

Food Recall Attitudes and Behaviors of School Nutrition Directors

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ABSTRACT

Purpose/Objectives

The purpose of this study was to explore school nutrition directors' attitudes and behaviors about food recalls. Specific objectives included: 1) Determine current food recall attitudes and the relationship between demographics and these attitudes; 2) Determine current practices of school nutrition directors related to food recalls and the relationship between demographics and these behaviors; 3) Examine school nutrition directors' level of confidence in responding to a recall; 4) Determine current food recall communication systems and practices in school nutrition operations.

Methods

An online survey was used for data collection and consisted of three sections: attitudes, self-reported behaviors, and demographics. To ensure content validity of the instrument, three experts reviewed the survey prior to pilot testing. The survey was then pilot tested with 14 school nutrition directors and state agency personnel. The survey was randomly distributed to 4,049 school nutrition directors across the United States. Statistical analysis was completed using SPSS (v. 20.0).

Results

A total of 567 (14%) usable surveys were collected. Perceived importance was rated very high, while perceived likelihood of possessing a recalled product was rated fairly low. Predictors of attitudes were found to be certification, work experience, and prior experience with a food recall. Respondents reported positive food recall behaviors. 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. Respondents were confident that their district can adequately respond to a food recall. Communication about food recalls was reported to most often occur through the state agency.

Application to Child Nutrition Professionals

Child nutrition professionals can use the results of this study for improving recall practices in schools. These results will also create awareness for food recalls systems that are available to child nutrition professionals.

Keywords: food recalls; food safety; foodservice director; school nutrition

INTRODUCTION

More than 31.8 million lunches are served daily in the United States through the National School Lunch Program (US Department of Agriculture [USDA] Food and Nutrition Service [FNS], 2011a). Through this program the USDA provides commodity foods to the schools to use in their Child Nutrition Program. These 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.

A food recall is the voluntary process where manufacturers and distributors remove food products from the market that may violate US Food and Drug Administration (FDA) or USDA regulations to protect consumers (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 regulations are the responsibility of the FSIS. All other products are regulated by the FDA (USDA FSIS, 2011).

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 product involved in a Class III recall will not cause adverse health effects, but does not meet company standards (USDA FSIS, 2011). FDA uses a similar classification system

In 2007 to 2011, a total of 1,960 food recalls occurred. Over this time period, possible *Salmonella* contamination accounted for the largest percentage of recalls (41.9%), followed by undeclared allergens (23.7%) (USDA Food Safety and Inspection Service [FSIS], 2012a, 2012b, 2012c, 2012d, 2012e, 2012f, 2012g, 2012h, 2012i, 2012j; US Food and Drug Administration [FDA], 2012a, 2012b, 2012c, 2012d, 2012e). 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 several formal communication systems in place for both USDA and commercial food recalls, such as Recalls.gov, FoodSafety.gov, and the USDA/FNS Commodity Alert System. School nutrition directors are notified about recalls of USDA foods through USDA or state agency channels (USDA FSIS, 2011). 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.).

Previous research concerning food recalls has been consumer focused (Hallman, Cuite, & Hooker, 2009; Steelfisher, Weldon, Benson, & Blendon, 2010). Hallman, Cuite, and Hooker (2009) found that consumers acknowledge the importance of recalls and recognize that recalls help save lives. Consumers were most concerned with a food recall that was the result of a large number of people becoming ill. Steelfisher et al. (2010) found evidence of general food recall awareness, but found that consumers are usually unaware of the depth of most recalls.

There is a paucity of studies exploring the attitudes and behaviors of school nutrition directors in relation to food recalls. Thoroughly examining these attitudes and behaviors can help to improve the effectiveness of recalls in schools.

Purpose of Study and Research Questions

The purpose of this study was to explore school nutrition directors' attitudes and behaviors about food recalls. This study evaluated what variables influenced attitudes and behaviors of school nutrition directors toward food recalls. The objectives of this study were to: 1) Determine current food recall attitudes and the relationship between demographics and these attitudes; 2) Determine current practices of school nutrition directors related to food recalls and the relationship between demographics and these behaviors; 3) Examine school nutrition directors' level of confidence in responding to a recall and 4) Determine current food recall communication systems and practices in school nutrition operations.

