water, consumers have the least confidence in fish and seafood, with 61% completely or somewhat confident and 37% not very or not at all confident. Consumers had the most confidence in fruits and vegetables with 92% completely or somewhat confident and 8% not very or not at all confident (Bruhn & Schutz, 1999).

Summary

There is a large amount of food served in schools. A large number of children could be impacted if a food recall occurs in schools. Previous research has been conducted with consumers concerning food recalls. However, little research is available on food recalls in schools. Previous research has shown high food recall awareness among consumers and the recognition that recalls help save lives (Hallman et al., 2009). Government, in addition to manufacturers and processors, are seen as the two parties with the most responsibility for the safety of food, emphasizing the need for food recalls (Stinson et al., 2008). Traceability is

essential to recall effectiveness and can be difficult due to many variables. The investigation of inventory practices in schools could be used to improve traceability and recall effectiveness.

There are several systems in place for obtaining food recall information. Examining school foodservice directors' attitudes and behaviors concerning food recalls can be used to improve the effectiveness of recalls in schools.

Chapter 3 - Methodology

The purpose of this study was to explore school foodservice directors' attitudes and behaviors about food recalls. This study evaluated variables influencing attitudes and behaviors of school foodservice directors toward food recalls.

Population and Sample

The population for this study included school foodservice directors in the United States (U.S.). For this study, a school foodservice director was defined as the person responsible for handling food recall communication to schools at the district level. The National Center for Education Statistics (n.d.) indicates that there were a total of 14,561 school districts registered during the 2009 – 2011 school years, excluding component districts, state districts, federal districts, and districts labeled as other.

The sample was drawn from MDR™, a marketing company that maintains databases for marketing to educational groups (Market Data Retrieval, 2013). MDR™ was contacted to obtain a random, national sample. The company has a database of 5,481 school foodservice directors. Based on the size of the target population of 14,561 school districts, a sample size of 370 was required for a 95% confidence level and a 5% sampling error (Dillman, 2007). The sample for this study consisted of 3,700 school foodservice directors, anticipating a 10% response rate.

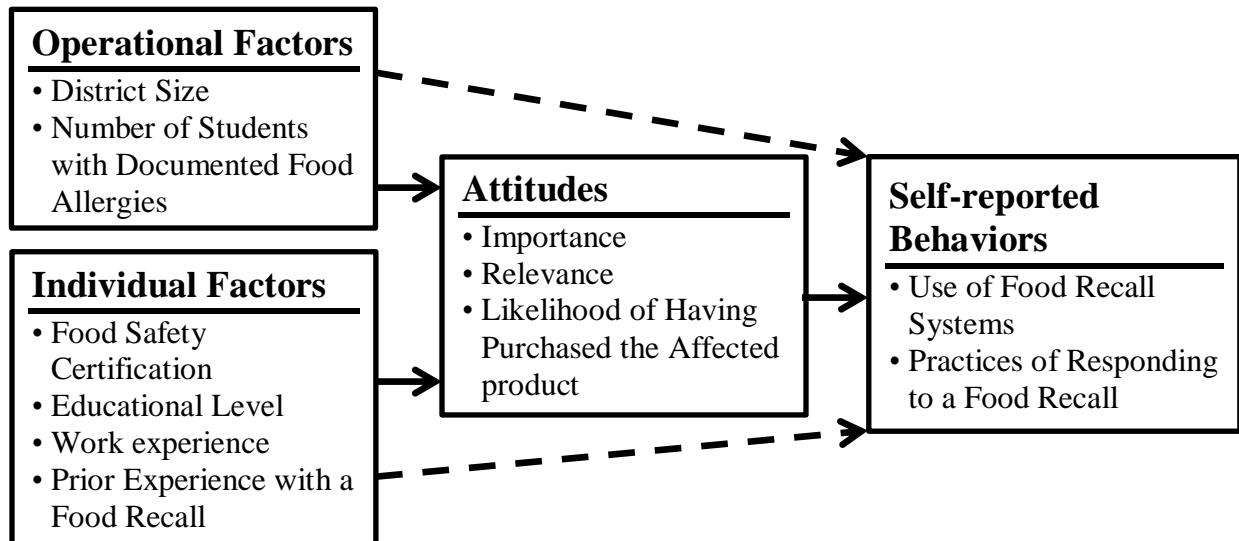
Research Design

This study collected quantitative data to measure school foodservice directors' attitudes and behaviors and assess relationships among variables. One model was tested in two parts (Figure 3.1). The first part examined the relationship between demographic variables and

attitudes. The second part examined the relationship among attitudes and behaviors as well as demographics and behaviors.

Quantitative data were also measured to examine foodservice directors' level of confidence in responding to a recall and how many school foodservice directors are signed up for recall systems. To reduce cost and the amount of labor needed to survey individuals, an online survey was utilized.

Figure 3.1. Model of Factors that Affect Food Recall Behavior of School Foodservice Directors



Instrument Development

The survey instrument consisted of three sections: attitudes, self-reported behaviors, and demographics (Appendix C). The first section assessed food recall attitudes of school foodservice directors. Three of the attitudinal variables examined by Hallman, Cuite, and Hooker's study (2009) of consumers' perceptions regarding food recalls were adapted for this study. Based on these variables, the following factors were used to evaluate attitudes: importance, relevance, and likelihood of having purchased the affected product. Attitudes of

school foodservice directors were evaluated using a 5-point rating scale, from strongly disagree (1) to strongly agree (5).

The second section consisted of self-reported behaviors of school foodservice directors when a food recall occurs. Self-reported behaviors included use of food recall systems and practices used when responding to a recall.

The third section collected operational and individual demographic information. The operational information included district size, number of students with documented food allergies, and the state in which their district resides. The individual demographic information included food safety certification, educational level, work experience, prior experience with a food recall, and gender. Food safety certification programs approved through the Conference for Food Protection were used in this study. The survey included items to examine positive and negative opinions about current recall practices, level of confidence in responding to a recall, and participation and preference of recall systems.

To measure content validity of the entire survey, three experts were asked to examine the questions on the survey. Feedback was also gathered from the USDA FNS Office of Food Safety staff. Their comments were collected and analyzed before pilot testing began and the survey instrument was modified based on their feedback.

Pilot Test

Upon Institutional Review Board approval, a convenience sample of approximately 30 foodservice directors in the state of Kansas and state agency personnel were sent the electronic survey and cover letter to pilot test the survey instrument. The cover letter explained the purpose of the study, confidentiality, and ability to withdraw from the study at any time while completing the survey. They were sent a reminder 12 days after the initial email to increase responses. They

had a total of 15 days to return the survey before the data were analyzed. The pilot survey included questions on how long it took to complete the survey and if all of the questions on the survey were worded correctly and were understandable.

Pilot study responses were obtained by 14 school foodservice directors and state agency personnel (approximately 47% response rate) with the majority from the state of Kansas. Internal consistency of the attitude items were measured using Cronbach's Alpha, utilizing SPSS v. 20.0. The Cronbach's Alpha coefficients for perceived importance, perceived relevance, and perceived likelihood of having purchased the affected product variables were 0.98, 0.91, and 0.81, respectively. Based on these results, no questions were removed from the survey. Some questions had minor wording modifications based on suggestions of the respondents.

Project Approval

Approval from the Kansas State Institutional Review Board was obtained prior to data collection (Appendix A). Participants were informed through the cover letter of the study purpose, use of responses, all participant responses will remain anonymous, and participants may end the survey at any time before submission without penalty.

Data Collection

SurveyMonkey™ was used for survey design and data collection. MDR™ was contacted for sample generation and survey distribution. MDR™ sent an email that included a cover letter with a survey link to all school foodservice directors who had been randomly selected to participate in the study. A 10-business day window for completing the survey was given. During that time, one reminder was sent to all initial participants one week following the initial email. Participants received the first email on April 1, 2013.

Data Analysis

All statistical analysis was completed using SPSS (v. 20.0). Descriptive statistics were calculated for all survey items. Frequencies, means, and standard deviations were calculated for attitudinal and behavioral items. Frequencies were calculated for all demographic information. An overall attitude score was calculated by summing responses to all attitudinal items.

Confirmatory factor analysis with varimax rotation was done for all attitudinal items to confirm the existence of three factors. A minimum eigenvalue of 1.0 and an examination of a scree plot to determine the point of discontinuity were used to confirm the number of factors. If the factors were not confirmed, placement of the items was reevaluated. Cronbach's alpha reliability coefficient was calculated to measure the reliability of each attitudinal factor identified. The factor was considered reliable if a Cronbach's alpha of greater than or equal to 0.7 was obtained.

Regression models were used to determine which variables influence attitudes and behaviors of school foodservice directors. The independent variables that were used to examine attitudes included operational demographics (district size and number of students with documented food allergies) and individual demographics (food safety certification, educational level, work experience, and prior experience with a food recall).

The independent variables that were used to examine behaviors included operational demographics (district size and number of students with documented food allergies), individual demographics (food safety certification, educational level, work experience and prior experience with a food recall), and attitudinal variables formed after factor analysis was conducted.

Chapter 4 - School Foodservice Directors' Attitudes and Behaviors

Toward Food Recalls

Introduction

More than 31.8 million lunches are served daily in the United States (U.S.) through the National School Lunch Program (United States Department of Agriculture [USDA] Food and Nutrition Service [FNS], 2011a). USDA Foods account for 15% to 20% of the food served in schools (USDA FNS, 2011b), with the other 80% to 85% of foods purchased through a commercial purveyor. When USDA Foods are involved in a food recall, there could be a significant impact on the safety of food served to children.

