

Food Safety Knowledge of Residents in a Central Illinois County

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Abstract

The threat of foodborne illness remains a serious issue for American consumers. Although strict regulations help protect against potential outbreaks in commercial food preparation, consumer education is the primary means for decreasing the potential for improper food handling in the home. In this study, consumer knowledge of food safety and sanitation techniques was assessed to determine if there were differences among gender, residency (metropolitan versus rural), age, and education. A random sample of residents in a central Illinois county returned 151 surveys, which included 19 food safety knowledge questions as well as demographic items. A total knowledge score was computed for each participant. The mean knowledge score for the entire sample was 12.9 (67.9 percent).

Statistical analysis revealed that there were no significant differences within the variables of gender, residency, age, or education. When examining the results from each of the individual survey items, the following food safety issues were commonly missed among participants: safe beef preparation temperatures, proper cleaning of a cutting board, placement of meat in the refrigerator, and the shelf life of eggs. Based upon the results of this study, a more focused target audience for food safety education could not be identified. Continuous efforts should be made to provide programs for individuals of all ages, residencies, and education levels which focus on the seriousness of foodborne illnesses and the importance of proper food handling.

Introduction

Food safety requires that foods be properly handled throughout every phase from receiving through consumption. Although American consumers have some of the highest standards in the world, the Centers for Disease Control and Prevention estimates that each year foodborne illness causes nearly 325,000 serious illnesses resulting in hospitalization, 76 million cases of gastrointestinal illnesses, and 5,000 deaths (Mead et al. 1999).

Consumers appear to have a higher expectation of commercial food handlers than of themselves when food safety is involved. Most consumers who suffer from a foodborne illness believe their illness was caused by food prepared somewhere other than the home (Williamson 1992; Fein, Jordan, and Levy 1995). However, a study by Daniels (1998) concluded that participants failed to follow food safety and sanitation practices in their own kitchen in more than 96 percent of the situations observed.

There are no regulations for the preparation, handling, and storage of food in the home. Home food safety is controlled through the education of the consumer. The literature has identified the need for continued efforts toward educating consumers on the hazards of improper food handling (Bruhn and Schutz 1999; Endres, Welch and Perseli 2001; Gettings and Kiernan 2001; Williamson, Gravani, and Lawless 1992; Li-Cohen and Bruhn 2002; Worsfold and Griffith 1997). However, identifying the target audience who benefit most is essential for educators working in areas where there is a diversified population. The purpose of this study was to examine consumer knowledge of food safety and sanitation techniques and identify any significant differences between genders, residency (metropolitan or rural setting), age groups, or education levels.

Methods

A systematic sample was selected by choosing the first name on every page of a central Illinois county telephone directory. If the first entry did not have a complete address, the next entry in the telephone directory with a complete address was chosen for the study. The survey sample consisted of 351 households. A survey instrument, which included 19 multiple-choice questions regarding food preparation and food handling techniques, was mailed to each household. Demographic data of the subjects were also obtained. The questionnaire was adapted from one developed by the local county health department which had been implemented as a supermarket survey. The survey questions specifically addressed items related to proper thawing techniques, cross-contamination, hand-washing, proper cleaning procedures for food preparation areas, cooling and reheating of foods, and storage practices. Three content experts using a Content Validity Index for each item established content validity. Each expert rated the items based upon a 4-point ordinal scale. A "1" connoted an irrelevant element related to the topic and a "4" an extremely relevant item. All items ranked a 3 or 4 among the experts. A Cronbach's alpha reliability coefficient was calculated for the 19 knowledge questions. The reliability coefficient was determined to be 0.81.

Included with the mail survey was a cover letter explaining the purpose of the study, how the data would be handled, and the rights of a participant. The cover letter instructed that the primary meal preparer should be the person to complete and return the survey. A self-addressed stamped envelope was supplied with the survey packet. To insure a higher participation rate, reminder

telephone calls were made 2 weeks following the initial mailing to each household who had not yet returned a survey. The protocol was approved by the Institutional Review Board at Illinois State University.

Data were analyzed using the Statistical Package for Social Sciences version 10.0 (Chicago, IL). Survey data were pre-coded for metropolitan and rural residencies based upon county census data and the telephone directory listing. A total knowledge score was calculated for each participant. Missing data for the knowledge section was coded as an incorrect response. Independent *t*-test and ANOVA were used to determine if there were significant differences among gender, residency, age, and education level. Missing data for demographic items were not reported.

