

ABSTRACT

Prevention of foodborne illness is a mutual responsibility of the government, food industry, and public. All foodservice employees on Fort Liberty, North Carolina (NC) that engage in food storage, preparation, and service must have food safety training. This study used qualitative data from the Department of Public Health, Fort Liberty, NC for 2021 to determine the extent to which training existed for the Person-In-Charge (PIC) and foodservice employees and the relationship to foodborne illness risk. Missing training was significantly (p<0.05) correlated with all Centers for Disease Control and Prevention foodborne illness risk factor categories. As expected, deficiencies were significantly (p<0.001) higher in facilities without sufficient training compared to facilities with sufficient training. Findings indicate that maintaining required foodservice sanitation training by managers and employees likely reduces deficiencies and the potential for foodborne illness outbreaks. Future research should utilize training deficiency severity ratings (i.e., critical, non-critical) in a longitudinal manner to determine a more detailed level of foodservice sanitation and safety operations.

INTRODUCTION

- Food sustains life and aids the human body in meeting its fundamental needs for function, development, and growth.
- Approximately 48 million Americans experience foodborne illnesses every year.
- Reducing food safety hazards through procurement, storage, preparation, and service is essential to mitigate and prevent foodborne illnesses.
- In 2017, the Food and Drug Administration (FDA) Food Code updated guidance requiring the PIC of each foodservice facility to maintain a food protection manager certification.
- All PICs must be Certified Food Protection Managers on Fort Liberty, NC (>100 foodservice facilities).
- All foodservice employees on Fort Liberty who engage in food storage, preparation, and service must have food safety training no later than 30 days post-employment and four hours of refresher training within 12 months.
- This study examined PIC and foodservice employee training and how the presence/absence of training may relate to foodborne illness risk factors identified during public health inspections on Fort Liberty, NC.



https://www.stripes.com/branches/army/2023-06-02/fort-liberty-bragg-name-ceremony-army-10314867.html

Relationship Between Food Safety Risk Factors and Food Service Employee Training at a Military Installation Shane Smith, Paul Knechtges, Nicole Arnold, Stephanie Richards

MATERIALS & METHODS

• Retrospective data analysis was conducted for 2021 and consisted of 716 periodic foodservice sanitation inspections of 124 total facilities including 17 childcare centers, eight elementary/middle schools, 64 fast food/retail, 14 military cafeterias, and 21 mobile unit/trucks.

Dependent variables were the five CDC foodborne illness risk factor categories:

- 1) Improper cooking temperatures
- 2) Improper hot/cold holding temperatures
- 3) Poor employee health and hygiene
- 4) Dirty and/or contaminated utensils and equipment
- 5) Food from unsafe sources

Deficiencies from each foodservice sanitation inspection during the study period, except for missing PIC/employee training, were placed in one of the five CDC categories. Independent variable was missing PIC/employee training. Spearman's rho and Fisher's Exact Test (p<0.05) used to examine the relationship between missing training and CDC risk factors.

Fisher's Exact Test (*p*<0.05) showed differences between missing training and CDC risk factors by facility type. One-Way ANOVA (p<0.001) evaluated differences between missing training and CDC risk factors by facility type. Independent samples *t*-test (*p*<0.05) was used to compare facilities with missing training to those with training.

RESULTS

• Significant correlation between missing training and CDC risk factors (Table 1). • Significant association between three of the five CDC foodborne illness risk factor categories of deficiencies (i.e., food from unsafe sources (p<0.001), improper hot/cold holding temperature (p < 0.001), and contaminated equipment (p < 0.001) and missing training)(Table 2). Four deficiency categories (i.e., food from unsafe sources, inadequate cooking, improper hot/cold holding temperatures, and contaminated equipment) were significantly correlated with missing PIC/employee training (p<0.001)(Figure 1).

> able 1. Correlation between deficiencies associated with the CDC Foodborne Illness Risk Factor categories

Measures	Missing PIC/Employee Training	Poor Personal Hygiene	Food From Unsafe Sources	Inadequate Cooking	Improper Holding Temperature	Contamina Equipmen
Missing PIC/Employee Training	1.00	0.20* (<i>p</i> =0.02)	0.56** (p<0.001)	0.43** (p<0.001)	0.45** (p<0.001)	0.49** (p<0.00
Poor Personal Hygiene	0.20* (<i>p</i> =0.02)	1.00	0.42** (<i>p</i> <0.001)	0.31** (p<0.001)	0.34** (p<0.001)	0.40** (p<0.00
Food From Unsafe Sources	0.56** (p<0.001)	0.42** (<i>p</i> <0.001)	1.00	0.60** (p<0.001)	0.60** (p<0.001)	0.75** (p<0.00
Inadequate Cooking	0.43** (p<0.001)	0.31** (p<0.001)	0.60** (p<0.001)	1.00	0.86** (p<0.001)	0.36** (p<0.00
Improper Holding Temperature	0.45** (p<0.001)	0.34** (<i>p</i> <0.001)	0.60** (p<0.001)	0.86** (p<0.001)	1.00	0.46** (p<0.00
Contaminated Equipment	0.49** (p<0.001)	0.40** (<i>p</i> <0.001)	0.75** (<i>p</i> <0.001)	0.36** (p<0.001)	0.46** (p<0.001)	1.00

*. Correlation is significant at the 0.05 level (2-tailed) **. Correlation is significant at the 0.01 level (2-tailed)



Deficiencies







Table 2. Relationship between missing PIC/employee training and deficiencies associated with CDC Foodborne Illness Risk Factor categories.

	Missing PIC/Employee Training				
CDC Five Foodborne Illness Risk	Yes		No		
Factors	(N=101)		(N=23)		
	n	%	n	%	
Poor Personal Hygiene					
Deficiencies	28	27.7	2	8.7	
No deficiencies	73	72.3	21	91.3	
Food From Unsafe Sources*					
Deficiencies	91	90.1	13	56.5	
No deficiencies	10	9.9	10	43.5	
Inadequate Cooking*					
Deficiencies	72	71.3	11	47.8	
No deficiencies	29	28.7	12	52.2	
Improper Holding Temperature*				26	
Deficiencies	69	68.3	4	17.4	
No deficiencies	32	31.7	19	82.6	
Contaminated Equipment*					
Deficiencies	84	83.2	7	30.4	
No deficiencies	17	16.8	16	69.6	

* Significant differences in training status between food facilities with deficiencies compared to no deficiencies with each factor at p < 0.05.

No Improper e Improper No Improper Contaminated Hot/Cold Holding Hot/Cold Holding Equipment**

Child Care Centers (17)

Elementary/Middle Schools (8)

■ Fast Food/Retail Facilities (64)

Military Cafeterias (14)

Mobile Units/Trucks Vendors (21)

Temperatures** Temperatures

No Contaminated Equipment

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DISCUSSION

- Missing PIC/employee training was significantly correlated with all five CDC foodborne illness risk factor categories.
- Foodservice sanitation/food safety training may help reduce and/or eliminate foodborne illness risk factor deficiencies at military installations.
- Limitations of the study include using a fixed sample from Fort Liberty, NC and a specific inspection form to identify deficiencies coinciding with the five CDC foodborne illness risk factors.
- This study relied on retrospective secondary data from standardized inspection reports, hence there may be variations in interpretation of individual inspectors who collected the data.
- This study observed only the quantity rather than the severity of deficiencies.
- Future research should use deficiency severity ratings (i.e., critical, non-critical) to determine a more detailed level of foodservice sanitation and safety operations, and the use of a longitudinal study method over a longer period.





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