

Training and Perceived Barriers to Implementing Food Safety Practices in School Foodservice

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ABSTRACT

While food safety is considered to be an important issue in school foodservice, there have been several recent outbreaks of foodborne illness in schools and research shows that safe sanitation and food-handling practices are not always followed in school meal programs. The purpose of this study was to identify barriers to implementing food safety practices, compare barriers for centralized and conventional foodservice systems, and determine the relationship of demographic characteristics of directors and districts with barriers. The study also determined training and certification of employees.

A written questionnaire was developed for this study that included nine barrier statements and 17 questions about school foodservice directors and their districts. A total of 1,169 questionnaires were mailed to a national random sample, in addition to all Iowa school foodservice directors and 33 directors of centralized foodservice systems. A total of 414 questionnaires were returned for a response rate of 35.4%. Statistical software SPSS version 10.0 for Windows was used for descriptive statistics, factors analysis for the barrier items, multiple linear regression, and t-test comparisons.

Two barrier factors were identified and named: employee barriers (6 items; $\alpha=0.81$) and resource barriers (3 items; $\alpha=0.83$). Employee training was rated as the greatest individual barrier item, and there were no differences in perceived barriers for supervisors of centralized and conventional foodservice systems. Directors in Iowa had a lower total barrier score and a lower employee barrier score than the national sample. Characteristics of the directors were not related to identified barriers. In districts with larger percentages of certified employees, barriers were rated lower. Barriers also were perceived to be lower in districts with an employee (or employees) who had primary responsibility for food safety and districts that had changed the form in which potentially hazardous food was purchased.

Directors should consider providing ongoing food safety training and encouraging certification of employees. They also may consider giving one or more employees the primary responsibility for food safety.

INTRODUCTION

Food safety has always been a concern in school foodservice, and the recent emphasis on Hazard Analysis of Critical Control Point (HACCP) programs has increased awareness of food-handling practices in schools. In developing a quality model for school foodservice, Gilmore, Brown, and Dana (1998) included food safety as an integral part of food quality when they stated that "quality food may be defined as food that is selected, prepared, and served in a way so that it

retains its natural flavor and identity, is nutritious, and is free of unsafe bacteriological or chemical contamination."

Foodborne illness outbreaks have large health and economic consequences (Mead et al., 1999), and the numbers have increased in recent years (Olsen, MacKinon, Goulding, Bean, & Slutsker, 2000). Recent testimony from the U.S. General Accounting Office (GAO) (2002) reported that school-related foodborne illness outbreaks have increased about 10% annually through the 1990s. It should be noted that school meal programs might not be the cause of all of these outbreaks. Of the 20 largest outbreaks reported for 1998 and 1999, 13 were associated with foods served in a school meals program (GAO, 2002). Outbreaks caused by *E. coli* (Cable News Network, 1998; Cary, 2001) and *Salmonellosis* (Centers for Disease Control and Prevention, 1987) affected several students' health and had major economic consequences to families and school districts. The publicity of these reports have been very negative to school foodservice and demonstrates the need for schools to place more attention on food safety.

Research provides evidence that sanitation and food-handling practices in school foodservice are not always optimal. Inadequate handwashing (Giampaoli, Cluskey, & Sneed, 2002; Gilmore et al., 1998) and inappropriate glove use (Gilmore et al., 1998) were identified as problem areas. Time and temperature control have been identified as areas needing improvement in school foodservice (Blakelee & Penner, 1999; Giampaoli, Cluskey, & Sneed, 2002; Kim & Shanklin, 1999). Other areas of concern identified by researchers (Giampaoli, Cluskey, & Sneed, 2002) include taking internal temperatures of food and recording temperatures in temperature logs.

The percentage of school districts that have implemented HACCP programs also is small. Hwang, Almanza, and Nelson (2001) found that only 13% of Indiana school districts had implemented HACCP programs. In a later national study, Giampaoli, Sneed, Cluskey, and Koenig (2002) found that approximately 30% of school districts reported to have HACCP programs.

Some researchers have identified barriers to implementing food safety and HACCP programs. Hwang, Almanza, and Nelson (2001) determined various factors influencing Indiana school foodservice directors/managers' plans to implement HACCP programs. These researchers found that the level of school foodservice managers' sanitation knowledge, certification, sanitation training program availability, sanitation practices, and size had a positive relationship with plans to implement HACCP. Time and money were identified as obstacles to implementing HACCP. Giampaoli, Sneed et al., (2002) found that school foodservice directors positively agreed on the benefits of certification and continuing education related to food safety. Time and money were identified as the greatest barriers to improving food safety.

