

Gaps in Safe Food Handling Practices of Older Adults

Abstract

We identified gaps in safe food handling practices that may be placing older adults at increased risk of food-borne illness. A convenience sample of 1,019 older adults completed the Food Safety Behavior Questionnaire. Majority groups among participants were those who were female, those who were White, and those who were widowed. Participants had lower adherences to safe practices related to temperature control, attention to sell-by/use-by dates on food packages, and cross-contamination. Adherences were significantly ($p < .05$) influenced by gender, race/ethnicity, age, marital status, and education. Our findings suggest the need for older adult-focused safe food handling education related to temperature control, product selection practices, and cross-contamination.

Keywords: [older adults](#), [food safety](#), [education](#)

LeLee Yap

Graduate Research
Assistant
Department of Food
Science and Human
Nutrition
Iowa State University
Ames, Iowa
leleeyap@gmail.com

Sarah L. Francis

Associate Professor
Department of Food
Science and Human
Nutrition
Iowa State University
Ames, Iowa
sfranci@iastate.edu
[@IAStateFSHN](http://IAStateFSHN)

Mack C. Shelley II

Professor
Departments of
Political Science and
Statistics
Iowa State University
Ames, Iowa
mshelley@iastate.edu

Doris Montgomery

State Coordinator,
Iowa Nutrition
Network
Iowa Department of
Public Health
Des Moines, Iowa
Doris.montgomery@idph.iowa.gov

Catherine J. Lillehoj

Research Analyst
Division of Health
Promotion and Chronic
Disease Prevention
Iowa Department of
Public Health
Des Moines, Iowa
Catherine.lillehoj@idph.iowa.gov

Introduction

Food safety education targeting specific safe food handling practice gaps experienced by older adults is needed. Older adults are at increased risk of food-borne illness due to chronic disease, effects of medical treatments, poor nutritional status, and age-related physiological function changes (U.S. Department of Agriculture & U.S. Food and Drug Administration [FDA], 2011). Each year, food-borne illness affects 48 million people nationally (U.S. FDA, 2017); among these cases, children and older adults are the most affected (U.S. FDA, 2017). It is important for older adults to understand food safety risk so that they can practice safe food handling behaviors.

Despite experiencing higher food safety risk, older adults may not be aware of their food safety risk (Cates et al.,

2009; Gettings & Kiernan, 2001). Specifically, Cates et al. (2009) reported that 41% of older adults did not feel that they were at higher food safety risk. It also has been reported that older adults were less likely to be concerned or to change food-related practices after publicized food-borne outbreaks (SteelFisher, Blendon, Hero, & Ben-Porath, 2013). Furthermore, those aged 65 and over may be cooking, handling, and storing food in ways that increase risk of food-borne illness (Gettings & Kiernan, 2001).

One strategy for promoting better understanding of and adherence to recommended safe food handling practices among older adults is to implement theory-based education. Theory-based nutrition and food safety education is recommended for establishing evidence-based health programming (Brownson, Baker, Leet, Gillespie, & True, 2011). One program development theory, social marketing theory (SMT), is related to ensuring that a program is designed to meet the needs and preferences of the target audience (Lefebvre & Rochlin, 1997).

Application of SMT includes involving the target audience throughout the development process and has been demonstrated to be effective in producing measurable behavior change (Francis & Taylor, 2009; Francis, Taylor, & Haldeman, 2009; Lefebvre & Rochlin, 1997; Roy, Francis, Shaw, & Rajagopal, 2016; Snow & Benedict, 2003). SMT emphasizes using research and test audiences to tailor programs to the specific needs and preferences of the larger target audience (Francis, Martin, & Taylor, 2011; Lefebvre & Rochlin, 1997; Roy et al., 2016; Snow & Benedict, 2003). Applying SMT is a cyclic process comprising six steps, with each step being essential to producing a client-centered curriculum that results in measurable outcomes. The six steps are

1. planning and strategizing,
2. selecting channels and materials,
3. developing materials and pretesting,
4. implementing the program,
5. assessing effectiveness, and
6. using feedback to revise the program (Lefebvre & Rochlin, 1997).

