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# **The Development of a Food Safety Brochure for Families: The Use of Formative Evaluation and Plain Language Strategies**

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**Abstract:** Printed materials have been used extensively as an educational tool to increase food safety awareness. Few educational materials have been designed to target families with young children for food safety education. This article reports the use of the formative evaluation process to develop a brochure designed to enhance awareness about food safety among primary food handlers of families with children 10 years and under. Quantitative and qualitative evaluation included the use of plain language principles and two focus groups with target audience members. Application of systematic formative evaluation can help health practitioners develop more effective consumer-centered educational materials.

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## Introduction

### Foodborne Illness

Foodborne illness continues to be a persistent health threat in the United States (CDC, 2007). Each year, an estimated 48 million people become ill, 128,000 are hospitalized, and 3,000 die from foodborne illness (CDC, 2011; Scallan et al., 2011). Many different disease-causing microbes, or pathogens, can contaminate foods and beverages. The Centers for Disease Control and Prevention (2007) identifies nine

pathogens as causing most foodborne illnesses: *Campylobacter*, *Salmonella*, *Shigella*, *Yersinia*, *Escherichia coli* (*E. coli*) 0157:H7, *Cryptosporidium*, *Cyclospora*, *Vibrio*, and *Listeria* (CDC, 2007). People affected by foodborne illness may have symptoms ranging from mild intestinal discomfort to severe dehydration, fever, and bloody diarrhea.

The federal government has identified several priority areas related to foodborne illness. Healthy People 2010 (USDHHS, 2000) identified one objective in which four of the nine pathogens associated with foodborne diseases are under surveillance for reduction: *Campylobacter*, *Salmonella*, *Escherichia coli* O157:H7, and *Listeria*. In addition, one objective proposed in Healthy People 2020 (USDHHS) focuses on increasing the proportion of consumers who follow key food safety practices (clean, separate, cook, chill).

According to the CDC (2007), children younger than four years of age accounted for a greater proportion of reported foodborne illnesses than other age groups. *Salmonella* and *Campylobacter* are associated with the highest rates of foodborne illness among children. Salmonellosis is caused by unsafe handling and consumption of poultry, meat, eggs, and unpasteurized milk (Buzby, 2001), while *Campylobacter* cases are most often associated with raw or undercooked poultry and unpasteurized milk (CDC, n.d.; Friedman et al., 2004). Raw foods of animal origin are the most likely to be contaminated. These foods include raw meat and poultry, raw eggs, unpasteurized milk, and raw shellfish. Fruits and vegetables consumed raw without washing can also be a source of contamination.

Children are at greater risk for foodborne illness for several reasons. Children have immune systems that are not fully developed and typically a lower body weight, where a lower pathogen load can cause illness. Another risk factor beyond the child's control is improper food handling practices of others (Buzby, 2002). The way food is prepared, cooked, served, and stored can increase or decrease the risk of foodborne illness. Several research studies have identified specific food handling practices among adults that place children and their families at risk. These practices include: improperly thawing frozen meat; using the color of the meat or juice to test the doneness of ground beef patties; and leaving cooked meat or poultry at room temperature for over 4 hours (Cates, Carter-Young, Conley & O'Brien, 2004; Kwon, Wilson, Bednar & Kennon, 2008; Wenrich, Cason, Lv, & Kassab, 2003). This literature suggests the need for more effective educational strategies that target improper food handling practices, specifically among the primary food handlers of families with young children.

## Food Safety Literacy

For the purpose of the study reported here, food safety literacy refers to the set of skills and abilities needed to understand and apply safe food handling practices. Food safety literacy requires a complex group of listening, analytical, and decision-making skills associated with health literacy; however, the reading level of print material frequently presents an overwhelming barrier to basic comprehension. A study conducted in Alabama found that educational materials were written at readability levels higher than those of the intended audiences (Johnson & Verma, 1990). Quality health information is essential for basic health literacy, but readily available health information, in this case food safety information, may be written at a reading level that is too difficult for many to understand let alone apply (Ley & Florio, 1996; Paul, Redman, & Sanson-Fisher, 2003).

Fundamental to most educational health campaigns is the use of printed materials, such as brochures. Several studies have shown that well-designed brochures and other generic print material can be effective in impacting knowledge, prompting attitudes, and influencing behavior change (Berkman et al., 2004; Currie, Rajendran, Carter, & Anderson, 2001; Paul & Redman, 1997; Whittingham et al. 2008).