Food Recalls

In 2007 to 2011, a total of 1,960 food recalls occurred. Undeclared allergens and *Salmonella* make up nearly two thirds of the total food recalls over this period (USDA Food Safety and Inspection Service [FSIS], 2012a, 2012b, 2012c, 2012d, 2012e, 2012f, 2012g, 2012h, 2012i, 2012j; U.S. Food and Drug Administration [FDA], 2012b, 2012c, 2012d, 2012e, 2012f). A food recall is the voluntary process where manufacturers and distributors remove food products from the market that may violate FDA, USDA, or company standards (USDA FSIS, 2011; FDA Enforcement Policy Rule, 2000). Recalls can be initiated by the manufacturer, distributor, or through the courts by the regulatory agency responsible for overseeing the safety of that particular product (FDA Enforcement Policy Rule, 2000).

There are three classes of food recalls outlined by USDA FSIS (2011). A Class I recall is initiated when a food is likely to cause adverse health effects or death after consumption; a Class II recall is used when the product has the potential to cause adverse health effects after

consumption; and food product in a Class III recall will not cause adverse health effects, but does not meet company standards (USDA FSIS, 2011). Market withdrawals are the firm's removal or correction of a product that has a minor or no violation that does not sanction legal action (FDA, 2009a). FDA uses a similar classification system (FDA, 2009a).

Communication of a Food Recall

The best defense against a recall is increased traceability (Gallozzi, Guggenheim, Charlton, Squires, & Pruitt, 2012). Traceability is using identification and record keeping in order to locate information on a product, or the product itself, during any part of its processing and distribution (Olsen & Borit, 2012). Traceability of food products can be difficult due to factors such as further processing and batch separation (Saltini & Akkerman, 2012; Skoglund & Dejmek, 2007). There is also a need for improved traceability of spices and flavoring products (Donnelly, Karlsen, & Olsen, 2009). Communication plays a big role in the traceability of food.

There are several formal communication systems in place for both USDA and commercial food recalls, such as Recalls.gov, FoodSafety.gov, and USDA/FNS Commodity Alert System. School foodservice directors are notified about recalls of USDA Foods through USDA or state agency channels (USDA FSIS, 2011). While notifications for the other 80% to 85% of commercial foods purchased are sent from the vendor or media sources (National Food Service Management Institute, n.d.). However, limited data are available to determine the attitudes and behaviors of school foodservice directors in relation to food recalls.

Consumer Perceptions and Buying Decisions

Previous research concerning food recalls has been consumer focused and has examined awareness after two major recall events. In 2009, 93% of consumers were aware of a peanut

product recall, while only 55% of consumers surveyed in 2008 were aware of a recent peanut butter recall. While this study found evidence of general food recall awareness, it found that consumers are not always aware of the breath of a recall. Concerning the various peanut product recalls in 2009, only 39% were aware that some candy was affected and 27% were aware that ice cream was affected (Steelfisher, Weldon, Benson, & Blendon, 2010).

Consumers across the U.S. were sampled to explore consumer perceptions of importance, relevance, frequency, personal experience, knowledge, awareness, preference, and actions related to specific food recalls. Results indicated that consumers acknowledge the importance of recalls and recognize that recalls help save lives. Consumers were most concerned with a food recall when a large number of people had become ill. The authors of this study noted that consumers have an 83% likelihood of checking for a recalled product at home after seeing notification of the recall in a retail store (Hallman, Cuite, & Hooker, 2009).

The impact a recall has on buying decisions can be examined by consumer responses. Consumer response to a recall was examined concerning two major recalls. Of those surveyed, 25% checked for peanuts as an ingredient when purchasing food at the grocery store in 2009 during the peanut product recall. In 2009, 41% of consumers surveyed reported to have stopped eating at least some foods containing the recalled peanut products in 2009. Only 14% reported to have stopped eating all foods containing peanuts during the 2009 recall (Steelfisher et al., 2010). Examining school foodservice directors' attitudes and behaviors concerning food recalls can be used to improve the recall effectiveness in schools. Thus, the purpose of this study was to explore school foodservice directors' attitudes and behaviors about food recalls.

Rational and Objectives of this Study

With such a large amount of lunches served daily through the National School Lunch Program, the possibility for severe consequences is great if a recall does occur and recalled food is served to children (USDA FNS, 2011a). Examining attitudes about recalls and behaviors, including the use of these systems by school foodservice directors, is needed in order to further develop the recall process in schools. Research questions for this study included:

1. What is school foodservice directors' level of confidence in responding to a recall?
2. Is there a relationship between food recall attitudes and response behaviors?
3. Is there a relationship between operational demographics of school district size or number of children with food allergies in the district and food recall attitudes and behaviors of school foodservice directors?
4. Is there a relationship between individual demographics of prior experience with a food recall, completion of food safety certification, educational level, or work experience and food recall attitudes and behaviors of school foodservice directors?
5. How many school foodservice directors are signed up for Recalls.gov, FoodSafety.gov, and USDA/FNS Commodity Alert System?

Materials and Methods

Population and Sample

The population for this study included school foodservice directors in the U.S. For this study, a school foodservice director was defined as the person responsible for handling food recall communication to schools at the district level. The National Center for Education Statistics (n.d.) indicates that there were a total of 14,561 school districts registered during 2009

to 2011 school years, excluding component districts, state districts, federal districts, and districts labeled as other. Based on this target population, a sample size of 370 was required to achieve a 95% confidence level and a 5% sampling error (Dillman, 2007). The sample for this study consisted of 3,700 school foodservice directors, anticipating a 10% response rate.

Instrument Development

The survey instrument consisted of three sections: attitudes, self-reported behaviors, and demographics. The first section assessed food recall attitudes of school foodservice directors. Attitudinal items were adapted from three of the variables examined by Hallman, Cuite, and Hooker (2009) in their research related to consumer perceptions of food recalls. Based on those three variables, the following categories were used to evaluate the attitudes of school foodservice directors: perceived importance, relevance, and likelihood of having purchased the affected product. Attitudes of school foodservice directors were evaluated using a 5-point rating scale, from strongly disagree (1) to strongly agree (5).

The second section consisted of self-reported behaviors of school foodservice directors when a food recall occurs. Self-reported behaviors included use of food recall systems and practices used when responding to a recall.

The third section gathered operational and individual demographic information. The operational information included district size, number of students with documented food allergies, and the state in which their district resides for descriptive purposes. The individual demographic information included food safety certification, educational level, work experience, prior experience with a food recall, and gender.

Approval from the Institutional Review Board (Appendix A) was obtained prior to pilot testing. Participants were informed of the purpose of the study, assured that only group data

would be reported, that all participant responses would remain anonymous, and that participants may end the survey at any time before submission without penalty.

Three experts examined the questions on the survey and additional feedback was given from the USDA FNS Office of Food Safety prior to pilot testing. The survey was pilot tested with 14 school foodservice directors and state agency personnel with an approximate 47% response rate. The pilot survey included questions on how long it took to complete the survey and if all of the questions on the survey were worded correctly and were understandable. After the pilot study was completed, corrections were made to the survey prior to data collection. Based on the results of the pilot study, no questions were removed from the survey, but minor wording modifications to some questions were made.

Data Collection

MDR™, a marketing company that maintains databases for marketing to educational groups (Market Data Retrieval, 2013), sent the email, including cover letter (Appendix B), with the survey link of the final survey (Appendix C) to a random national sample of 3,700 school foodservice directors on April 1, 2013. The actual number of surveys sent out by MDR™ was 4,049 to account for any bounce back emails from incorrect contact information. A 10-business day window for completing the survey was given. After seven days, one reminder was sent to all participants.

Data Analysis

All statistical analysis was completed using SPSS (v. 20.0). Descriptive statistics were calculated for all survey items. Frequencies, means, and standard deviations were calculated for

attitudinal, behavioral, and demographic items. An overall attitude score was calculated by summing responses to all attitudinal items.

Confirmatory factor analysis with varimax rotation was conducted for all attitudinal and behavioral items. The Cronbach's alpha reliability coefficient was calculated to measure the reliability of each attitudinal factor identified. The factor/scale was considered as reliable if $\alpha \geq 0.7$.

Regression models were used to determine which variables influenced attitudes. The independent variables that were examined included operational (district size and number of students with documented food allergies) and individual (food safety certification, educational level, work experience and prior experience with a food recall) demographics.

Regression models were also used to determine which variables influence behaviors of school foodservice directors. The independent variables that were examined included operational (district size and number of students with documented food allergies) and individual (food safety certification, educational level, work experience and prior experience with a food recall) demographics, and attitudinal variables (formed after factor analysis was conducted).

Results

Demographic Information of Participants

MDR™ sent the email containing the survey link to 4,049 school foodservice directors from their sample. As anticipated, 18 of the emails sent were undeliverable due to incorrect contact information. A total of 690 school foodservice directors completed the survey, but only 567 were usable, to yield a 17% response rate.

Of the respondents, 467 (84%) were female and 68 (12%) were male. There were 23 (4.1%) who did not answer this question. The size of respondents' districts ranged from 85 to 225,000 students with an average of 6,108 students per district. The number of students with documented food allergies ranged from zero to 4,884 students with an average of 124 students per district. All states were represented, except for Delaware, Hawaii, and Rhode Island.

When examining individual demographics of the respondents (Table 4.1), the majority of respondents held a bachelor's degree (27.5%), had been employed for 26 years or more in the foodservice industry (44.6%), and employed in school foodservice for 6 to 15 years (34.6%). Most respondents (34.0%) agreed ($M=3.2$, $SD=1.0$) on a scale from strongly disagree (1) to strongly agree (5) that they have a great deal of experience with food recalls. Although the survey was sent to directors, the recipient was asked to forward the email to the person responsible for handling food recalls in their district. The job title of the respondents included child nutrition director/supervisor/coordinator/administrator (78.4%), manager/cook/supervisor (19.2%), other (1.8), and assistant director (0.5%).

