The Center of Excellence for
FOOD SAFETY RESEARCH IN
CHILD NUTRITION PROGRAMS

FOOD SAFETY RISK IDENTIFICATION AT CHILD NUTRITION PROGRAMS IN THE U.S. THROUGH FOOD SAFETY INSPECTION REPORTS

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Introduction

- The Centers for Disease Control and Prevention reported 1,034 foodborne illness outbreaks in 2008 resulting in 23,152 illnesses, 1,276 hospitalizations, and 22 deaths.
- School foodservice operations are the third most likely setting for foodborne illness outbreaks followed by restaurants and private residences.
- The number of cases per outbreak is greater in school foodservice operations than restaurants.
- More than 31 million students eat meals daily in over 100,000 school cafeterias.
- The 2004 Child Nutrition and WIC Reauthorization Act mandated that all school foodservice operations have two health inspections annually.

Purpose

- To identify food safety risks in child nutrition programs by reviewing food safety inspection reports.

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Methodology

- Food safety inspection reports (n=28,171) from all school foodservice facilities in 21 states were collected.
- All food code violations were:
  - Recorded on the original state inspection form.
  - Categorized as behavioral, non-behavioral, critical, and non-critical violations.
  - Consolidated into 31 pre-determined food code categories.
- Descriptive statistics were calculated
- Based on the number of violations in each category, the most frequent food code violation categories were identified and ranked.

Results

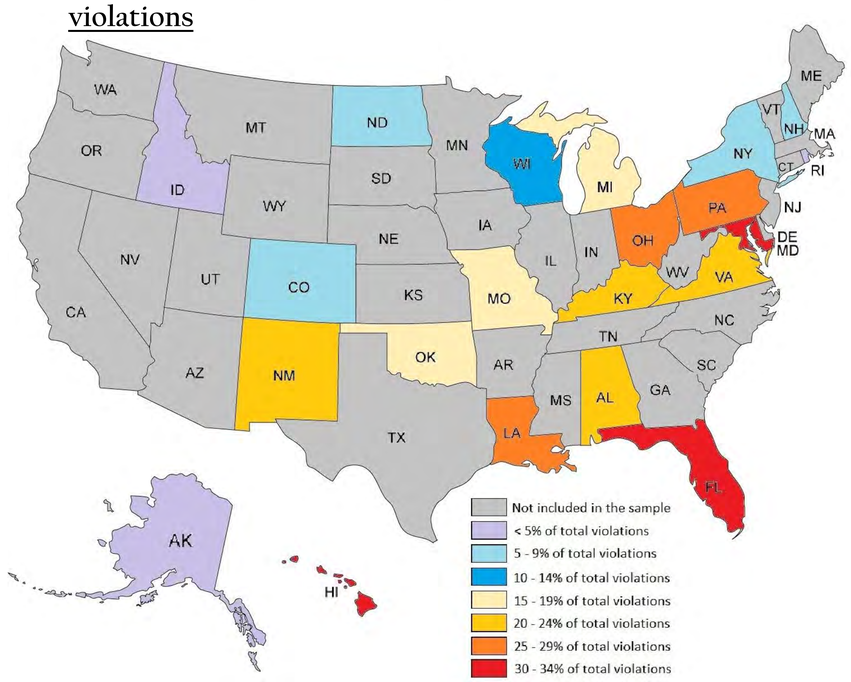
The most challenging food code violations in 21 states

Violation Categories	No. of Violations[a] (%)	No. of States Ranked as Top 5	Ranking[b] (M±SD)
Premises & Equip Maintenance	9,797 (18.5)	18	3.8±1.9
Protecting Food from Contamination	3,355 (6.3)	13	1.4 ± 1.6
Non-food Contact Surface Maintenance	2,988 (5.6)	11	1.4 ± 1.7
Time & Temperature Control	2,366 (4.5)	9	1.1 ± 1.6
Ware Washing	2,164 (4.1)	9	1.1 ± 1.5
Food Contact Surface Maintenance	2,317 (4.4)	7	1.0 ± 1.7

a. Based on 52,900 total violations recorded from 28,171 facilities.
b. Ranking scores assigned as 5 for the most violated category followed by 4, 3, 2, and 1.

Results (Continued)

Percentage of premise & equipment maintenance related violations



Conclusions

- Food code violations in school foodservice appear to pose relatively low food safety risks.
- Directors may seek to address facility and equipment maintenance challenges with school administrators.
- Directors need to enhance food safety training related to behavioral food code violations.
- Food safety inspection reports often attract attention from the public, and CNP directors may benefit from identifying challenge areas by comparing their performance with our findings.

The authors would like to express their sincere appreciation to Kerri Cole, Project Coordinator, Amber Grisamore and Shenji Fan, Graduate Research Assistants for their countless hours of data entry and support.

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HEALTH INSPECTION VIOLATIONS IN SCHOOL FOODSERVICE OPERATIONS

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Introduction

- Approximately 48 million cases of foodborne illness occur annually in the US, yielding 128,000 hospitalizations and 3,000 deaths.
- Young children are highly susceptible to foodborne illnesses.
- With greater than 2.2 billion meals and snacks served annually in child nutrition programs, the opportunity exists for large-scale foodborne outbreaks to occur.
- Preparing and serving safe food to our nation's children must be a priority of all those involved in the food chain.

Purpose

- The purpose of this study was to analyze current food safety violations in schools to explore research and educational opportunities.