Results

Of the 351 households surveyed, 152 (43.3 percent) responses were received. One survey was discarded because the participant identified that she lived in a retirement home where all meals were prepared for her. The final sample consisted of 151 participants (43.0 percent). Of the 351 systematically selected households, 50 (14 percent) were rural residencies and 301 (86 percent) were metropolitan residencies. This compared with the population of the county which has ~152,000 residents of which ~111,000 (73 percent) reside in the metropolitan area and ~41,000 (27 percent) reside in the rural part of the county. Of those surveyed from rural residencies, 20 (40 percent) were returned and of those surveyed to metropolitan households, 131 (43.5 percent) were received. The final sample was primarily female (76.8 percent), residing in the metropolitan area of the county, representing a variety of age groups, and well-educated (63.6 percent with some college or a college degree). Table 1 provides a summary of the demographic characteristics of the sample.

A total knowledge score was calculated based upon the 19 food safety questions. Mean knowledge scores for each variable are also presented in Table 1. The mean knowledge score for the sample was 12.9 (67.9 percent). Females scored slightly higher (M=13.2) than males (M=11.9). There was little variation among age groups although those individuals aged 50-59 scored the highest (M=14.2) while individuals aged 30-39 scored the lowest (M=11.7). Those individuals who indicated that they had not completed high school (n=6) had the lowest score among education levels (M=11.2), whereas all other levels of education had very similar scores. An independent *t*-test comparing mean knowledge scores between gender and residency revealed no statistically significant differences. ANOVA was also used to compare mean knowledge scores among age groups and education levels. Analysis revealed no statistically significant differences.

When examining the results from each of the individual items, the following food safety issues were commonly missed among participants: safe beef preparation temperatures, proper cleaning of a cutting board, placement of meat in the refrigerator, and the shelf life of eggs. The majority (> or = 85 percent) of participants were able to correctly answer the questions pertaining to length of holding perishable foods without refrigeration, washing apples, meal preparation and surfaces used, purchasing canned foods, and appropriate grilling techniques. Table 2 provides a summary of these results.

Discussion and conclusions

The results of this study reveal that the knowledge of safe food handling practices remains less than optimal among consumers. Even the highest scoring group [participants 50-59] only answered ~75 percent of the questions correctly. Other studies, which also addressed the knowledge and/or practices of similar areas of food handling, suggest that knowledge of safe food handling practices may vary based upon age, level of education, and/or residency (Altekruse et al. 1995; Klontz et al. 1995; Li-Cohen and Bruhn 2002; and Williamson, Gravani, and Lawless 1992). However, the results of our study were fairly consistent among the various demographic groups.

Williamson, Gravani, and Lawless (1992) specifically identified individuals younger than 35 and Li-Cohen and Bruhn (2002) included all people younger than 65 as target audiences for consumer education regarding safe food handling. Our study found that individuals 30-39 years old did score the lowest (M=11.7) among all age categories, yet no one category scored significantly higher than this group. Gettings and Kierman's (2001) study, which evaluated the practices and perceptions among seniors using focus groups, confirmed that seniors remain as a target group for food safety education. Results from our study revealed seniors 50-59 earned the highest knowledge score (M=14.2), but scores for participants = 60 years old were lower (M=13.0). Such findings provide support that all age categories may benefit from enhanced consumer education.

Studies have also suggested that there is an increased knowledge, understanding, and ability to evaluate unsafe food handling practices with increased education (Altekruse et al. 1995, and Klontz et al. 1995). However, results from our study indicated that although individuals who had not earned a high school diploma did score the lowest (M=11.2) there was very little variation among participants with higher levels of education. These findings are consistent with Williamson, Gravani, and Lawless (1992), who reported a similar trend from their nationwide study. Their study also focused on consumers' knowledge of key home food-safety terms and concepts as well as food handling practices.

Results of this research do not help to identify a narrower audience from which community educators, including Cooperative Extension specialists, can target their consumer food safety education. Nevertheless, our findings do support the need for continued public awareness about the role of consumer practices in the development of foodborne illness. However, these findings are limited by the small sample size. Future studies are encouraged with a larger sample size from a broader region to help validate the results of this study. Furthermore, including a "not sure" response for knowledge questions is suggested to avoid any potential bias that may occur from coding unanswered questions as incorrect.