Characteristics of well-designed brochures shown to maximize educational impact include: a) the

presentation of accurate and relevant information (content) in an easy-to-read format (design) (Paul et al., 2003) and b) the testing of these attributes on the targeted sub-population group. At the time of the research reported here, few food safety education studies referenced the assessment strategies used for determining the appropriate reading levels, design, and layout of their education materials.

The aim of the study reported here was to plan and conduct a formative evaluation process to determine the receptivity and relative effectiveness of a food safety brochure. This article outlines the formative evaluation process used to develop and test an educational brochure designed to provide accurate, relevant, and easy-to-read information about safe food handling practices for families with young children.

## Methods

Formative evaluation can enhance practitioners' understanding of their target population. It is conducted before, during, and throughout programming (Green & Lewis, 1986, p. 362). Six action steps were identified and served as a formative evaluation guide throughout the designing and testing of the food safety brochure.

1. **Conduct a published literature review.** A review of the literature was done to identify and verify the most accurate information necessary to prevent foodborne illness. The review included published educational programs shown to be effective in reducing the prevalence of food handling, preparation, and consumption behaviors associated with foodborne diseases.
2. **Translate the food safety information using plain language strategies.** Clear communication strategies such as the use of plain language can improve the readability of printed material (Mazur, 2000) and may enable consumers to make more informed decisions about personal food handling practices. Plain language techniques were implemented by: a) substituting more familiar, concrete, everyday words for technical terms, b) organizing the text in a structured, logically sequenced fashion, using short sentences and active voice, and c) applying effective design and layout strategies such as the use of white space in margins, highlighting techniques, and attractive and relevant graphics.
3. **Create a mock up of a brochure template, applying design and layout features consistent with plain language strategies, including readability analysis of the content.** The brochure was initially designed as a tri-fold brochure. The information and graphics were obtained from published studies and various credible websites, primarily <http://www.fightbac.org>. The brochure was reviewed by a panel of experts (Extension educators and specialists at two Midwestern universities). The brochure was revised and reformatted into a four-fold brochure for ease in reading by presenting one concept per column (clean, separate, cook, chill). Content development followed guidelines from [plainlanguage.gov](http://plainlanguage.gov) and Simply Put (Anon, 2011; CDC, 1999). Efforts were made to quantify readability levels using a triangulation of scales: the Flesh Reading Ease, the Gunning Fog Index, and the Flesh-Kincaid Grade Level (Readability Formulas, 1996).
4. **Establish content validity using a panel of experts and revise the brochure as necessary.** A panel of experts consisting of Extension educators and university researchers reviewed the first draft of the brochure. Content analysis examined the presence and accuracy of the key messages related to food safety (clean, separate, cook, chill) and relevancy and attractiveness of the graphics and brochure layout.
5. **Field test the brochure using focus group discussions with target group members, revise and disseminate the final draft of the brochure.** Two focus group discussions were conducted with

the main food preparer in families with young children. Focus groups were conducted following methodology described by Krueger (1990). After IRB approval, focus group participants were recruited with the help of Extension Educators in two midwestern states. The primary food handlers were typically parents or guardians of child(ren) 10 years and under. A focus group script was developed and reviewed by three professionals prior to use. A facilitator and one assistant who took notes conducted the focus groups. Each focus group was audiotaped and transcribed to ensure accuracy of the participants' discussion and comments. The focus group facilitator conducted the focus group in the following manner. After signing consent forms, an ice-breaking activity preceded each focus group. After completion of a demographic survey, participants were given the food safety brochure and then asked to read the brochure. During this period, participants were encouraged to circle items on the written material that were unclear and to write notes capturing their thoughts to share during the focus group. A focus group script was developed with questions and prompts on brochure content and brochure format. After participants responded to the material, the focus group session began. Following the discussion, the participants received a food safety kit. The focus group transcripts were analyzed for common themes.

## Results

### Published Literature Review

A review of the literature suggested that information from the FightBac!<sup>TM</sup> campaign (USDA) would provide the primary messages for the brochure. Four main behavioral constructs often correlated with risk reduction were used to structure the brochure content: practicing hand and surface hygiene (clean), avoiding cross-contamination (separate), cooking foods to proper temperatures (cook), and storing foods at safe temperatures (chill).

### Plain Language Strategies and Readability

The Flesch Reading Ease formula and the Gunning Fog Index (Readability Formulas, 1996) both yield a mathematical estimate of the readability of a specific text. The Flesch Reading Ease values for the brochure were estimated at 70.7 on a difficulty scale ranging from 0-100. Standard scores typically range from 60-70, where higher scores indicate easier to understand text. The Fog Index was estimated at 10.04, which is slightly above the ideal values of 7-8. Scores above 12 indicate the text is quite difficult to understand. The Flesch-Kincaid Grade Level Readability Test, which rates the text on a U.S. grade school level, estimated the brochure was at the 7th grade reading level.