METHODOLOGY

Population and Sample

The population for this study included school nutrition directors in the US. For this study, a school nutrition 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 to 2011 school years, excluding component districts, state districts, federal districts, and districts labeled as other. Based on this target population, 370 responses were required to achieve a 95% confidence level and a 5% sampling error (Dillman, 2007). The sample for this study consisted of 4,049 school nutrition directors.

Data Collection Instruments

The survey instrument used in this study consisted of three sections: attitudes, self-reported behaviors, and demographics. The first section assessed attitudes on a 5-point Likert-type scale from strongly disagree (1) to strongly agree (5). Items included perceived importance, relevance, and likelihood of having purchased the affected product, which were adapted from a study by Hallman, Cuite, and Hooker (2009). The survey also included items to examine positive and negative opinions about current recall practices and level of confidence in responding to a recall. The second section consisted of self-reported behaviors of school nutrition 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 obtained demographic information. This included food safety certification, educational level, work experience, prior experience with a food recall, and gender. School district demographic information, such as school district size and number of students with a food allergy, was also collected.

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 research protocol was reviewed and approved by the Kansas State University Institutional Review Board prior to data collection.

The survey was pilot tested with 14 school nutrition directors and state agency personnel with a 47% response rate. Based on the results of the pilot study, no questions were removed from the survey, but minor wording modifications were made.

Data Collection

Market Data Retrieval™, a marketing company that maintains databases for marketing to educational groups (Market Data Retrieval, 2013), sent an email, including cover letter and a link to the final survey to a random national sample of 4,049 school nutrition directors on April 1, 2013. A 10-business day window for completing the survey was given. After seven days, one reminder was sent to all participants.

Data Analyses

All statistical analyses were 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.

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 then used to determine which variables influenced attitudes and behaviors of school nutrition directors.

RESULTS AND DISCUSSION

A total of 4,049 school nutrition directors were sent surveys by email. Of these, 18 emails were undeliverable due to incorrect contact information, yielding a total sample size of 4,031. A total of 690 school nutrition directors completed the survey, but due to incomplete or missing data, only 567 were usable, yielding a 14% response rate.

Demographic Information of Participants

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.

Individual demographics of the directors are presented in Table 1. The majority of respondents were female (84%), 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 nutrition for six to 15 years (34.6%).

Attitudes

Overall, most directors had positive attitudes about food recalls (Table 2). Approximately 92% of directors strongly agreed that responding quickly to a food recall is part of ensuring the safety of children in their districts. The statement "*In my position, food recalls have little impact on what I do*" was reverse coded for data analysis.

Table 1. Demographic Characteristics of School Nutrition Directors (N=567)

Characteristics	n(%)^a
Gender	
Male	68 (12.0)
Female	476 (84.0)
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 nutrition	
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.

A factor analysis was conducted on the 12 attitude items. 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. The Cronbach alpha for the perceived importance and perceived likelihood of possessing a recalled product factors were 0.907 and 0.494, respectively (Table 2).

Perceived importance consisted of nine items. The item-total statistics showed that deleting any item would decrease the alpha. Therefore, all items were retained. The mean overall perceived importance for the factor was 4.8 ± 0.5 on a 5-point scale.

The overall perceived importance score was used as the dependent variable for one regression 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 nutrition], and prior experience with a food recall) as the independent variables. The model was significant ($R^2=.058$, $F=4.042$, $p=0.000$). The certification Certified Food Safety Manager (CFSM) ($\beta=-0.105$, $p=0.016$), number of years in school nutrition ($\beta=-0.103$, $p=0.049$), and prior experience with a food recall ($\beta=0.215$, $p=.000$) were significant independent variables. The regression showed perceived importance was negatively associated with both the CFSM certification and number of years in school nutrition. It is possible that the certification course should focus more on food recalls and the implications they can have in the foodservice environment; however, it is difficult to determine this without further investigation. Likewise, those with more years in school nutrition may have perceived recalls as less important if they had become desensitized to recall notification or were seldom impacted by a recall. The positive relationship between prior experience with a food recall and perceived important of food recalls may indicate the seriousness of recall notifications.