Level of Confidence in Responding to a Recall

When examining school foodservice directors' level of confidence in responding to a recall, school foodservice directors' perceptions of the information they receive, inventory practices they use, training utilized, and ability to respond adequately to a recall were explored. More than 82% of respondents agreed (4) or strongly agreed (5) that the information they receive about food recalls is adequate to ensure that recalled product is removed from inventory ($M=4.2$, $SD=1.0$) (Table 4.2). Approximately 89% of school foodservice directors' were mostly confident (4) or very confident (5) that their district can adequately respond to a food recall ($M=4.5$, $SD=0.7$) (Table 4.2). More than 94% of respondents indicated they have a reliable way

Table 4.1. Individual Demographics (n=567)

Variables	n(%)^a
Level of education	
Less than high school degree	3 (0.5)
High school degree or equivalent (e.g., GED)	107 (18.9)
Some college but no degree	145 (25.6)
Associate degree	69 (12.2)
Bachelor degree	156 (27.5)
Graduate degree	71 (12.5)
Years employed in the foodservice industry	
5 years or less	21 (3.7)
6 - 15 years	91 (16.0)
16 - 25 years	176 (31.0)
26 years or more	253 (44.6)
Years employed in school foodservice	
5 years or less	57 (10.1)
6 - 15 years	196 (34.6)
16 - 25 years	193 (34.0)
26 years or more	106 (18.7)
Experience with a food recall^b	
Strongly disagree	18 (3.2)
disagree	123 (21.7)
undecided	184 (32.5)
agree	193 (34.0)
strongly agree	48 (8.5)
Certifications	
ServSafe®	431 (76.0)
Certified Food Protection Professional (CFPP)	19 (3.4)
Certified Food Safety Manager (CFSM)	64 (11.3)
Prometric's Certified Professional Food Manager Program (CPFM)	6 (1.1)

^aPercentages may be less than 100% due to responses not provided.

^bThe stem "I have a great deal of experience with food recalls" was used for responses.

to contact departmental staff in case of a food recall and more than 37% have a staff member whose main responsibility is managing food recalls.

Inventory practices were examined and showed that most directors (80.6%) take inventory on a monthly basis and almost all (99.1%) use first in, first out (FIFO) inventory

Table 4.2. School Foodservice Directors' Level of Confidence in Responding to a Recall (n=567)

Statements from Survey	Frequency (%) ^a				
	Strongly Disagree	Disagree	Undecided	Agree	Strongly Agree
Adequacy of information					
The information I receive about food recalls is adequate to ensure that recalled product is removed from inventory.	14 (2.5)	30 (5.3)	56 (9.9)	222 (39.2)	243 (42.9)
I receive recall notifications in a timely manner so that I may adequately respond.	15 (2.6)	38 (6.7)	73 (12.9)	228 (40.2)	212 (37.4)
My inventory records are detailed enough so that I can trace recalled products.	11 (1.9)	36 (6.3)	99 (17.5)	230 (40.6)	190 (33.5)
	Not Confident	Somewhat Confident	Reasonably Confident	Mostly Confident	Very Confident
Ability to respond to a recall					
Our district can adequately respond to a food recall.	0 (0.0)	8 (1.4)	52 (9.2)	146 (25.7)	357 (63.0)
Our district has appropriate policies and procedures in place for responding to a food recall.	5 (0.9)	28 (4.9)	82 (14.5)	168 (29.6)	280 (49.4)
Personnel in our district have the knowledge to respond to a food recall.	1 (0.2)	18 (3.2)	73 (12.9)	158 (27.9)	311 (54.9)
When our district receives lot information for a recalled product, we can identify the product.	5 (0.9)	12 (2.1)	81 (14.3)	151 (26.6)	313 (55.2)

^aMay be less than 100% due to non-respondents.

rotation. The majority of directors (61.6%) would rather throw away all product of a certain type than risk serving a recalled product. Training utilized within the district was examined and showed that almost 51% of respondents had been provided training from the state on food recalls and almost 52% on inventory management. More than 52% stated that staff is provided annual in-service training on recalls or inventory management. Only about one fourth of respondents have received National Food Service Management Institute (NFSMI) Inventory Management and Tracking training.

Attitudes

Overall, most directors had positive attitudes about food recalls. Approximately 92% of directors strongly agreed that responding quickly to a food recall is part of ensuring the safety of children in their districts. Nearly 80% of directors strongly agreed that it is important to monitor recalls to avoid serving recalled foods (Table 4.3).

A factor analysis was conducted on the 12 attitude items to determine the existence of three factors. Use of a minimum eigenvalue of 1.0 and examination of a scree plot to determine the point of discontinuity produced two factors: perceived importance and perceived likelihood of possessing a recalled product. For the perceived importance factor, the item-total statistics showed that deleting any item would decrease the alpha. Therefore, all items were retained. For the second factor, perceived likelihood of possessing a recalled product, item-total statistics showed that deleting “there are minimal food recalls for foods used in schools” would increase the alpha. After review, it was deleted from further analysis. Both factors and each individual item are shown in Table 4.3. The statement “in my position, food recalls have little impact on what I do” was reverse coded for data analysis. The Cronbach alpha for the perceived importance and perceived likelihood of possessing a recalled product factors were .907 and .494,

Table 4.3. Foodservice Directors' Attitudes Toward Food Recalls (n=567)

Statements from Survey	Frequency (%)					
	Mean \pm SD ^a	Strongly Disagree	Disagree	Undecided	Agree	Strongly Agree
Perceived importance ($\alpha = 0.907$)						
Responding quickly to a food recall is part of ensuring the safety of children in my district.	4.9 \pm 0.6	10 (1.8)	0 (0.0)	0 (0.0)	34 (6.0)	523 (92.2)
It is important to monitor food recalls for products purchased in my district.	4.8 \pm 0.6	10 (1.8)	0 (0.0)	2 (0.4)	79 (13.9)	476 (84.0)
School foodservice directors who serve recalled product may endanger children.	4.7 \pm 0.7	13 (2.3)	1 (0.2)	11 (1.9)	85 (15.0)	457 (80.6)
When I receive a recall notification, I believe it is important to check food in my district to determine if it has been recalled.	4.8 \pm 0.6	9 (1.6)	1 (0.2)	0 (0.0)	52 (9.2)	505 (89.1)
Removing recalled product is very important to protect children in my district.	4.7 \pm 0.8	20 (3.5)	3 (0.5)	1 (0.2)	61 (10.8)	482 (85.0)
In my position, food recalls have little impact on what I do.	1.4 \pm 0.7	381 (67.2)	160 (28.2)	15 (2.6)	7 (1.2)	4 (0.7)
Responding to a food recall is part of protecting the health of children in my district.	4.8 \pm 0.6	10 (1.8)	1 (0.2)	0 (0.0)	58 (10.2)	498 (87.8)
It is important to monitor recalls to avoid serving recalled foods.	4.7 \pm 0.7	11 (1.9)	1 (0.2)	1 (0.2)	102 (18.0)	452 (79.7)
When I am notified of a food recall, it is important to immediately check my inventory for the product.	4.8 \pm 0.6	11 (1.9)	0 (0.0)	0 (0.0)	64 (11.3)	492 (86.8)

^aOn a 5-point scale from (1) strongly disagree to (5) strongly agree.

Table 4.3. Foodservice Directors' Attitudes Toward Food Recalls (n=567) Continued

Statements from Survey	Frequency (%)					
	Mean \pm SD ^a	Strongly Disagree	Disagree	Undecided	Agree	Strongly Agree
Perceived likelihood of possessing a recalled product ($\alpha = 0.494$)						
Recalled product is likely to be served in a school in my district.	1.4 \pm 0.8	412 (72.7)	109 (19.2)	24 (4.2)	7 (1.2)	15 (2.6)
It is likely that my district could have a product in inventory that could have been recalled.	1.9 \pm 1.1	278 (49.0)	160 (28.2)	53 (9.3)	53 (9.3)	23 (4.1)

^aOn a 5-point scale from (1) strongly disagree to (5) strongly agree.

respectively. Perceived importance consisted of nine items. Perceived likelihood of possessing a recalled product was measured with only two items after one was deleted, leading to a lower Cronbach alpha for that factor.

Perceived importance of food recalls was examined using nine items from the survey (Table 4.3). The overall perceived importance factor was calculated using the average of all responses from these nine questions. The mean overall perceived importance factor was 4.8 \pm 0.5 on a 5-point scale.

Perceived likelihood of possessing a recalled product was examined using two items from the survey. Nearly 92% of respondents strongly disagreed (1) or disagreed (2) that a recalled product is likely to be served in a school in their district (Table 4.3). More than 77% of respondents strongly disagreed (1) or disagreed (2) that it is likely that their district could have a product in inventory that could have been recalled. The overall perceived likelihood of possessing a recalled product (M=1.7, SD=0.8) was calculated using the average of all responses from these two questions.

The overall perceived importance was used as the dependent variable for the two regression models using operational demographics (district size and number of students with documented food allergies) and individual demographics (food safety certifications [ServSafe®, CFPP, CFSM, CPFM], educational level, work experience [number of years in foodservice industry and number of years in school foodservice], and prior experience with a food recall) as independent variables. The model testing the relationship of operational demographics and perceived importance was not significant. However, the model testing the relationship of individual demographics and perceived importance was significant ($R^2=.058$, $F=4.042$, $p=0.000$) (Table 4.4). The certification Certified Food Safety Manager (CFSM) ($\beta=-0.105$, $p=0.016$), number of years in school foodservice ($\beta=-0.103$, $p=0.049$), and prior experience with a food recall ($\beta=0.215$, $p=.000$) were significant independent variables.

Results indicate that school foodservice directors, who have the CFSM certification and those with more years in school foodservice, are less likely to perceive food recalls as important. However, there was a positive relationship between greater prior experience with a food recall and perception of importance.