In the study we describe herein, we focused on SMT step 1. Our goal was to identify gaps in safe food handling practices among older adults participating in Supplemental Nutrition Assistance Program Education (SNAP-Ed) in a midwestern state. As part of program planning and strategizing (SMT step 1), needs assessments are helpful for identifying target audience needs and/or preferences related to a specific program and/or intervention. Our long-term goal was to develop older adult-focused food safety education materials and messages based on identified needs and preferences.

Methods

Participants and Recruitment

A convenience sample of 1,019 older adults was recruited from 81 randomly selected congregate meal sites across 58 counties (44 rural, 14 urban) in a Midwest state. These older adults were participating in a larger, statewide SNAP-Ed evaluation study. Rural counties were defined as those aligning with Rural-Urban Continuum

Code values of 4 ("non-metro") or higher (U.S. Department of Agriculture Economic Research Service, 2013).

Participant recruitment was accomplished through in-person presentations conducted at the meal sites. The study protocol was reviewed and approved for exempt status by Iowa State University's institutional review board.

Questionnaire

We assessed safe food handling practices using the 10-question Food Safety Behavior Questionnaire, which measures the frequencies of specific food handling behaviors (University of Hawaii Cooperative Extension Service, 2006). We selected this questionnaire because it addresses three core principles of the Fight BAC! food safety campaign (i.e., chill, clean, and separate) (Partnership for Food Safety Education, n.d.) as well as food preparation, selection, and leftovers topics. The questionnaire was evaluated for face and content validity by the research team.

Participants responded by choosing "Yes," "Sometimes," or "No" to describe the frequency of implementing specific safe food handling behaviors in their homes. We calculated individual summated scores; maximum total score was 10 points, with a higher score indicating greater frequency of implementing a food safety behavior.

Participants also answered sociodemographic questions about gender, racial/ethnic group, age, marital status, and education. Participants completed both the Food Safety Behavior Questionnaire and the sociodemographic questionnaire at baseline, before any intervention occurred.

Statistical Analyses

We conducted statistical analyses using IBM SPSS Statistics, version 24.0. We used descriptive statistics to assess the response frequency for each question and conducted chi-square tests to determine whether differences in safe food handling practices existed relative to the sociodemographic variables of gender, racial/ethnic group, age, marital status, and education. For the chi-square analyses, we compared response frequencies with expected frequencies. We identified statistical significance as $p < .05$

For data analytic purposes, we collapsed questionnaire responses into two categories, "Yes" and "No/Sometimes." Additionally, we collapsed the applicable characteristics for some sociodemographic variables into two categories. Race/ethnicity responses were organized to identify two groups: persons of color (i.e., African Americans, Asians, or Hispanics/Latinos/Latinas) and Whites. Marital status was dichotomized as "married" and "nonmarried" (i.e., divorced, single, or widowed). Education was recoded as "high school or less" (i.e., high school degree/GED or less) and "some college and above."

Results

Participants

Participants were mostly female (76.3%), White (95.8%), and widowed (52.8%), and many (68%) had a high school/GED education or higher (Table 1).

Table 1.

Sociodemographic Characteristics of Study Participants

Participant characteristic^a	Number	Percentage
Age (1,019)		
60–70	224	22.0
71–80	351	34.4
81–90	364	35.7
90-plus years	80	7.9
Gender (1,019)		
Female	778	76.3
Male	241	23.7
Race/ethnicity (1,010)		
Asian	8	0.8
Black	22	2.2
Hispanic/Latino/Latina	7	0.7
White	968	95.8
Other	5	0.5
Marital status (1,013)		
Divorced	133	13.1
Married	263	26.0
Single	82	8.1
Widowed	535	52.8
Education (1,006)		
Associate's degree/technical degree	77	7.7
Bachelor's degree or higher	144	14.3
High school or GED	463	46.0
Less than high school	93	9.2
Some college	229	22.8

^aNumber in parentheses is number of respondents for questionnaire item.

Top Safe Food Handling Practice Gaps

The top four safe food handling practices to which participants responded "No" or "Sometimes" were

1. "thaw meat in the refrigerator" (50.0%);
2. "pick up refrigerated and frozen foods just before checking out" (40.3%);
3. "check 'sell-by' or 'use-by' dates on packages when shopping or eating" (34.1%); and
4. "keep raw meat or poultry juice away from other foods by using separate cutting boards" (21.5%) (Table 2).