The second factor, perceived likelihood of possessing a recalled product, consisted of three items. However, the item-total statistics showed that deleting “*There are minimal food recalls for foods used in schools*” would increase the alpha. After review, this item was deleted from further analysis.

The overall perceived likelihood of possessing a recalled product score was 1.7 ± 0.8 on a 5-point scale. This indicates that respondents have the perception that product recalls in school nutrition operations are not likely to happen.

The overall perceived likelihood of possessing a recalled product score was used as the dependent variable for one regression 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 nutrition], and prior experience with a food recall) as the independent variables. The model was significant ($R^2=.047$, $F=3.238$, $p=0.001$). ServSafe® certification ($\beta=0.095$, $p=0.029$), number of years in school nutrition ($\beta=0.134$, $p=0.011$), and prior experience with a food recall ($\beta=-0.151$, $p=0.001$) were significant. This suggests that ServSafe® training provides awareness of food recall occurrence. Surprisingly, those with more prior experience with a food recall perceive a lower likelihood of possessing a recalled product.

Behaviors

Practices were examined using self-reported behaviors that relate to food recalls in schools (Table 3). Approximately, 77% of respondents have received a recall notification directly from their vendor and almost 86.2% from their state agency. However, directors’ use of food safety recall systems such as Recalls.gov or FoodSafety.gov was split. While 55% regularly or very often utilize these systems, 23% indicated they seldom or never do.

Table 2. School Nutrition Directors' Attitudes Toward Food Recalls (n=567)

Statements from Survey	Frequency (%)					
	<i>M</i> ± <i>SD</i> ^a	Strongly Disagree	Disagree	Undecided	Agree	Strongly Agree
Perceived importance ($\alpha = 0.907$)						
Responding quickly to a food recall is part of ensuring safety of children in my district.	4.9 ± 0.6	10 (1.8)	0 (0.0)	0 (0.0)	34 (6.0)	523 (92.2)
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 ± 0.6	9 (1.6)	1 (0.2)	0 (0.0)	52 (9.2)	505 (89.1)
Responding to a food recall is part of protecting the health of children in my district.	4.8 ± 0.6	10 (1.8)	1 (0.2)	0 (0.0)	58 (10.2)	498 (87.8)
It is important to monitor food recalls for products purchased in my district.	4.8 ± 0.6	10 (1.8)	0 (0.0)	2 (0.4)	79 (13.9)	476 (84.0)
When I am notified of a food recall, it is important to immediately check my inventory for the product.	4.8 ± 0.6	11 (1.9)	0 (0.0)	0 (0.0)	64 (11.3)	492 (86.8)
School nutrition directors who serve recalled product may endanger children.	4.7 ± 0.7	13 (2.3)	1 (0.2)	11 (1.9)	85 (15.0)	457 (80.6)
Removing recalled product is very important to protect children in my district.	4.7 ± 0.8	20 (3.5)	3 (0.5)	1 (0.2)	61 (10.8)	482 (85.0)
It is important to monitor recalls to avoid serving recalled foods.	4.7 ± 0.7	11 (1.9)	1 (0.2)	1 (0.2)	102 (18.0)	452 (79.7)
In my position, food recalls have little impact on what I do.	1.4 ± 0.7	381 (67.2)	160 (28.2)	15 (2.6)	7 (1.2)	4 (0.7)
Perceived likelihood of possessing a recalled product ($\alpha = 0.494$)						
There are minimal food recalls for foods used in schools.	2.2 ± 0.9	100 (17.6)	335 (59.1)	69 (12.2)	54 (9.5)	9 (1.6)
It is likely my district could have a product in inventory that could have been recalled. ^b	1.9 ± 1.1	278 (49.0)	160 (28.2)	53 (9.3)	53 (9.3)	23 (4.1)
Recalled product is likely to be served in a school in my district.	1.4 ± 0.8	412 (72.7)	109 (19.2)	24 (4.2)	7 (1.2)	15 (2.6)

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

^bItem was removed from the factor and further data analysis after item-total statistics showed that deleting this item would increase the alpha.