The overall perceived likelihood of possessing a recalled product score was used as the dependent variable for two regression models using operational demographics (district size and number of students with documented food allergies) and individual demographics (food safety certifications [ServSafe®, CFPP, CFSM, CPFM], educational level, work experience [number of years in foodservice industry and number of years in school foodservice], and prior experience with a food recall) as independent variables. The model testing the relationship of operational demographics and perceived likelihood of possessing a recalled product was not significant. However, the model testing the relationship of individual demographics and perceived likelihood

Table 4.4. Multiple Regression Model for Predicting Perceived Importance Based on Individual Demographics

Model	Sum of Squares	df	Mean Square	F	Significance
Regression	7.957	8	.995	4.042	0.000
Residual	128.928	524	.246		
Total	136.886	532			

Standardized Coefficients				
Model	Beta	t	Significance	
(Constant)		39.134	0.000	
Certification: ServSafe®	-0.063	-1.446	0.149	
Certification: Certified Food Protection Professional (CFPP)	0.037	0.868	0.386	
Certification: Certified Food Safety Manager (CFSM)	-0.105	-2.414	0.016	
Certification: Prometric’s Certified Professional Food Manager Program (CPFM)	-0.006	-0.143	0.886	
Educational level	-0.017	-0.394	0.694	
Work experience: Number of years in foodservice industry	0.005	0.100	0.921	
Work experience: Number of years in school foodservice	-0.103	-1.976	0.049	
Prior experience with a food recall	0.215	4.894	0.000	

of possessing a recalled product was significant ($R^2=.047$, $F=3.238$, $p=0.001$) (Table 4.5). The certification ServSafe® ($\beta=0.095$, $p=0.029$), number of years in school foodservice ($\beta=0.134$, $p=0.011$), and prior experience with a food recall ($\beta=-0.151$, $p=0.001$) were significant, indicating that school foodservice directors who have the ServSafe® certification and more years in school foodservice perceive a higher likelihood of possessing a recalled product. However, those with more prior experience with a food recall perceive a lower likelihood of possessing a recalled product.

Table 4.5. Multiple Regression Model for Predicting Perceived Likelihood of Purchasing a Recalled Product Based on Individual Demographics

Model	Sum of Squares	df	Mean Square	F	Significance
Regression	17.277	8	2.160	3.238	0.001
Residual	349.526	524	0.667		
Total	366.803	532			

Standardized Coefficients				
Model	Beta	t	Significance	
(Constant)		9.109	.000	
Certification: ServSafe®	0.095	2.187	0.029	
Certification: Certified Food Protection Professional (CFPP)	-0.065	-1.512	0.131	
Certification: Certified Food Safety Manager (CFSM)	0.019	0.432	0.666	
Certification: Prometric’s Certified Professional Food Manager Program (CPFM)	-0.047	-1.104	0.270	
Educational level	-0.021	-0.472	0.637	
Work experience: Number of years in foodservice industry	-0.039	-0.731	0.465	
Work experience: Number of years in school foodservice	0.134	2.546	0.011	
Prior experience with a food recall	-0.151	-3.424	0.001	

Behaviors

Behaviors were examined using statements of self-reported behaviors that relate to food recalls in schools. Overall behaviors of the foodservice directors included in the study are presented in Table 4.6. Of the total surveys, 77.6% of respondents reported to have received a recall notification directly from their vendor and almost 86.2% from their state agency. Nearly all respondents who had received a recall notification from their vendor stated that they regularly or very often determine if they have purchased that product (99.5%), check the product code to see if they have it in inventory (98.6%), and notify staff to separate the product from the general inventory to assure it is not served (99.1%) upon receiving a recall notification (Table 4.6). Likewise, nearly all respondents who had received a recall notification from their state agency

Table 4.6. Foodservice Directors' Self-reported Food Recall Behaviors (n=567)

Statements from Survey	Mean \pm SD	Frequency (%) ^a				
		Never	Seldom	Sometimes	Regularly	Very Often
Practices of responding to a recall ($\alpha = 0.955$)						
<i>When I receive a recall notification from my vendor, I immediately:</i>						
Determine if I have purchase that product.	4.7 \pm 0.5	0 (0.0)	1 (0.2)	1 (0.2)	108 (24.5)	330 (75.0)
Check the product code to see if I have it in inventory.	4.7 \pm 0.5	0 (0.0)	1 (0.2)	3 (0.7)	110 (25.0)	324 (73.6)
Notify staff to separate the product from the general inventory to assure it is not served.	4.7 \pm 0.5	1 (0.2)	0 (0.0)	1 (0.2)	109 (24.8)	327 (74.3)
<i>When I receive a recall notification from my state agency, I immediately:</i>						
Determine if I have purchase that product.	4.7 \pm 0.5	1 (0.2)	0 (0.0)	3 (0.6)	149 (30.5)	335 (68.5)
Check the product code to see if I have it in inventory.	4.7 \pm 0.6	2 (0.4)	1 (0.2)	5 (1.0)	144 (29.4)	334 (68.3)
Notify staff to separate the product from the general inventory to assure it is not served.	4.7 \pm 0.6	2 (0.4)	2 (0.4)	3 (0.6)	146 (29.9)	331 (67.7)
Use of recall systems ($\alpha = 0.684$)						
<i>How often do you or another designated person in your district:</i>						
Check for food recalls?	3.8 \pm 1.0	13 (2.3)	48 (8.5)	94 (16.6)	280 (49.4)	128 (22.6)
Use food recall systems, such as Recalls.gov or FoodSafety.gov?	3.5 \pm 1.3	66 (11.6)	64 (11.3)	121 (21.3)	170 (30.0)	142 (25.0)
Communication with state agency and vendors about food recalls ($\alpha = 0.676$)						
<i>How often do you or another designated person in your district:</i>						
Communicate with your vendors about food recalls?	3.7 \pm 1.0	14 (2.5)	49 (8.6)	154 (27.2)	221 (39.0)	123 (21.7)

^aResponses may be less than 100% due to non-respondents^bRespondents were only included if they had received a recall notification form their vendor or state agency.

Table 4.6. Foodservice Directors' Self-reported Food Recall Behaviors (Continued)
(n=567)

Statements from Survey	Mean \pm SD	Frequency (%) ^a				
		Never	Seldom	Sometimes	Regularly	Very Often
Communicate with your state agency about recalls?	3.5 \pm 1.0	22 (3.9)	76 (13.4)	168 (29.6)	207 (36.5)	91 (16.0)
<i>When I receive a recall notification from my vendor, I immediately: (n=440)^b</i>						
Contact vendor for further instruction.	4.5 \pm 0.7	4 (0.9)	4 (0.9)	28 (6.4)	117 (26.6)	283 (64.3)
<i>When I receive a recall notification from my state agency, I immediately: (n=489)^b</i>						
Contact state agency for further instructions	4.3 \pm 0.9	11 (2.2)	15 (3.1)	49 (10.0)	147 (30.1)	265 (54.2)

^aResponses may be less than 100% due to non-respondents

^bRespondents were only included if they had received a recall notification form their vendor or state agency.

stated that they regularly or very often determine if they have purchased that product (99.0%), check the product code to see if they have it in inventory (97.7%), and notify staff to separate the product from the general inventory to assure it is not served (97.6%) upon receiving a recall notification (Table 4.6). However, few directors utilized food safety recall systems such as Recalls.gov or FoodSafety.gov. While 55% regularly or very often utilize these systems, 23% indicated that they seldom or never do (Table 4.6).

A factor analysis was conducted on behavioral items. Based on a minimum eigenvalue of 1.0 and examination of a scree plot to determine the point of discontinuity, three factors resulted: practices of responding to a recall, use of recall systems, and communication with state agency and vendors about food recalls. Practices of responding to a recall consisted of six items, use of recall systems consisted of two items, and communication with state agency and vendors

about food recalls consisted of four items. For all factors, the item-total statistics showed that deleting any item would decrease the alpha. Therefore, all items were retained. The Cronbach alpha statistics for the factors were .955 for practices of responding to a recall, .684 for use of recall systems, and .676 for communication with state agency and vendors about food recalls.

Average practices of responding to a recall score, derived by using the mean of the six items, ($M=3.6 \pm 1.0$) was used as the dependent variable for the three regression models using attitudes (perceived importance and likelihood of possessing a recalled product) in the first model, operational demographics (district size and number of students with documented food allergies) in the second model, and individual demographics (food safety certifications [ServSafe®, CFPP, CFSM, CPFM], educational level, work experience [number of years in foodservice industry and number of years in school foodservice], and prior experience with a food recall) in the third model, each as independent variables. The models testing the relationship of attitudes and practices of responding to a recall and the relationship of operational demographics and practices of responding to a recall were not significant. However, the model testing the relationship of individual demographics and practices of responding to a recall was significant ($R^2=.070$, $F=3.305$, $p=0.001$) (Table 4.7). Educational level ($\beta=0.137$, $p=0.009$) and prior experience with a food recall ($\beta=0.165$, $p=.002$) were significant independent variables. Results indicate that the higher the educational level of the foodservice director and those with greater prior experience with a food recall were related to higher scores for practices of responding to a recall.