The Partnership for Food Safety Education has the mission to reduce the incidence of foodborne illness by educating Americans about safe food handling practices. However, The Partnership for Food Safety Education and The FightBAC™ campaign has primarily targeted school-aged children. Based upon this research, and that of others, the messages provided by the FightBAC™ campaign are obviously important for individuals of all ages, residencies, and education levels. Community education programs should continue to focus on the seriousness of foodborne illnesses and the importance of proper food handling. Focused educational efforts are needed by national, state, and local organizations to ensure The Partnership for Food Safety Education mission is achieved among all demographics.

Table 1. Demographics and Total Mean Knowledge Score. N=151

		Frequency	Percent	Mean	SD
Total Mean Score				12.9	3.2
Gender <i>n</i> =148	Male	32	21.2	11.9	3.7
	Female	116	76.8	13.2	3.1
Residency <i>n</i> =151	Metropolitan	131	86.8	12.9	3.1
	Urban	20	13.2	12.8	3.9
Age <i>n</i> =149	20-29	22	14.9	12.6	2.4
	30-39	26	17.2	11.7	4.1
	40-49	33	21.9	13.2	2.3
	50-59	25	16.6	14.2	2.7
	≥ 60	43	28.5	13.0	3.7
Education <i>n</i> =150	Some High School	6	4.0	11.2	4.5
	High School Diploma	48	31.8	12.9	3.1

	Some College	30	19.9	13.5	2.7
	College Degree*	66	43.7	12.8	3.5

*Associate's, Bachelor's, Master's, Doctorate

Table 2. Percent of Correctly Answered Questions for Individual Survey Items.

Survey Item	Percent	<u>SD</u>
Safe beef preparation temperatures	25.8	.44
Cleaning cutting boards	27.8	.45
Placement of meat in the refrigerator	43.0	.50
Shelf life of eggs	47.0	.50
Cooling leftovers	58.3	.49
Reheating	60.9	.49
Thawing food	61.1	.49
Cleaning counters	64.2	.48
Grocery shopping routine and perishable foods	68.9	.46
Handling food -- hand washing	74.8	.43
Using the microwave for defrosting/preparation	80.1	.40
Shelf life of chicken	80.8	.39
Shelf life of milk	81.5	.39
Meal preparation and surfaces used	84.8	.36
Purchasing canned foods	86.8	.33
Holding perishable foods without refrigeration	86.8	.33
Using appropriate grilling techniques	88.1	.32
Washing produce	88.7	.31

References

Altekruse, S.F., D.A. Street, S.B. Fein, and A.S. Levy. 1995. Consumer knowledge of foodborne microbial hazards and food handling practices. *Journal of Food Protection* 59:287-294.

Bruhn, C.M., and H.G. Schutz. 1999. Consumer food safety knowledge and practices. *Journal of Food Safety* 19:73-87.

Daniels, R.W. 1998. Home food safety. *Food Technology* 52:54-56.

Endres, J., T. Welch, and T. Perseli. 2001. Use of computerized kiosk in an assessment of food safety knowledge and high school students and science teachers. *Journal of Nutrition Education* 33:37-42.

Gettings, M.A., and N.E. Kiernan. 2001. Practices and perceptions of food safety among seniors who prepare meals at home. *Journal of Nutrition Education* 33:148-154.

Klontz, K.C., B. Timbo, S.B. Fein, and AS Levy. 1995. Prevalence of food consumption and preparation behaviors association with increased risks of foodborne disease. *Food Protection* 58:927-930.

Li-Cohen, A.E., and C.M. Bruhn. 2002. Safety of consumer handling of fresh produce from the time of purchase to the plate: A comprehensive consumer survey. *Journal of Food Protection* 65:1287-1296.

Mead, P.S., L. Slutsker, V. Dietz, L.D. Macaig, J.S. Breese, and C. Shapiro. 1991. Food-related illness and death in the United States. *Emerging Infectious Diseases* 5:607-625.

Willimson, D.M., R.B. Gravani, and H.T. Lawless. 1992. Correlating food safety knowledge with home food preparation practices. *Food Technology* 46:94-100.

Worsfold, D., and C.J. Griffith. 1997. Assessment of the standards of consumer food safety behavior. *Journal of Food Protection* 60:399-406.

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