Table 3. School Nutrition Directors' Self-reported Food Recall Behaviors (n=567)

Statements from Survey	Frequency (%) ^a					Very Often
	<i>M</i> ± <i>SD</i>	Never	Seldom	Sometimes	Regularly	
Practices of responding to a recall ($\alpha = 0.955$)^b						
<i>When I receive a recall notification from my vendor, I immediately:</i>						
Determine if I have purchased that product.	4.7 ± 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 ± 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 ± 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 purchased that product.	4.7 ± 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 ± 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 ± 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 ± 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 ± 1.3	66 (11.6)	64 (11.3)	121 (21.3)	170 (30.0)	142 (25.0)
Communication with state agency and vendors ($\alpha = 0.676$)						
<i>How often do you or another designated person in your district:</i>						
Communicate with your vendors about food recalls?	3.7 ± 1.0	14 (2.5)	49 (8.6)	154 (27.2)	221 (39.0)	123 (21.7)
Communicate with your state agency about recalls?	3.5 ± 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 ± 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 ± 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.

A factor analysis was conducted on behavioral items. Three factors resulted: practices of responding to a recall ($\alpha=0.955$), use of recall systems ($\alpha=0.684$), and communication with state agency and vendors about food recalls ($\alpha=0.676$). 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 consisted of four items (Table 3). Upon completing item-total statistics for these factors, all items were retained.

The average factor scores for each of the three identified factors were then used in regression models using the average factor score as the dependent variable and individual demographics in the first model and attitudes in the second model as independent variables.

The only significant model utilizing average practices of responding to a recall ($M=3.6 \pm 1.0$) was the model utilizing individual demographics as the independent variable. Educational level ($\beta=0.137$, $p=0.009$) and prior experience with a food recall ($\beta=0.165$, $p=0.002$) were significant independent variables. The higher the educational level of the school nutrition director, the more frequently they respond to a recall, regardless of how often a recall occurs. Additionally, those with more experience with recalls, more frequently respond to recalls.

The models using the average use of recall systems score ($M=4.1 \pm 0.6$) as the dependent variable found that both individual demographics ($R^2=0.065$, $F=4.518$, $p=0.000$) and attitudes ($R^2=0.024$, $F=6.954$, $p=0.001$) were significant. When using individual demographics as predictors, prior experience with a food recall ($\beta=0.197$, $p=0.000$) was the significant independent variable, with a positive relationship. This is likely due to heightened awareness of recalls after being affected by a recall. When using attitudes as predictors, perceived likelihood of possessing a recalled product ($\beta=-0.130$, $p=0.004$) was the significant independent variable, with a negative relationship. This suggests that the more familiar the director is about food recall systems, the lower their perceived likelihood of possessing a recalled product will be. Training needs to reinforce that recall systems need to be frequently used, even if they rarely see a relevant recall.

Only one multiple linear regression using the communication frequency with the state agency and vendors score ($M=4.1 \pm 0.6$) was significant. The model testing the relationship of individual demographics and communication with state agency and vendors was significant ($R^2=.069$, $F=3.215$, $p=0.002$). 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 school nutrition directors with a higher level of education and more prior experience with a food recall have greater communication with state agencies and vendors about food recalls.

Level of Confidence in Responding to a Recall

When examining school nutrition directors' level of confidence in responding to a recall, school nutrition directors' perceptions of the information they receive, inventory practices and training utilized, and ability to respond adequately to a recall were explored. These results are presented in Table 4. Approximately 89% of school nutrition directors were mostly confident (4) or very confident (5) that their district can adequately respond to a food recall ($M=4.5$, $SD=0.7$). More than 94% of respondents indicated they have a reliable way 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.