The use of recall systems score ($M=4.1 \pm 0.6$) was used as the dependent variable for the three regression models using attitudes (perceived importance and likelihood of possessing a recalled product), operational demographics (district size and number of students with

Table 4.7. Multiple Regression Model for Predicting Practices of Responding to a Recall Based on Individual Demographics

Model	Sum of Squares	Df	Mean Square	F	Significance
Regression	4.749	8	.594	3.305	0.001
Residual	63.223	352	.180		
Total	67.972	360			

Standardized Coefficients			
Model	Beta	t	Significance
(Constant)		32.963	0.000
Certification: ServSafe®	0.050	0.948	0.344
Certification: Certified Food Protection Professional (CFPP)	0.017	0.322	0.747
Certification: Certified Food Safety Manager (CFSM)	-0.077	-1.462	0.145
Certification: Prometric's Certified Professional Food Manager Program (CPFM)	0.008	0.151	0.880
Educational level	0.137	2.613	0.009
Work experience: Number of years in foodservice industry	0.070	1.092	0.276
Work experience: Number of years in school Foodservice	-0.108	-1.718	0.087
Prior experience with a food recall	0.165	3.136	0.002

documented food allergies) and individual demographics (food safety certifications [ServSafe®, CFPP, CFSM, CPFM], educational level, work experience [number of years in foodservice industry and number of years in school foodservice], and prior experience with a food recall) as independent variables. All three models were significant: the relationship of attitudes and use of recalls ($R^2=.024$, $F=6.954$, $p=0.001$), the relationship of operational demographics and use of recall systems ($R^2=.016$, $F=4.201$, $p=0.015$), and the relationship of individual demographics and use of recall systems ($R^2=.065$, $F=4.518$, $p=0.000$). When using attitudes as predictors, perceived likelihood of possessing a recalled product ($\beta=-0.130$, $p=0.004$) was the significant

independent variable (Table 4.8). When using operational demographics as predictors, district size ($\beta=0.127$, $p=0.011$) was the significant independent variable (Table 4.9). When using individual demographics as predictors, prior experience with a food recall ($\beta=0.197$, $p=.000$) was the significant independent variable (Table 4.10).

Table 4.8. Multiple Regression Model for Predicting Use of Recall Systems Based on Attitudes

Model	Sum of Squares	df	Mean Square	F	Significance
Regression	13.446	2	6.723	6.954	0.001
Residual	537.498	556	.967		
Total	550.944	558			

Standardized Coefficients			
Model	Beta	t	Significance
(Constant)		7.128	0.000
Perceived likelihood of possessing a recalled product	-0.130	-2.926	0.004
Number of students with documented food allergies	0.053	1.189	0.235

Table 4.9. Multiple Regression Model for Predicting Use of Recall Systems Based on Operational Demographics

Model	Sum of Squares	df	Mean Square	F	Significance
Regression	8.235	2	4.117	4.201	0.015
Residual	507.688	518	.980		
Total	515.922	520			

Standardized Coefficients			
Model	Beta	t	Significance
(Constant)		75.380	0.000
District size	0.127	2.539	0.011
Number of students with documented food allergies	-0.002	-0.036	0.971

Table 4.10. Multiple Regression Model for Predicting Use of Recall Systems Based on Individual Demographics

Model	Sum of Squares	df	Mean Square	F	Significance
Regression	34.224	8	4.278	4.518	0.000
Residual	488.586	516	.947		
Total	522.810	524			

Standardized Coefficients			
Model	Beta	t	Significance
(Constant)		10.644	0.000
Certification: ServSafe®	-0.012	-0.282	0.778
Certification: Certified Food Protection Professional (CFPP)	0.064	1.501	0.134
Certification: Certified Food Safety Manager (CFSM)	0.027	0.626	0.531
Certification: Prometric’s Certified Professional Food Manager Program (CPFM)	0.030	0.694	0.488
Educational level	0.069	1.585	0.113
Work experience: Number of years in foodservice industry	0.081	1.492	0.136
Work experience: Number of years in school foodservice	0.003	0.061	0.952
Prior experience with a food recall	0.197	4.453	0.000

Results indicate that the higher the frequency of school foodservice directors’ use of recall systems, the lower their perceived likelihood of possessing a recalled product. The larger the district size, the more frequently the school foodservice director will use recall systems. Likewise, those with more prior experience with a food recall will use recall systems more frequently.

The average communication frequency with the state agency and vendors about food recalls score ($M=4.1 \pm 0.6$) was used as the dependent variable for three regression models. The first model using attitudes (perceived importance and likelihood of possessing a recalled

product), the second model using operational demographics (district size and number of students with documented food allergies) and the third model using individual demographics (food safety certifications [ServSafe®, CFPP, CFSM, CPFM], educational level, work experience [number of years in foodservice industry and number of years in school foodservice], and prior experience with a food recall) as independent variables. The model testing the relationship of attitudes and communication with state agency and vendors about food recalls was not significant. The model testing the relationship between operational demographics and overall communication with state agency and vendors about food recalls was significant ($R^2=.019$, $F=3.429$, $p=0.033$) though neither district size nor number of students with documented food allergies were significant independent variables (Table 4.11).

Table 4.11. Multiple Regression Model for Predicting Communication with State Agency and Vendors about Food Recalls Based on Operational Demographics

Model	Sum of Squares	df	Mean Square	F	Significance
Regression	2.654	2	1.327	3.429	0.033
Residual	136.603	353	.387		
Total	139.257	355			

Standardized Coefficients			
Model	Beta	t	Significance
(Constant)		106.451	0.000
District size	0.118	1.705	0.089
Number of students with documented food allergies	0.028	0.404	0.686

The model testing the relationship of individual demographics and communication with state agency and vendors about food recalls was significant ($R^2=.069$, $F=3.215$, $p=0.002$) (Table 4.12). Educational level ($\beta=0.124$, $p=0.019$) and prior experience with a food recall ($\beta=0.222$, $p=.000$) were significant independent variables. Results indicate that the higher the educational

level of the foodservice director and those with more prior experience with a food recall have greater communication with state agency and vendors about food recalls.

Table 4.12. Multiple Regression Model for Predicting Communication with State Agency and Vendors about Food Recalls Based on Individual Demographics

Model	Sum of Squares	df	Mean Square	F	Significance
Regression	10.203	8	1.275	3.215	0.002
Residual	138.066	348	.397		
Total	148.269	356			

Standardized Coefficients				
Model	Beta	t	Significance	
(Constant)		17.843	0.000	
Certification: ServSafe®	-0.040	-0.760	0.448	
Certification: Certified Food Protection Professional (CFPP)	0.033	0.641	0.522	
Certification: Certified Food Safety Manager (CFSM)	-0.049	-0.929	0.354	
Certification: Prometric’s Certified Professional Food Manager Program (CPFM)	0.040	0.759	0.448	
Educational level	0.124	2.360	0.019	
Work experience: Number of years in foodservice industry	-0.092	-1.411	0.159	
Work experience: Number of years in school foodservice	0.078	1.224	0.222	
Prior experience with a food recall	0.222	4.172	0.000	

Current Recall Systems and Practices

School foodservice directors reported that they most often communicated about food recalls through the state agency (email or telephone) (88.9%). More than 72% of respondents stated their state agency also sends out recall notifications for non-USDA products. Other

commonly used methods included communication from vendors (email, telephone) (85.9%), email from USDA/FNS Commodity Alert System (60.5%), and press releases from manufacturers (54.3%). Less frequent systems respondents used were email from FoodSafety.gov (42.3%) or Recalls.gov (33.3%), websites (Recalls.gov, FoodSafety.gov) (26.5%), peers in other districts (21.3%), and mobile applications (Recalls.gov, FoodSafety.gov) (2.3%). Other methods were marked by 8.5% of respondents, with a recurring response of media (news stories, television, internet, etc.).

Respondents preferred to get recall communications through their state agency (email or telephone) (86.6%), communication from vendors (email or telephone) (82.2%), and automated emails from the USDA/FNS Commodity Alert System (50.4%). Other frequent choices respondents listed as their top three methods included email from FoodSafety.gov (42.0%) or Recalls.gov (35.8%) and press releases from the manufacturer (29.3%).

Open-ended questions were evaluated to explore the positives and negatives of current food recall practices. When asked what works well, respondents frequently stated communication with state agency, vendor, other districts, and school nutrition staff about food recalls. Continuous communication was reported to be needed for products until they have been excluded from the operation and can assist in the recall process when properly utilized. Directors reported to prefer to be notified if the product they purchased has been recalled, in some cases through an online ordering system. Directors indicated that notifications worked well through email, text, phone, media, and websites. Email was stated as being the fastest, with timeliness being stressed by many respondents. It was stated to utilize both email and phone for notifications. Receiving daily alerts can also assist in recall notification.

Once notification is received, communication within the district through phone trees, recall alerts, emails, etc. to allow school nutrition staff to remove recalled product from inventory. In order to properly locate recalled product, obtaining trace back information through photos, lot numbers, manufacture dates, etc. is helpful. Aid used for food recall practices that respondents identified include the use of the county health inspector, state child nutrition services, forms for the food recall process, and training.

When asked what could be done to improve recall systems in schools, respondents showed a great concern for how recall notifications were delivered. Several suggested that there should be one system for delivering recall notification to schools. While a single system with specified training and protocols would show all directors what they need to do, there is not a system or organization like this available. Instead of directors having to look for the information, some suggested it be delivered to them by email and a follow-up phone call, a phone app, text message, or automated phone message. Respondents felt burdened to check the state website every day, and would prefer the information was sent to them. The best way to eliminate these problems is to assign a specific person in the district only to obtain and respond to recall notifications.

One of the most commonly suggested improvements is to obtain recall notifications quicker. Directors indicated that they do not like seeing it on the news and serving it to children before they receive a recall notification; although, responses suggest this does not happen often. Respondents also want to know only the information that is pertinent to them. The state agency screening out other recalls for foods not served in schools would reduce the number of recall notifications that are desensitizing. It was requested to have one place for schools to go to see if their food is recalled, however, assigning a position responsible for this task in their district is an

alternative solution. The information contained in a recall notification needs to be easier to read and understand and include the reason for the recall, how to handle the product, who purchased, when, and how much. Communication was seen as a needed improvement on all levels. It was suggested for schools to be notified through an all call system. Training by the state, in-service training, and training on inventory management was suggested by the respondents. Preventative measures of better food safety practices was suggested to lower the need for recalls overall.

Discussion

School foodservice directors' are confident that their districts can adequately respond to a food recall. Most feel they have appropriate policies and procedures in place and that personnel in their district have the knowledge to respond to a food recall. However, four of five directors are at least mostly confident that they can identify the product from the lot information. Training on how to identify recalled product should to be more frequently provided. Most directors have a reliable way to contact departmental staff in case of a food recall. Promoting the use of calling trees and announcement systems would increase communication for those who cannot contact departmental staff.