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Methodology

- A random sample of 21 states, three states from each of the USDA's seven regions was selected.
- Inspection reports were requested for every school in each state.
  - This information was available online for seven states and 14 states mailed their inspection reports directly to the researchers.
- Since food codes vary among states, frequencies of each violation will be recorded at the state-level.
  - Inspection forms were then compared across states to categorize the data for comparison purposes.
  - A total of 31 categories were identified. Data were collapsed into as many categories as possible to retain the integrity of the data.
- SPSS was used to conduct the statistical analysis to determine the most common violations across the sample.

Results

- A total of 28,106 school inspection reports were analyzed, representing 46,389 total violations.
- An average response rate of 89% of schools in each state was achieved.

Results, Continued

Most Common Violations

Violation Category	Total Violations
Premises & equipment	8,915
Non-food contact surfaces	3,230
Food protected from contamination	3,129
Food contact surfaces	2,163
Warewashing	2,149

Least Common Violations

Violation Category	Total Violations
Cooling	261
Employee health	183
Thawing	174
Cooking	70
Reheating	63

Conclusions

- Regulatory bodies, can use this data to benchmark current food safety practices in schools.
- National benchmark data can be used to improve current food safety training in schools.
- This data can help establish food safety research priorities in school foodservice operations.

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FOOD SAFETY RISKS IN RESTAURANTS AND SCHOOL FOODSERVICE ESTABLISHMENTS: AN INVESTIGATION OF HEALTH INSPECTION REPORTS

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Introduction

●The Centers for Disease Control and Prevention reported 1,034 foodborne illness outbreaks in 2008 resulting in 23,152 illnesses, 1,276 hospitalizations, and 22 deaths (CDC, 2011).

●More than 190 million meals served in restaurants and over 31 million students in school cafeterias daily.

●Three most likely setting for foodborne illness outbreaks are (Lynch et al., 2006):

- Restaurants and delis (50.2%)
- Private residence (19.5%)
- School foodservice (4.3%)

●The average number of cases per outbreak is greater in schools (M=48.1) than restaurants or delis (M=14.1) (http://wwwn.cdc.gov/foodborneoutbreaks/Default.aspx)

●The 2004 Child Nutrition and WIC Reauthorization Act mandated that all school foodservice operations have two health inspections annually. Most restaurants receive at least one inspection annually.

Purpose

●To identify food safety risks and needs for behavior changes in restaurant and school foodservice operations utilizing health inspection reports

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Methodology

●Food safety inspection reports from all school foodservice facilities (n=2,511) and randomly selected restaurants (n=2,624) in OK, PA and RI were collected.

●All food code violations were:

- Recorded on the original state inspection form.
- Categorized as behavioral, non-behavioral, critical, and non-critical violations.
- Consolidated into 30 pre-determined food code categories.

●Statistical analyses included descriptive statistics, independent sample t-tests, χ^2 analyses, and odds ratios.

●Statistical significance was determined at $p < 0.01$.

Results

Mean Number of Behavioral, Non-behavioral, Critical, and Non-critical violations in Restaurants and Schools

Violation Classifications	Restaurants (n=2,624)	Schools (n=2,511)	t	P[a]
	Mean ± SD			
Behavioral	2.94 ± 3.23	0.94 ± 1.21	29.17	<0.001
Non-behavioral	1.68 ± 1.89	0.90 ± 1.24	17.56	<0.001
Critical	1.68 ± 1.89	0.90 ± 1.24	17.56	<0.001
Non-critical	1.68 ± 1.89	0.90 ± 1.24	17.56	<0.001
Total	4.75 ± 4.51	1.99 ± 1.98	28.61	<0.001

[a] *Based on independent t-tests.*

Non-behavioral Violation Categories (11 categories)

- Restaurants had more violations in 7 categories.
- No differences were found in 3 categories
  - *Premises & Equipment Maintenance*
  - *Pest & Animal Controls*
  - *Waste Water & Sewage*
- Schools had more violations in 1 category
  - *Adequate Equipment for Cold/Hot Holding*

Results (Continued)

Behavioral Violation Categories (26 categories)

- Restaurants had significantly more violations in 20 categories than restaurants.
- No differences were found in 4 categories:
  - *Approved Food Sources*
  - *Cooling*
  - *Use of Thermometers & Test Kits*
  - *Display of Valid Permit & Consumer Advisories*
- Schools had more violations in 2 categories:
  - *Ware Washing*
  - *Garbage & Recycling Facilities Outside*

Cross-tabulation and Odds Ratios of Code Violations

Violation Classifications	Restaurants (n=2,624)	Schools (n=2,511)	Odds Ratio
	No. of Facilities with Violations (%)		
Behavioral	2,123 (80.9%)	1,364 (54.3%)	3.6
Non-behavioral	1,793 (68.3%)	1,268 (50.5%)	2.1
Critical	806 (32.1%)	1,542 (58.8%)	3.0
Non-critical	2,194 (83.6%)	1,726 (68.7%)	2.3

Conclusions

●School foodservice had fewer overall, behavioral, non-behavioral, and high risk food code violations than restaurants.

●School foodservice had the greatest number of citations in *Premises and Equipment Maintenance* followed by *Plumbing and Adequate Toilet Facilities.*

●Restaurants are more likely to be cited for food code violations than schools.

●Further investigation is needed related to food sources.

The authors would like to express their sincere appreciation to Kerri Cole, Project Coordinator, Amber Grisamore and Shenji Fan, Graduate Research Assistants for their countless hours of data entry and support.