### Content Validity

The brochure was reviewed by a panel of experts for content accuracy and design layout. Experts recommended reorganizing the content of the brochure to better focus on the four key messages related to food safety, cook, clean, chill, and separate. Colorful and relevant graphics were added to enhance attractiveness and to emphasize key messages.

### Focus Group Discussions

A total of 15 individuals participated in the focus groups, which included: 13 females, two males, six White, two Hispanic, five African American, one Native American, and one Asian American. Two primary themes emerged from the focus group discussions relative to the brochure: format/design features and content characteristics (Table 1). The format of the brochure was well accepted by most of the

participants. Pictures, color, and layout were positive features most often mentioned. A few participants felt that the brochure was too wordy; however, readability was favorable. The level of detail was described as being "just right"; however, a few participants indicated that the brochure should include information about the consequences of foodborne illness. The general consensus was that the brochure informed them about food safety practices as intended and that the content was understood. A few participants mentioned that the messages increased their awareness and interest in food safety practices.

**Table 1.**  
Participants' Comments About Brochure Content and Format

<b>Content Characteristics</b> (Select Comments from Participants)	<b>Format/Design Characteristics</b> (Select Comments from Participants)
<p>- "You want to make it like a newscaster, like in the middle of the news, have 'it could kill your children after you eat this' it doesn't use a bunch of big words that sometimes, you know, gets you confused, ...it's pretty simple, which simplicity is always the best."</p> <p>- "I like "be food safe" and that nice little picture."</p> <p>- "Maybe I need some data to impress me... this is just common sense, I separate and you know, I mean I didn't measure temperature, I never have any problems."</p> <p>- "I feel so much safer at home when I cook."</p> <p>- "I'm probably not going to change unless something shocking that told me maybe I should cook my spinach or cook all my vegetables because it causes death".</p> <p>- "I don't have a thermometer in my house, it (using a thermometer) makes it a lot easier when you cook for a lot of people, you know you like your steaks certain ways."</p> <p>- "You know the thing that is missing is maybe some of the signs of food poisoning...like you get more of a reaction out of people when they know what could happen... like food poisoning causes you to vomit or get a high temperature or could kill you, or kill young children, and then they are more likely to pick up the brochure..."</p>	<p>- "It's a little wordy, I would like to see, I don't know, maybe to me it just looks like too many words."</p> <p>- "I like that it is separated: clean, separate, cook, chill, like that's nice to know like the different process."</p> <p>- "I think the pictures are great!"</p> <p>- "I like the Bac!"</p> <p>- "I like the layout of everything, each panel has a separate section to it, so you know if you don't have time to read the whole thing, you can go to whatever seems the most important to you, to see at the point."</p> <p>- "They (pictures) are good, they go along with what it says and you know, and what information that's below them."</p>

## Conclusion

Formative evaluation is integral to effective programming. By using the focus group technique, we were able to gain a deeper understanding of participants' views and experiences, perceptions, beliefs, knowledge, and attitudes about food safety and their preferred ways to be informed about this topic. Applying a formative evaluation process that incorporates plain language techniques for the development of a food safety brochure can be useful for both project researchers as well as program participants. There is no one single strategy that defines plain language. Plain language is defined by the outcomes of the specific project. Print material should be easy to read, understandable, and useable by the intended audience. The use of various readability formulas was helpful in quantifying the reading ease for this audience.

Extension education materials are often developed for large populations rather than developed for specific targeted audiences. In this article, we described a process for the development of an audience-centered educational brochure targeted to families with children 10 years and under. Written materials, such as brochures, are developed to increase awareness and knowledge. Implementing this process for educational material development provides a greater probability of reaching these outcomes.

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## References

- Anonymous (2011). Improving communication from the federal government to the public. Retrieved from: <http://www.plainlanguage.gov/>
- Berkman, N. D., DeWalt D. A., Pignone, M. P., Sheridan, S. L., Lohr, K. N., Lux, L., Sutton, S. F., Swinson, T., & Bonito A. J. (2004). Literacy and health outcomes. Evidence Report/Technology Assessment No. 87 (Prepared by RTI International–University of North Carolina Evidence-based Practice Center under Contract No. 290-02-0016). AHRQ Publication No. 04-E007-2. Rockville, MD: Agency for Healthcare Research and Quality.
- Buzby, J. C. (2001). Children and microbial foodborne illness. *Food Review*, 24(2), 3237.
- Buzby, J. C. (2002). Older adults at risk of complications from microbial foodborne illness. *Food Review*, 25, 30-35.
- Cates, S. C., Carter-Young, H. L., Conley, S., & O'Brien, B. (2004). Pregnant women and listeriosis: Preferred educational messages and delivery mechanisms. *Journal of Nutrition Educational Behavior*, 36, 121-127.
- Centers for Disease Control and Prevention. (n.d). Campylobacter. General information. Division of Foodborne, Bacterial and Mycotic Diseases (DFBMD). Retrieved from: [http://www.cdc.gov/nczved/dfbmd/disease\\_listing/campylobacter\\_gi.html](http://www.cdc.gov/nczved/dfbmd/disease_listing/campylobacter_gi.html)
- Centers for Disease Control and Prevention. (1999). *Simply Put*. Retrieved from:

[http://www.cdc.gov/healthcommunication/ToolsTemplates/Simply\\_Put\\_082010.pdf](http://www.cdc.gov/healthcommunication/ToolsTemplates/Simply_Put_082010.pdf)

Centers for Disease Control and Prevention. (2011). CDC Estimates of foodborne illness in the United States. Retrieved from: <http://www.cdc.gov/foodborneburden/2011-foodborne-estimates.html>

Centers for Disease Control and Prevention. (2007). FoodNet surveillance report for 2004. Retrieved from: <http://www.cdc.gov/foodnet/annual/2004/Report.pdf>.

Currie, K., Rajendran, M., Carter, M., & Anderson, J. (2001). Consumer health information: What the research is telling us. *Australian Family Physician*, 30, 1108-1112.

Friedman, C. R., Hoekstra, R. M., Samuel, M., Marcus, R., Bender, J., & Shiferaw, B., et al. (2004). Risk factors for sporadic *Campylobacter* infection in the United States: A case-control study in FoodNet sites. *Clinical Infectious Diseases*, 38(Suppl. 3), S286-296.

Green, L. W., & Lewis, F. M. (1986). *Measurement and evaluation in health education and health promotion*. Palo Alto, CA: Mayfield.

Krueger, R. A. (1990). *Focus groups: A practical guide for applied research*. Thousand Oaks, CA: Sage Publications, Inc.

Kwon, J., Wilson, A. S., Bednar, C., & Kennon, L. (2008). Food safety knowledge and behaviors of women, infant, and children (WIC) program participants in the United States. *Journal of Food Protection*, 71, 1651-1658.

Ley, P., & Florio, T., (1996). The use of readability formulas in health care. *Psychology, Health & Medicine*, 1, 7-28.

Johnson, E., & S. Verma. (1990). Are Extension publications readable? *Journal of Extension* [On-line], 47(6) Article 6RIB4. Available at: <http://www.joe.org/joe/1990spring/rb2.php>

Mazur, B. (2000), Revisiting plain language. *Journal of the Society for Technical Communication*, 47, 205-211.

Paul, C., & Redman, S. (1997). A review of the effectiveness of print material in changing health-related knowledge, attitudes and behaviour. *Health Promotion Journal of Australia*, 7, 91-99.

Paul, C. L., Redmen, S., & Sanson-Fisher R.W. (2003). Print material content and design: Is it relevant to effectiveness? *Health Education Research*, 18, 181-190.

Readability Formulas. (1996). Retrieved from: <http://www.readabilityformulas.com/free-readability-formula-assessment.php>.

Scallan, E., Hoekstra, R. M., Angulo, F. J., Tauxe, R. V., Widdowson, M-A, Roy, S. L., Jones, J. L., & Griffin, P. M. (2011). Foodborne illness acquired in the United States—Major pathogens. *Emerging Infectious Diseases*, 17, 7-15.

U.S. Department of Health and Human Services. (2000). *Healthy People 2010: Understanding and improving health*. 2nd ed. Washington, DC: U.S. Government Printing Office.

U.S. Department of Health and Human Services. *Healthy People 2020*. Retrieved from: <http://www.healthypeople.gov/document/html/objectives/10-02.htm>



U.S. Department of Agriculture. Website for the Partnership for Food Safety Education (PFSE). Retrieved from: <http://www.fightbac.gov> and <http://www.foodsafety.gov/>

Wenrich, T., Cason, K., Lv, N., & Kassab, C. (2003). Food safety knowledge and practices of low income adults in Pennsylvania. *Food Protection Trends*, 23, 326-335.

Whittingham, J. R., Robert, A., Ruiter, C., Catermans, D., Huiberts, A., & Kok, G. (2008). Designing effective health education materials: Experimental pre-testing of the theory-based brochure to increase knowledge. *Health Education Research*, 23, 414-426.

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