Attitudes

Perceived Importance

School foodservice directors responded differently to attitudinal items included in this study. Respondents' perceived food recalls as being important. There was a relationship between individual demographics and perceived importance of food recalls. School foodservice directors who have the CFSM certification or have more years of experience in school foodservice, are less likely to perceive food recalls as important. It is unclear why those who

have the CFSSM certification would have a lower perceived importance for food recalls. Perhaps CFSSM training should emphasize the importance of food recalls. Those with more years in school foodservice were less likely to perceive food recalls as important. Those who work in school foodservice longer may become desensitized to regular recall notifications, or have seldom been impacted by a recall. However, those with greater experience with a food recall were more likely to perceive food recalls as important.

Perceived Likelihood

Respondents' perceived likelihood of possessing a recalled product was very low. When stressing food recalls, there needs to be a sense of urgency so that no one perceives that recalls will never impact them. More respondents had a higher perceived likelihood of their school having a product in inventory that could have been recalled than a product being served in a school in their district. This indicates that respondents have the perception that little amounts of product may be purchased in schools and an even smaller amount is actually served.

There was a relationship between individual demographics and perceived likelihood of possessing a recalled product. Those who have been certified through ServSafe® and have more years in school foodservice perceive a higher likelihood of possessing a recalled product than those not certified and with less foodservice experience. This suggests that ServSafe® provides awareness of food recall occurrence. Schools should stress the importance of obtaining ServSafe® certification and make it a requirement of all food handling staff if they are not already doing so. Those with more years in school foodservice having a higher perception of the likelihood of possessing a recalled product could indicate that food recalls do need significant attention. Those with more prior experience with a food recall perceive a lower likelihood of

possessing a recalled product. This indicates that their product were either not affected or recalls are carefully checked to remove any recalled product.

Behaviors

Responding to a Recall

Foodservice directors have consistent practices for responding to a food recall. Almost all foodservice directors regularly, upon receiving a recall notification, determine if they have purchased the recalled product, check the product code to see if they have it in inventory, and notify staff to separate the product from the general inventory to assure it is not served.

Although there was such a high number who do respond to a recall, there is always room for improvement. Consistent training would further develop food recall response practices.

There was a relationship between individual demographics and practices of responding to a recall. The higher the educational level of the foodservice director, the more frequent they respond to a recall, regardless of how often a recall occurs. Higher education may be a factor that needs to be more heavily weighed for foodservice director positions. Those with more experience with recalls, the more frequently they respond to a recall. Mock recalls would increase the recall experience.

Use of Recall Systems

The majority of directors or another designated persons in their district regularly checks for food recalls or use recall systems, such as Recalls.gov or FoodSafety.gov. However, there is room for improvement on actively checking for food recalls. Awareness of recall systems should be emphasized to improve recall practices. There was a relationship between attitudes and use of recalls. There was a negative relationship between how likely directors think they

possess a recalled product and their use recall systems. Foodservice directors may be less likely to think they will possess a recalled item if they are often checking for recalls and seldom are impacted. Training needs to reinforce that recall systems need to be frequently used, even if they rarely see a relevant recall. There was also a relationship between individual and operational demographics and use of recall systems. The larger the district size, the more frequently the director uses recall systems. This is encouraging, because larger districts are buying more products and serving more children, but smaller districts could just as easily fall victim to a recall. Those with more prior experience with a food recall more frequently used recall systems. This is probably due to heightened awareness of the recall systems in place after being affected by a recall. Mock recalls would provide experience on using recall systems available.

Communication with State Agency and Vendors about Food Recalls

There was a high level of communication with state agency and vendors after receiving a recall notification. There was a positive relationship between individual demographics and communication with state agency and vendors. Foodservice directors with a higher education level will communicate more with state agency staff and vendors about food recalls. This is another reason why educational level of the director is important. Likewise, those with prior experience with a food recall will more likely have greater communication with state agency staff and vendors about food recalls. Mock recalls could provide the same benefit to communication as going through an actual recall. Operational demographics were shown to have a positive relationship to communication with the state agency and vendors about food recalls as a whole, although, all school districts need to pay close attention to recalls.

Current Recall Systems and Practices

School foodservice directors mostly agreed that the recall information they receive is adequate to ensure that recalled product is removed from inventory. Fewer are content with the timeliness of notifications, but still agree that they receive recall notifications in a timely manner so they can respond adequately. Timeliness of notifications should allow for directors to remove product before it can be served. Even though directors expressed concern with being notified of a recall after the general public, there is no way to inform them any sooner. The inventory records are not detailed enough to trace a recalled product by more than a quarter of the respondents. Although most directors take inventory on a monthly basis and almost all use FIFO inventory rotation, increased trace back would assist in properly removing recalled product. Frequent training is needed on inventory practices and identifying trace back information. More than six out of ten directors would rather throw away all product of a certain type than risk serving a recalled product. This reduces the effectiveness of having good inventory practices. While this is playing it safe, proper recall knowledge would reduce wasteful and expensive practices.

Almost half of directors who responded had not been provided training from the state on food recalls or inventory management. More training on recalls and inventory management would increase recall awareness and knowledge of how to find recall information, and improve inventory practices. Only about a quarter of the respondents had received National Food Service Management Institute (NFSMI) Inventory Management and Tracking training. This training is offered online at no cost to the participant (University of Mississippi, 2013b). Training is also offered in-person by appointment at a variety of locations (University of Mississippi, 2013a).

This training should be required for all directors to reduce the risk of liability and wasteful inventory practices.

The most common method to obtain recall notifications is through the state agency by way of email or telephone. Approximately 72% of respondents noted that they receive recall notifications for non-USDA products from their state agency. Other commonly used methods are communication from vendors, through email or telephone, email from USDA/FNS Commodity Alert System, and press releases from the manufacturer. A phone call following the initial email will increase the chance of the director receiving the recall notification. Websites such as Recalls.gov and FoodSafety.gov were less frequently used. More directors are signed up to receive emails than use Recalls.gov and FoodSafety.gov websites. State training should emphasize Recalls.gov and FoodSafety.gov websites.

Most school foodservice directors prefer to learn about food recalls from the state agency by way of email or telephone and from vendor by way of email or telephone. About half prefer to receive an email from the USDA/FNS Commodity Alert System. State training should emphasize the benefit of this system as a reliable way of receiving recall notifications on USDA Foods. An email from FoodSafety.gov or Recalls.gov and press releases from manufacturers are slightly less preferred. Though these are less preferred, they are a good way sending information without the time and resources of more personal routes of communication.

Based on open-ended questions on positives and areas for improvement of current recall practices, communication with state agency, vendor, other districts, and school nutrition staff about food recalls is working well in schools. Looking at good forms of communication, email is believed to be the fastest by many respondents. Areas of concern are the timeliness of recall notification delivery. Notifications could be more simplified so that notifications are easier to

obtain and more likely to be received. The timeliness of receiving recall notifications would ideally be faster as well. It is important to directors that they receive recall notification before the product is served. The information on recall notifications needs to be more descriptive so that the product can be identified and handled properly. Recall notifications given to directors should be limited to those that affect school meals. Too many unnecessary recall notifications are desensitizing and will diminish the effectiveness of the recalls that do pertain to schools. There is room for improving communication and there needs to be more training opportunities offered to foodservice directors in regards to these recall systems.

Chapter 5 - Summary and Conclusions

The purpose of this study was to explore school foodservice directors' attitudes and behaviors about food recalls. This study evaluated what variables influenced attitudes and behaviors of school foodservice directors toward food recalls. The following research questions were examined in this study:

1. What is school foodservice directors' level of confidence in responding to a recall?
2. Is there a relationship between food recall attitudes and response behaviors?
3. Is there a relationship between operational demographics of school district size or number of children with food allergies in the district and food recall attitudes and behaviors of school foodservice directors?
4. Is there a relationship between individual demographics of prior experience with a food recall, completion of food safety certification, educational level, or work experience and food recall attitudes and behaviors of school foodservice directors?
5. How many school foodservice directors are signed up for Recalls.gov, FoodSafety.gov, and USDA/FNS Commodity Alert System?

A survey was used to measure school foodservice directors' attitudes and behaviors related to food recalls and assess relationships among variables. Based on an extensive literature review and three of the variables examined by Hallman, Cuite, and Hooker (2009) of consumers' perceptions regarding food recalls, a survey was developed consisting of three sections: attitudes, self-reported behaviors, and demographics. A confirmatory factor analysis with varimax rotation was conducted on the initial attitude items related to perceived importance, relevance, and likeliness of purchasing a recalled product to produce two factors: perceived importance of food

recalls and perceived likelihood of possessing a recalled product. Confirmatory factor analysis with varimax rotation was also done for behavioral items yielding three factors: practices of responding to a recall, communication with state agency and vendors about food recalls, and use of recall systems. MDR™ sent the email containing the survey link to 4,049 school foodservice directors from their sample. A total of 690 school foodservice directors completed the survey (567 usable) to yield a 17% response rate.

Major Findings

Research Question 1: What is school foodservice directors' level of confidence in responding to a recall?

School foodservice directors' are confident that their district can adequately respond to a food recall, with almost 89% mostly confident or very confident (M=4.5, SD=0.7 on a 5-point scale). The majority (79.0%) are mostly confident or very confident that they have appropriate policies and procedures in place for responding to a recall (M=4.2, SD=0.9). Nearly 83% of respondents were mostly confident or very confident that personnel in their district have the knowledge to respond to a food recall (M=4.4, SD=0.8). Nearly 82% of respondents were confident or very confident that when their district receives lot information for a recalled product, they can identify the product (M=4.3, SD=0.9). The majority (94.4%) of directors responded that they have a reliable way to contact departmental staff in case of a food recall and 37.4% have a staff member whose main responsibility is managing food recalls.