Training has been identified as one way to overcome barriers. Belo, Giampaoli, and McProud (1996) indicated that major factors for controlling food safety are to educate and train food-handlers. In addition, Snyder and Matthews (1996) reported that foodservice operators should spend more time and money on educating and training workers in safe food-handling practices and procedures. Furthermore, all foodservice workers, including part-time and limited-term employees, should be trained as soon as they are hired and training should be ongoing (Snyder & Matthews, 1996).

Little research has been done to determine barriers to implementing food safety practices in centralized foodservice systems. The purpose of this research was to identify barriers to implementing food safety practices, compare perceptions of barriers for school foodservice directors of centralized and conventional foodservice systems, and determine the relationship of demographic characteristics of directors and districts to perceived barriers. In addition, training/certification of employees was determined for use as one of the district characteristics and to provide baseline data.

METHODOLOGY

Sample Selection

A national random sample of 600 district school foodservice directors was selected for this study. All Iowa school foodservice directors (n=536) were included in the study sample. To ensure representation of school districts with centralized foodservice systems, a list of foodservice directors (n=33), acquired through the U.S. Department of Agriculture (USDA) listserv "MealTalk," was included.

Questionnaire Design

A written questionnaire was developed for this study. Nine statements related to potential barriers to implementing food safety practices were included. Barrier statements related to time, money, HACCP plan availability, employees' motivation, knowledge about food safety practices, facility design, and having a food safety specialist. These items were answered using the statement "Food safety in my school district would improve if..."

The questionnaire also contained 17 questions about characteristics of school foodservice directors and districts. School foodservice directors' characteristics related to education level, age, gender, number of years employed in foodservice operations, number of years employed in school foodservice operations, and food safety certification. Characteristics of school foodservice districts related to food safety training programs, number of employees certified in food safety, number of employees, number of students participating in foodservice programs, type of foodservice system, meal program, meal payment type of students, and number of students participating per meal.

Pilot Test

The questionnaire was pilot tested by graduate students with foodservice experience, as well as by state agency staff and school foodservice directors. The questionnaire was revised based on recommendations made by the pilot-test groups. The Human Subjects Committee of the Institutional Review Board approved the revised questionnaire and research proposal.

Data Collection

The questionnaire, a cover letter that explained the purpose of the study and encouraged participation, and a postage-paid return envelope were mailed to the study sample. Three weeks after the initial mailing, a follow-up postcard was sent to the directors to remind them to complete and return the questionnaire. A second questionnaire was sent to directors who did not respond within seven weeks of the initial mailing.

Data Analyses

Data were analyzed using SPSS version 10.0 for Windows. Respondents could answer more than one category for type of foodservice system used. For data analysis purposes, responses were divided into two categories: centralized foodservice systems and conventional foodservice system. Foodservice directors in 193 school districts checked that they used only a conventional foodservice system. Foodservice directors in 213 school districts checked that either a central or a regional foodservice system were placed in the centralized foodservice system category.

Descriptive statistics including means, standard deviations, and frequencies were calculated for each barrier statement. Principal component factor analysis with varimax rotation was used to determine if the nine barrier items could be grouped into a smaller number of factors. A Cronbach alpha reliability coefficient was calculated to determine the reliability for the items in each factor (Cronbach, 1951).

A total score and factor scores for barriers were calculated by summing the responses to all items. Independent t-tests were conducted to compare the total score and factor score means for conventional and centralized foodservice systems. Multiple linear regression models were used to determine relationships between the total score and factor scores, and school foodservice directors' and districts' characteristics. A probability of ≤ 0.05 was considered significant.

RESULTS AND DISCUSSION

For this study, 1,169 questionnaires were mailed to the national random sample and all Iowa directors of school foodservice. A total of 414 questionnaires were returned for a 35.4% response rate. Of 536 questionnaires sent to the Iowa sample, 218 questionnaires were returned for a 40.7% response rate. Of the 633 questionnaires sent to the national sample of school foodservice directors, 196 questionnaires were returned for a 31% response rate.

Demographic Information

Characteristics of school foodservice directors are presented in **Table 1**. The majority (96%) of school foodservice directors were between ages 31 and 65, and more than 90% were female. Noticeably, only two-thirds of the school foodservice directors indicated that they held food safety certification. This finding is similar to the study of Giampaoli, Sneed et al. (2002) that reported 71% of foodservice directors had food safety certification. The researchers found that of the two-thirds who had food safety certification, 30% were certified through the National Restaurant Association's ServSafe® course. This is fewer than the 50% of school foodservice directors who obtained food certification through the same course in another national study (Giampaoli, Sneed et al., 2002).

