An Investigation to Determine Association between Foodborne Illness and Number of Citations in a Food Establishment

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University of Cincinnati, Department of Public Health Services
Master of Public Health Capstone Presentation
March 3, 2010 at 1 p.m.
Stetson Building Room 4205
Capstone Committee

- William A. Mase, Dr.PH, MPH, MA
- Mohammad Alam, Ph. D., MSc., MS., RS., REHS

A special thanks to my family, and Jun Ying Ph. D.
Purpose of this study

- To determine if the number of CDC foodborne illness risk factors are less likely to be cited than non-CDC foodborne illness risk factors prior to the implementation of the food safety standardization program.
Purpose of this study

- To determine if the number of non-CDC and CDC foodborne illness risk factors cited increase as the risk classification of the establishment increase.
CDC Foodborne Illness Risk Factors

- Food from an unsafe sources
- Improper holding/time and temperature
- Inadequate cooking
- Poor personal hygiene
- Contaminated equipment/prevention of contamination
Overview of the Literature

  - Facilities out of compliance
  - Identifies the CDC foodborne illness risk factors
  - Standardization of FDA staff
    - Training/education of staff
    - Uniform approach
Overview of the Literature

- Cost of foodborne illness outbreak (Martin, Schmidt, WHO)
  - Health care costs
  - Lost work days
  - Food recall, business costs
Overview of the Literature

- Laws, regulations and organizations lag behind scientific knowledge and ability to apply risk factors to an inspection (Woteki and Kineman)

- Local regulatory authority agency responsibility to ensure safe food through risk assessments (Hoag et al.)
Overview of the Literature

- Investigation of Foodborne illnesses (Bryan, Wotekı and Kıneman, Martin and Walls)
Study Design

- This was a descriptive study that compared the CDC and non-CDC foodborne illness risk factors and their association with an establishment risk class.
Study Design

- Identified CDC and non-CDC foodborne illness risk factors in the Ohio Uniform Food Safety Code
- Collected data from the electronic inspection program through CAGIS.
Study Design

- Identifiable information was removed from the data collected
- Paired t-tests were used for each risk class compared CDC vs. non-CDC violations
  - Data prior to implementation of standardization program
Study Design

- ANOVA statistical method was used for association between risk class and CDC and non-CDC foodborne illness risk factors
- Multiple comparisons using Tukey’s method.
Variables

- **Dependant variable**
  - Risk class

- **Independent variables**
  - Total mean number of violations per inspection
  - Mean number of CDC foodborne illness risk factors
  - Mean number of non-CDC foodborne illness risk factors
Risk Class

- Risk class 1, prepackaged food items, baby food and formula, coffee and fountain drinks
- Risk class 2, TCS food held at temp received at, individually packaged TCS foods for immediate service
- Risk class 3, handling, preparing, cooking and then serving TCS foods
Risk Class

- Risk class 4, preparation of food items with several steps including reheating TCS foods, ROP, offering raw TCS meats as a menu item, serving high risk clientele etc....
Limitations

- Type of facilities the sanitarian was assigned
- Location of the facility within the city
- Prior training for the sanitarian
## Results and Data, paired t-tests

<table>
<thead>
<tr>
<th>Risk class</th>
<th>CDC</th>
<th>non-CDC</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Risk class 1</td>
<td>.79 ± .69</td>
<td>1.54 ± 1.30</td>
<td>.001</td>
</tr>
<tr>
<td>Risk class 2</td>
<td>.62 ± .40</td>
<td>1.28 ± .94</td>
<td>.001</td>
</tr>
<tr>
<td>Risk class 3</td>
<td>1.19 ± .59</td>
<td>2.06 ± .98</td>
<td>.001</td>
</tr>
<tr>
<td>Risk class 4</td>
<td>2.02 ± 1.00</td>
<td>2.95 ± 1.04</td>
<td>.001</td>
</tr>
</tbody>
</table>

Source: Cincinnati Health Department
## Results and Data, ANOVA

<table>
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<tr>
<th>Risk class</th>
<th>Total mean per Insp</th>
<th>CDC</th>
<th>non-CDC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Risk class 1</td>
<td>2.33</td>
<td>.79 ± .69</td>
<td>1.54 ± 1.30</td>
</tr>
<tr>
<td>Risk class 2</td>
<td>1.90</td>
<td>.62 ± .40</td>
<td>1.28 ± .94</td>
</tr>
<tr>
<td>Risk class 3</td>
<td>3.25</td>
<td>1.19 ± .59</td>
<td>2.06 ± .98</td>
</tr>
<tr>
<td>Risk class 4</td>
<td>4.98</td>
<td>2.02 ± 1.00</td>
<td>2.95 ± 1.04</td>
</tr>
</tbody>
</table>

Source: Cincinnati Health Department
Results and Data

- The P-value < .05 for the ANOVA, is considered statistically significant
- The total mean number of violations did not increase as you increased in risk class
Conclusion

- The t-test affirmed the first hypothesis that there were most non-CDC than CDC foodborne illness risk factors
- The P-value < .05 indicating that the data was significant
Conclusion

- The ANOVA results had a P-value < .05 indicating the data was significant.
- However, this did not affirm the second hypothesis that the total mean number of violations increases as the risk class goes up.
Questions Contact Information

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