Table 4. School Nutrition Directors' Level of Confidence in Responding to a Recall (n=567)

Statements from Survey	<i>M ± SD^a</i>	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.	4.2 ± 1.0	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.	4.0 ± 1.0	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.	4.0 ± 1.0	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.	4.5 ± 0.7	0 (0.0)	8 (1.4)	52 (9.2)	146 (25.7)	357 (63.0)
Personnel in our district have the knowledge to respond to a food recall.	4.4 ± 0.8	1 (0.2)	18 (3.2)	73 (12.9)	158 (27.9)	311 (54.9)
Our district has appropriate policies and procedures in place for responding to a food recall.	4.2 ± 0.9	5 (0.9)	28 (4.9)	82 (14.5)	168 (29.6)	280 (49.4)
When our district receives lot information for a recalled product, we can identify the product.	4.3 ± 0.9	5 (0.9)	12 (2.1)	81 (14.3)	151 (26.6)	313 (55.2)

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

Current Recall Communication Systems and Practices

School nutrition directors reported that they most often communicated about food recalls through the state agency (email or telephone) (88.9%). More than 72% of respondents indicated 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%). These less common systems should be recommended for use as a more proactive approach to tracking food recalls.

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

When asked what could be done to improve recall systems in schools, respondents showed great concern for how recall notifications were delivered and timeliness of their delivery. 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.

CONCLUSIONS AND APPLICATION

Most school nutrition 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, showing room for improvement in this area of training. 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 prompt 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, a practice leading to increased food waste. Almost half of directors had not been provided training on food recalls or inventory management.

The survey used to measure school nutrition directors' attitudes and behaviors and assess relationships among variables revealed predictors of attitudes to be food safety certification, work experience, and prior experience with a food recall. 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. However, results indicated that school nutrition directors who have the CFSM certification are less likely to perceive food recalls as important. That those with more

years in school nutrition perceive a higher likelihood of possessing a recalled product emphasizes the importance of experience.

Predictors of behaviors were found to be perceived likelihood of possessing a recalled product, educational level, and prior experience with a food recall. School nutrition directors are less likely to think they will possess a recalled item if they often check for recalls, but are seldom impacted by them. Because higher educational levels and experience increase recall response behaviors, these factors should be more heavily weighed when hiring for director positions. The standards for educational level will likely be addressed in the professional standards being developed by USDA. Results also indicated that those with prior experience with a food recall are more likely to respond appropriately. Mock recalls could provide the same benefit as prior experience with an actual recall and should be utilized in school districts to simulate recalls.

The most common methods of obtaining recall notification are communication from the state agency thorough email or telephone, communication from vendors through email or telephone, email from the USDA/FNS Commodity Alert System, and press releases from the manufacturers. Websites such as Recalls.gov and FoodSafety.gov could be more fully utilized.

Several school nutrition directors in this study suggested that notification about food recalls should occur through email followed by a phone call. About half prefer to receive an email from the USDA/FNS Commodity Alert System. Because of the ease of use and reliability of the system, an introduction to the USDA/FNS Commodity Alert System, including the benefits of using the system, should be included in training with directors about recalls concerning USDA foods. Emails from FoodSafety.gov or Recalls.gov and press releases from the manufacturers are slightly less preferred, although they are reliable ways of sending information without the time and resources of more personal routes of communication.

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. 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.

Results indicated that, on average, 124 students per district have a food allergy. Because a large portion of the recalls (23.7%) are the result of an undeclared allergen, there is an increased need for quickly responding to food recalls in child nutrition programs.

This study further illustrates 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 agency on food recalls or inventory management. Increased training on both topics would improve recall awareness, knowledge of how to find recall information, and inventory practices. Moreover, proper tracking of inventory and training

would reduce the risk of liability and wasteful inventory practices for those who do not currently require it.

This study focuses on food recalls in school nutrition 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 nutrition directors in the US. 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 no 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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