Table 1. Demographic characteristics of the school foodservice directors participating in the study (N=414)	
Characteristic	n (%)
Age	
30 years or younger	9 (2%)
31- 50 years	205 (50%)
51- 65 years	189 (46%)
Older than 65 years	7 (2%)
Gender	
Male	30 (7%) ^a
Female	380 (92%)
Education Level	
High school	127 (31%)
Some college	127 (31%)
Bachelor's degree	88 (21%)
Graduate degree	65 (16%)
Years in Foodservice Industry	
5 years or less	27 (6%)
6-15 years	137 (33%)
16-25 years	167 (40%)
26 years	74 (18%)
Years in School Foodservice	
5 years or less	72 (17%)
6-15 years	181 (44%)
16-25 years	116 (28%)
26 years	40 (10%)
Food Safety Certification	
No	124 (30%)
Yes	255 (62%)
Type of Certification	
ServSafe®	123 (30%)
Serving it Safe	6 (1%)
Other	112 (27%)

^aPercentages may not total 100% due to non-response to a question

Additionally, 22% of the school foodservice directors reported that they had implemented a comprehensive HACCP plan in their district. This is slightly higher than the number reported by Hwang et al. (2001) in Indiana and lower than the 30% reported in the Giampaoli, Sneed et al. study (2002). Only 30% of the districts had one or more employees whose primary responsibility is implementing and monitoring food safety in the foodservice department. These employees were in positions such as head cook, supervisor, manager, and foodservice coordinator.

For school districts with centralized foodservice systems, 125 transported food in bulk, while only 13 school districts pre-plated their foods. The majority (n=111) transported hot food, while only 27 school districts transported chilled food. Approximately two-thirds (70%) of the districts had 4,000 or fewer students. Seventy-two percent served 500 or fewer students for breakfast and 91% of the districts provided 500 or fewer snacks, while 80% served 4,000 or fewer students for lunch. The majority of school districts employed 20 or fewer managers or supervisors, and 56% had 20 or fewer employees.

One-third of these school foodservice districts indicated purchasing a processed form of potentially hazardous foods. In response to an open-ended question, they reported purchasing precooked hamburgers, precooked beef, precooked meats, and dried, frozen, and pasteurized eggs.

Food Safety Training and Certification of Employees in School Districts

A summary of food safety training and certification of employees in school districts is presented in **Table 2**. Approximately two-thirds (60%) of the school districts provided the opportunity for their employees to attend food safety training. Thirty-one percent of the school districts provided managers with the opportunity to attend a food safety training program in the past two years, and 40% provided a training program annually.

Table 2. Food safety training and certification of foodservice employees in school districts (N=414)

Characteristics of School Districts	n (%)
Opportunity to attend food safety program	
No	125 (30%)
Yes	250 (60%)
When	
2001	70 (17%)
2000	56 (14%)
1999	27 (7%)
1998	9 (2%)
1997	4 (1%)
How often	
Weekly	3 (1%)
Monthly	30 (7%)
Annually	164 (40%)
Twice a year	43 (10%)
Other	24 (6%)
The percentage of employees certified in food safety	
Managers/Supervisors	
Less than 25%	91 (22%)
25% - 50%	14 (3%)
51% - 75%	9 (2%)
More than 75%	233 (54%)
Employees	
Less than 25%	206 (50%)
25% - 50%	49 (12%)
51% - 75%	21 (5%)
More than 75%	57 (14%)

Half of these school districts had more than 75% of managers certified in food safety, while only 14% indicated that the number of employees certified in food safety was more than 75% of the total employees. In an open-ended question related to training topics, a number of school foodservice directors commented that they provided training related to standardized recipes, sanitation, food safety, food quality, hygiene, and chemicals.

Perceived Barriers to Following Food Safety Practices

Responses related to potential barriers to the following of food safety practices in school foodservice are shown in **Table 3**. Items are categorized into two factors identified by factor analysis: employee and resource barriers. The Cronbach alpha was 0.81 for the employee barrier

factor and 0.83 for the resource barrier factor. These factors are similar to the factors identified by Giampaoli, Sneed et al. (2002): employee confidence, resource management, and employee motivation.

Table 3. School foodservice directors' perceptions of barriers to following food safety practices in school foodservice (N=414)