The majority of school foodservice directors (82.1%) agreed or strongly agreed that the recall information they receive is adequate to ensure that recalled product is removed from inventory (M=4.2, SD=1.0). The majority (77.6%) agreed or strongly agreed that they receive recall notifications in a timely manner so that they can adequately respond (M=4.0, SD=1.0).

Most (74.1%) agreed or strongly agreed that their inventory records are detailed enough to trace recalled products (M=4.0, SD=1.0). The majority of directors (80.6%) take inventory on a monthly basis and nearly all (99.1%) use FIFO inventory rotation. More than six out of ten directors would rather throw away all product of a certain type than risk serving a recalled product.

Less than half of directors surveyed had not been provided training from the state on food recalls (47.8%) or inventory management (46.2%). Likewise, less than half (46.0%) stated that staff is not provided annual in-service training on recalls or inventory management. Less than a quarter (23.6%) of the respondents stated they had received the National Food Service Management Institute (NFSMI) Inventory Management and Tracking training, leaving room for additional growth.

Research Question 2: Is there a relationship between food recall attitudes and response behaviors?

There was a negative relationship between attitudes and use of recalls ($R^2=.024$, $F=6.954$, $p=0.001$) between how likely directors think they are of possessing a recalled product and their use of recall systems ($\beta=-0.130$, $p=0.004$). Foodservice directors may be less likely to think they will possess a recalled item if they are often checking for recalls and are seldom affected by one.

Research Question 3: Is there a relationship between operational demographics of school district size or number of children with food allergies in the district and food recall attitudes and behaviors of school foodservice directors?

No relationships were found between operational demographics and attitudes. There was a positive relationship between operational demographics and use of recall systems ($R^2=.016$, $F=4.201$, $p=0.015$). The larger the district size that the school foodservice director is in, the more frequent they were to use recall systems ($\beta=0.127$, $p=0.011$). This is encouraging, because larger districts are buying more products and serving more children; however, most districts are small. Although operational demographics were shown to have a significant positive relationship to communication with state agency and vendors about food recalls ($R^2=.019$, $F=3.429$, $p=0.033$), neither district size ($\beta=0.118$, $p=.089$) or number of students with documented food allergies ($\beta=0.028$, $p=.404$) had a significant relationship to communication.

Research Question 4: Is there a relationship between individual demographics of prior experience with a food recall, completion of food safety certification, educational level, or work experience and food recall attitudes and behaviors of school foodservice directors?

There was a significant relationship found between individual demographics and perceived importance toward food recalls ($R^2=.058$, $F=4.042$, $p=0.000$). School foodservice directors who had the certification Certified Food Safety Manager (CFSM) ($\beta=-0.105$, $p=0.016$) were less likely to perceive food recalls as important. It is unsure why those who had CFSM would have a lower perceived importance for food recalls. However, the CFSM certification may need to further highlight the importance of recall practices as part of their certification. There was a negative relationship between years in school foodservice and perceive important ($\beta=-0.103$, $p=0.049$). Those who work in school foodservice may view recalls as less important if their school seldom encounters a recall. There was a positive relationship between prior

experience with a food recall and perceived important ($\beta=0.215$, $p=.000$). Showing those who have experienced a recall recognize their importance.

There was a significant relationship between individual demographics and perceived likelihood of possessing a recalled product ($R^2=.047$, $F=3.238$, $p=0.001$). Those who had been certified through ServSafe® perceived a higher likelihood of possessing a recalled product ($\beta=0.095$, $p=0.029$). This suggests that ServSafe® provides awareness of food recall occurrence. Those with more years in school foodservice perceived a higher likelihood of possessing a recalled product ($\beta=0.134$, $p=0.011$). This could indicate that food recalls do occur in schools. There was a negative relationship between prior experience with a food recall and perceived likelihood of possessing a recalled product ($\beta=-0.151$, $p=0.001$). These findings suggest that it is not often that the recalled product is found in the inventory or that they are properly checking and removing recalled product.

There was a positive relationship between individual demographics and practices of responding to a recall ($R^2=.070$, $F=3.305$, $p=0.001$). Those with more experience with recalls reported more frequent practices of responding to a recall ($\beta=0.165$, $p=.002$). Also, the higher the education level the foodservice director had the more frequently they reported to respond to a recall ($\beta=0.137$, $p=0.009$). Higher education may be a factor that needs to be more heavily weighed for foodservice director positions.

There was a significant relationship between individual demographics and use of recall systems ($R^2=.065$, $F=4.518$, $p=0.000$). Those with more prior experience with a food recall had reported more frequent use of recall systems ($\beta=0.197$, $p=.000$). This is probably due to heighten awareness of the recall systems in place after being affected by a recall.

There was a positive relationship between individual demographics and communication with state agency and vendors about food recalls ($R^2=.069$, $F=3.215$, $p=0.002$). Those with prior experience with a food recall were more likely to communicate with state agency staff and vendors about food recalls ($\beta=0.222$, $p=.000$). This suggests there is good communication occurring during recalls. Also, a higher education level of the foodservice director demonstrated more frequent communication with state agency and vendors about food recalls ($\beta=0.124$, $p=0.019$). This is another reason why educational level of the director should be highly considered.

Research Question 5: How many school foodservice directors are signed up for Recalls.gov, FoodSafety.gov, and USDA/FNS Commodity Alert System?

The most common method for obtaining recall notifications is communication from the state agency by way of email or telephone (88.9%). It is also common to receive recall notification for non-USDA products from their state agency (72.3%). Other commonly used methods are communication from vendors (85.9%), through email or telephone, email from USDA/FNS Commodity Alert System (60.5%), and press releases from the manufacturers (54.3%). More directors are signed up to receive emails from FoodSafety.gov (42.3%) or Recalls.gov (33.3%) than use Recalls.gov and FoodSafety.gov websites (26.5%).

Most school foodservice directors prefer to learn about food recalls through communication from their state agency (86.6%) by way of email or telephone and from vendors (82.2%) by way of email or telephone. About half (50.4%) prefer to receive an email from USDA/FNS Commodity Alert System. An email from FoodSafety.gov (42.0%) or Recalls.gov (35.8%) and press releases from the manufacturers (29.3%) are slightly less preferred.

Based on feedback from school foodservice directors' statements of what works well regarding current recall practices, communication is key. Notifications through email, text, phone, media, and websites work well in addition to follow up information. Timeliness is a huge factor when removing a recalled product, and email is believed to be the fastest. The use of both email and phone notifications assists in being sure the needed person receives the message. Further communication within the district through phone trees, recall alerts, emails, etc. allows school nutrition staff to ensure recalled product is removed. Inventory practices of staff play a large role in removing recalled product as well. It was interesting to find that a large number of directors are immediately discarding all product because they do not want to take the chance. There was some concern for properly locating recalled product due to unreadable or not understandable trace back information. Photos, lot numbers, manufacture dates, etc. were stated to be helpful. The county health inspector, state child nutrition services, forms for the food recall process, and training can be utilized for improving recall practices.

Areas with room for improvement are methods for delivering notifications. One complete system was suggested to be used for food recalls in all school foodservice operations. It was found that school foodservice directors, for the most part, want the recall information delivered to them; it is a burden to check the state website every day. Timeliness has much room to improve. It is discouraging to see a recall on the news and serving a product to children before they receive notification. Notifications would be better utilized if the information given to them were pertinent. A large number of recalls that do not affect schools lead directors to relax their awareness of food recalls. Recall notifications given to directors need to be easier to read and understand. Information such as reason for recall, how to handle the product, who purchased, when, and how much is helpful for properly handling the recall. Training by the

state, in-service training, training on inventory management, and information on recall systems will increase recall awareness as well as give directors the tools they need to effectively respond to food recalls in school foodservice operations.

Conclusions and Implications

School foodservice directors are confident that their districts can adequately respond to a food recall due to appropriate policies and procedures. Fewer directors are confident in being able to identify the recalled product from the lot information. Most directors take inventory on a monthly basis and almost all use FIFO inventory rotation; however, increased trace back would assist in properly removing recalled product.

Although it is not always possible to inform directors of recalls before the product is served, the timeliness of recall notifications should be faster and should occur before the general public knows about them. A large number of directors would rather throw away all product of a certain type rather than risk serving a recalled product. Almost half of directors had not been provided training from the state or annual in-service training on food recalls or inventory management.

A survey was used to measure school foodservice directors' attitudes and behaviors and assess relationships among variables. Predictors of attitudes were found to be food safety certification, work experience, and prior experience with a food recall. It was found that school foodservice directors who have the CFSM certification are less likely to perceive food recalls as important. It may be that the CFSM certification should highlight the importance of recall practices as part of their certification. Prior experience with a food recall emphasizes the importance of food recalls because those who are familiar with them know just how important they are. Those with more years in school foodservice perceiving a higher likelihood of

possessing a recalled product emphasizes the importance of experience. Those with more prior experience with a food recall perceiving a lower likelihood of possessing a recalled product reiterates the importance of experience.

Predictors of behaviors were found to be perceived likelihood of possessing a recalled product, educational level, prior experience with a food recall, and size of district. Foodservice directors may be less likely to think they will possess a recalled item if they are often checking for recalls and seldom being affected by them. Higher education levels and experience may be factors that need to be more heavily weighed for foodservice director positions because it increases recall behaviors. Likewise, those with prior experience with a food recall showed for frequent recall behaviors. Mock recalls could provide the same benefit to communication as going through an actual recall. The larger the district size, the more frequent they will use recall behaviors. However, all school districts, small or large, can be affected so the directors need to pay close attention to recalls and practice regular recall behaviors.