Potential Barriers	Frequency of Responses ^b					
	Mean ± SD ^a	SD	D	N	A	SA
Employee Barriers (α=0.81)						
Employees had more training. ^c	3.8 ± 1.0	10 (2%)	24 (6%)	105 (25%)	176 (43%)	91 (22%)
We had a HACCP plan developed.	3.5 ± 1.0	11 (3%)	33 (8%)	151 (37%)	127 (31%)	69 (17%)
Employees were more motivated to follow food safety practices.	3.5 ± 1.1	23 (5%)	37 (9%)	114 (27%)	154 (37%)	72 (17%)
Supervisors had more time to follow food safety practices.	3.5 ± 1.2	25 (6%)	59 (14%)	93 (22%)	141 (34%)	84 (20%)
Employees had more time to follow food safety.	3.4 ± 1.2	26 (6%)	65 (16%)	109 (26%)	125 (30%)	74 (18%)
We could hire a food safety specialist.	2.8 ± 1.1	55 (13%)	98 (24%)	147 (35%)	61 (15%)	40 (10%)
Resource Barriers (α=0.83)						
We had more money to devote to food safety.	3.4 ± 1.2	25 (6%)	60 (14%)	121 (30%)	106 (25%)	89 (21%)
Our facilities were designed differently.	3.3 ± 1.1	23 (5%)	63 (15%)	138 (33%)	107 (26%)	70 (17%)
Our equipment was newer.	3.1 ± 1.2	34 (8%)	85 (20%)	141 (34%)	73 (18%)	70 (17%)

^a Mean ± Standard Deviation

^b Strongly agree was coded as 5, agree as 4, neutral as 3, disagree as 2, and strongly disagree as 1

^c The stem "Food safety in my school district would improve if" was included prior to the list of barriers

The school foodservice directors were in agreement that employee training is the biggest barrier. Twenty-two percent of school foodservice directors strongly agreed that employees needed more training to improve food safety practices. This finding was consistent with the findings of Sneed and White (1993), Hwang et al. (2001), and Giampaoli, Sneed et al. (2002). Hwang et al. (2001) also found that the availability of sanitation training had a positive relationship to implementing HACCP.

In addition, having an established HACCP plan, time, and motivation were other reported barriers. Giampaoli, Sneed et al. (2002) also identified time as one of the greatest challenges. Twenty-one percent indicated that they needed more money to devote to food safety, and 20% commented that supervisors needed more time to follow food safety practices. Time and cost limitations were identified as obstacles to implementing adequate training in another study (Penner et al., 1997).

Multiple linear regression models using the total barriers score and the two factor scores, and school foodservice directors' characteristics were not significant. However, the models using the total barriers score and two factor scores, and school district characteristics were significant for the total score ($F=3.02$, $p=0.004$) and for the employee barriers factor score ($F=3.06$, $p=0.004$). Among district characteristics, the percentage of certified employees negatively influenced the total score ($\beta=-0.619$, $p=0.012$) indicating that certified managers did not perceive the barriers to be as great as those who were not certified. Changes in how potentially hazardous foods are purchased positively influenced the total score ($\beta=0.193$, $p=0.002$). In addition, having an employee with primary responsibility for food safety ($\beta=-0.131$, $p=0.031$) and changes in how potentially hazardous foods are purchased ($\beta=-0.165$, $p=0.014$) resulted in fewer employee barriers.

T-test comparisons of the overall barrier score and the scores for the two factors for centralized and conventional foodservice systems showed no significant differences. Since directors of both types of systems perceive the same barriers, strategies for working with both groups would be similar.

T-test comparisons of the Iowa and national samples identified significant differences. For the overall score and the employee barrier factor, the mean scores were different for the Iowa and national samples. The overall score for Iowa was 29.4 ± 6.9 , and for the national sample it was 30.9 ± 7.0 ($p=0.31$). For Factor 1, employee barriers, Iowa was 19.6 ± 4.7 and the national sample was 21.0 ± 5.0 ($p=0.004$).

CONCLUSIONS AND APPLICATIONS

This study found that only 22% of the participating school districts had a comprehensive HACCP plan in place. This indicates that school foodservice directors need to put more emphasis on HACCP programs in their districts. They may need support in developing and implementing HACCP programs for their districts.

Employee barriers were perceived as a greater problem than resource barriers. Therefore, to overcome employee barriers, directors may need to consider strengthening their employee

training programs. One outcome of training should be food safety certification for employees, since certification reduced perceptions of barriers.

Money and time were resource barriers identified by school foodservice directors. Foodservice directors need to examine how resources are allocated in their district and may need to reallocate funds for food safety and HACCP because this is a critical health and safety issue. These barriers also may have policy implications. If there were an emphasis on HACCP implementation in schools or if HACCP were to be required, especially in small school districts, consideration would need to be given to increasing reimbursement rates to ensure that there are adequate resources for HACCP implementation.

School foodservice directors should consider giving one or two employees primary responsibility for HACCP implementation since this reduces barriers to improving food safety. In large districts, this may be an assistant manager, where in small districts it may be the foodservice director. In any case, all individuals involved in food production will need to have training in food safety and HACCP.

For small school districts, technical assistance from such groups as USDA, state agencies responsible for child nutrition programs, the National Food Service Management Institute, and the state Cooperative Extension Service could be useful. These small districts also may need mentors to help them with implementation.

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