The most common methods to obtain recall notification is communication from the state agency thorough email or telephone, vendors through email or telephone, email from USDA/FNS Commodity Alert System, and press releases from the manufacturers. Websites such as Recalls.gov and FoodSafety.gov could be more fully utilized. More directors are signed up to receive emails than use Recalls.gov and FoodSafety.gov websites. Most school foodservice directors prefer to learn about food recalls from communications from the state agency by way of email or telephone and from vendors by way of email or telephone. Notification through email followed by a phone call should be used more prevalently. About half prefer to receive an email from USDA/FNS Commodity Alert System, but should be emphasized in training on the benefits of this system as a reliable way of receiving recall notifications on USDA Foods. An email from

FoodSafety.gov or Recalls.gov and press releases from the manufacturers are slightly less preferred, though are a reliable ways of sending information without the time and resources of more personal routes of communication.

This study further illustrated the need for training. Frequent training is needed that specifies inventory management practices and how to identify trace back information. Almost half of the directors have not had training from the state on food recalls or inventory management. Increased training on recalls and inventory management would improve recall awareness, knowledge of how to find recall information, and inventory practices. Schools should stress the importance of obtaining ServSafe® certification and make it a requirement of all food handling staff if they are not already doing so. Increased training through National Food Service Management Institute (NFSMI) Inventory Management and Tracking with proper documentation of training would reduce the risk of liability and wasteful inventory practices for those who do not currently require it.

Federal and state agencies can use the results of this study in developing programs to improve food recall practices. Based on the open-ended questions, the delivery of recall notifications to directors could be simplified so that notifications are easier to obtain and more likely to be received. The timeliness of receiving recall notifications would ideally be faster as well. It is important to directors that they receive recall notification before the product is served. The information on recall notifications needs to be more descriptive so that the product can be identified and handled properly. Recall notification given to directors should be limited to those that affect school meals. Too many unnecessary recall notifications are desensitizing and will diminish the effectiveness of the recalls that do pertain to them. Someone should be assigned in each district to monitor recalls. With the large number of children with food allergies there is an

increased need for quickly responding to food recalls. There is room for improving communication, there needs to be more training opportunities offered through the state agency.

Limitations and Recommendations

This study focuses on food recalls in school foodservice operations. Because other commercial foodservice operations were not examined in this study, recommendations can only be made for better food recall practices in schools. Further research can examine both school and other commercial foodservice operations. A limited sample size may not represent all school foodservice directors in the U.S. Further research could obtain a large sample from each state in order to make regional comparisons. Although little differences were found between early and late responders, there is not a guarantee that respondents did not differ from non-respondents. Future research could increase the window of time for responses and add another reminder email.

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Appendix A - **Institutional Review Board Approval Letter**

TO: Kevin Roberts
HMD
106 Justin Hall

Proposal Number: 6589

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

DATE: 03/05/2013

RE: Proposal Entitled, "Food Recall Attitudes and Behaviors of School Foodservice Directors"

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

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

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

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

Appendix B - Cover Letter

Dear Foodservice Director,

Food recalls play a significant part in the safety of food served in schools. A research team at Kansas State University is conducting a survey to explore the attitudes and behaviors of school foodservice directors related to food recalls. If someone else handles food recalls for your district, please forward this email to the person responsible for this matter.

Your response is very important to the success of this study. We greatly appreciate your time and assistance. The results of this study will remain anonymous. Only group data will be reported. You can withdraw from the study at any time while completing the survey. Please complete the linked survey by April 12, 2013. It should take you between 5-10 minutes to complete.

Completing this survey will indicate your willingness to participate in the study. Should you have any questions about the rights of individuals in this study or about the way this study is conducted, you may contact the Kansas State University Research Compliance Office at (785) 532-3224. If you have any questions regarding this study, please contact Mrs. Amber Grisamore at (785) 532-2211 (amberag@k-state.edu) or Dr. Kevin Roberts at (785) 532-2399 (kevrob@k-state.edu).

Here is a link to the survey:
<https://www.surveymonkey.com/s/recalls>

Thank you for your participation!

Cordially,

Amber A. Grisamore
Graduate Research Assistant
The Center of Excellence for Food Safety Research in Child Nutrition Programs

Dr. Kevin R. Roberts
Associate Professor & Director
The Center of Excellence for Food Safety Research in Child Nutrition Programs

Appendix C - Survey

Handling Food Recalls in School Foodservice

Page 1

Directions: Please answer the following questions based on your opinion.

1. Please rate the following statements on a scale from (1) strongly disagree to (5) strongly agree.

	Strongly Disagree	Disagree	Undecided	Agree	Strongly Agree
Responding quickly to a food recall is part of ensuring the safety of children in my district.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
It is important to monitor food recalls for products purchased in my district.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
There are minimal food recalls for foods used in schools.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
School foodservice directors who serve recalled product may endanger children.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
When I receive a recall notification, I believe it is important to check food in my district to determine if it has been recalled.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Recalled product is likely to be served in a school in my district.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Removing recalled product is very important to protect children in my district.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
In my position, food recalls have little impact on what I do.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Responding to a food recall is part of protecting the health of children in my district.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
It is important to monitor recalls to avoid serving recalled foods.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
It is likely that my district could have a product in inventory that could have been recalled.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
When I am notified of a food recall, it is important to immediately check my inventory for the product.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The information I receive about food recalls is adequate to ensure that recalled product is removed from inventory.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I receive recall notifications in a timely manner so that I may adequately respond.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
My inventory records are detailed enough so that I can trace recalled products.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I have a great deal of experience with food recalls.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

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Please rate how often you perform the following tasks on a scale from (1) never to (5) very often.

Handling Food Recalls in School Foodservice

2. How often do you or another designated person in your district:

	Never	Seldom	Sometimes	Regularly	Very Often
check for food recalls?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
use food recall systems, such as recalls.gov or food safety.gov?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
communicate with your state agency about recalls?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
communicate with your vendors about food recalls?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

3. Does your state agency send out recall notifications for non-USDA products?

- Yes
 No

4. Have you received a recall notification directly from your vendor?

- Yes
 No

5. When I receive a recall notification from my vendor, I immediately:

	Never	Seldom	Sometimes	Regularly	Very Often
determine if I have purchased that product.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
check the product code to see if I have it in inventory.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
notify staff to separate the product from the general inventory to assure it is not served.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
contact vendor for further instructions.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

6. Have you received a recall notification from your state agency?

- Yes
 No

7. When I receive a recall notification from my state agency, I immediately:

	Never	Seldom	Sometimes	Regularly	Very Often
determine if I have purchased that type of product.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
check the product code to see if I have it in inventory.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
notify staff to separate the product from the general inventory to assure it is not served.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
contact state agency for further instructions.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Handling Food Recalls in School Foodservice

8. Which methods of recall notification do you use to obtain recall information (select all that apply).

- Communication through state agency (email, telephone)
- Communication from vendor (email, telephone)
- Press release from the manufacturer
- Email from Recalls.gov
- Email from FoodSafety.gov
- Email from USDA/FNS Commodity Alert System
- Web Sites (Recalls.gov, FoodSafety.gov)
- Mobile App (Recalls.gov, FoodSafety.gov)
- From peers in other districts
- Other (please specify)

9. How would you prefer to learn about food recalls (select top three)?

- Communication through state agency (email, telephone)
- Communication from vendor (email, telephone)
- Press release from the manufacturer
- Email from Recalls.gov
- Email from FoodSafety.gov
- Email from USDA/FNS Commodity Alert System
- Web Sites (Recalls.gov, FoodSafety.gov)
- Mobile App (Recalls.gov, FoodSafety.gov)
- From peers in other districts
- Other (please specify)

Handling Food Recalls in School Foodservice

10. Rate your level of confidence for each of the following statements:

	Not confident	Somewhat confident	Reasonably confident	Mostly confident	Very confident
When our district receives lot information for a recalled product, we can identify the product.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Our district has appropriate policies and procedures in place for responding to a food recall.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Our district can adequately respond to a food recall.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Personnel in our district have the knowledge to respond to a food recall.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

11. Please answer yes or no for each of the following statements:

	Yes	No
I would rather throw away all products of a certain type recalled than risk using a recalled product (i.e. one lot of green beans recalled, I throw out all product).	<input type="radio"/>	<input type="radio"/>
We take a physical inventory on a monthly basis.	<input type="radio"/>	<input type="radio"/>
We use first in, first out (FIFO) inventory rotation.	<input type="radio"/>	<input type="radio"/>
I have been provided training from the state on food recalls.	<input type="radio"/>	<input type="radio"/>
I have been provided training from the state on inventory management.	<input type="radio"/>	<input type="radio"/>
I have received National Food Service Management Institute (NFSMI) Inventory Management and Tracking training.	<input type="radio"/>	<input type="radio"/>
Staff is provided annual in-service training on recalls or inventory management.	<input type="radio"/>	<input type="radio"/>
I have a reliable way to contact departmental staff in case of a food recall.	<input type="radio"/>	<input type="radio"/>

12. What works well concerning current food recall practices?

Handling Food Recalls in School Foodservice

13. What could be done to improve the recall system for school foodservice?

Page 3

14. Please select your state.

Your state or region:

15. What is the size of your district?

Number of students:

16. What is the approximate number of students with documented food allergies in your district?

Number of students:

17. What is your job title?

18. Does your district have a staff member whose main responsibility is managing food recalls?

Yes

No

19. Which of the following food safety certifications do you have?

ServSafe®

Certified Food Protection Professional (CFPP)

Certified Food Safety Manager (CFSM)

Prometric's Certified Professional Food Manager (CPFM) Program

Handling Food Recalls in School Foodservice

20. What is the highest level of school you have completed or the highest degree you have received?

- Less than high school degree
- High school degree or equivalent (e.g., GED)
- Some college but no degree
- Associate degree
- Bachelor degree
- Graduate degree

21. How many of years have you been employed in the foodservice industry?

- 5 years or less
- 6 - 15 years
- 16 - 25 years
- 26 years or more

22. How many of years have you been employed in school foodservice?

- 5 years or less
- 6 - 15 years
- 16 - 25 years
- 26 years or more

23. What is your gender?

- Male
- Female

Complete!

Thank you for participating in the survey.