Table 2.
Distribution of Food Safety Behavior Questionnaire Responses

Safe food handling practice^a	Number	Percentage
I always thaw meat in the refrigerator. (988)		
Yes	486	50.0
No/sometimes	486	50.0
When grocery shopping, I pick up refrigerated and frozen foods just before checking out. (988)		
Yes	590	59.7
No/sometimes	398	40.3
I check "sell-by" or "use-by" dates on packages when shopping or eating. (986)		
Yes	650	65.9
No/sometimes	336	34.1
I keep raw meat or poultry juice away from other foods by using separate cutting boards. (974)		
Yes	765	78.5
No/sometimes	209	21.5
I refrigerate my leftovers immediately. (969)		
Yes	845	87.2
No/sometimes	124	12.8
I wash my hands before I prepare food. (985)		
Yes	892	90.6
No/sometimes	93	9.4
I keep kitchen towels and sponges clean. (981)		
Yes	902	91.9
No/sometimes	79	8.1
Spoiled leftover food does not always smell, taste, or look bad, so when I'm in doubt, I throw it out. (992)		
Yes	921	92.8
No/sometimes	71	7.2
I wash cutting boards that have touched raw meat or poultry between uses. (976)		
Yes	909	93.1
No/sometimes	67	6.9
When I bring my groceries home, I refrigerate cold foods immediately. (996)		
Yes	967	94.9
No/sometimes	29	2.8

^aNumber in parentheses is number of respondents for questionnaire item.

Sociodemographic Differences in Safe Food Handling Practices

We found that adherences to safe practices were influenced by gender, race/ethnicity, age, marital status, and education. Here we present summaries of those influences. The comprehensive chi-square test results are shown in Table 3, following the summaries.

Significantly more men than women reported not engaging in the following safe food handling practices: using separate cutting boards ($p = .033$), hand washing ($p = .031$), keeping kitchen towels/sponges clean ($p = .003$), throwing out suspicious leftovers ($p = .001$), and washing cutting boards before use ($p = .002$).

Significantly higher percentages of respondents who self-identified as persons of color, compared to those who self-identified as White, indicated that they did not thaw meat in the refrigerator ($p = .024$) and did not pick up cold or frozen food last before checking out at the grocery ($p = .003$). Conversely, a significantly higher percentage of respondents who self-identified as White, compared to those who self-identified as persons of color, did not check food package dates ($p = .044$).

Additionally, participants aged 71 to 80 years were less likely to thaw meats in the refrigerator ($p = .006$) or refrigerate leftover food immediately ($p = .034$), compared to other age groups. A lower proportion of married participants, compared to nonmarried participants, reported thawing meat in the refrigerator ($p = .006$), but the opposite relationship was true for checking food package dates ($p = .016$). Finally, those with a lower education level were less likely to wash cutting boards between uses ($p = .045$) than those who had a higher education level.

Table 3.

Association of Sociodemographic Characteristics with Safe Food Handling Practices

Sociodemographic variable	Percentage within group reporting "no/sometimes"	X ²	p-value
Thaw meat in the refrigerator			
Race/ethnicity		5.1	.024
Persons of color	67.5		
White	49.2		
Age		10.1	.006
60–70	47.0		
71–80	57.0		
81–90	45.9		
90-plus years	50.0		
Marital status		7.6	.006
Married	29.9		
Nonmarried	70.1		
Pick up cold food last before check out			
Race/ethnicity		8.6	.003
Persons of color	61.9		
White	39.2		
Check dates on food packages			

Race/ethnicity		4.0	.044
Persons of color	19.5		
White	34.7		
Marital status		5.8	.016
Married	40.2		
Nonmarried	31.9		
Use separate cutting boards			
Gender		4.7	.033
Females	19.9		
Males	26.5		
Refrigerate leftovers immediately			
Age		6.8	.034
60–70	15.0		
71–80	15.3		
81–90	9.5		
90-plus years	12.8		
Wash hands before preparing food			
Gender		4.5	.031
Females	8.3		
Males	13.1		
Keep kitchen towels/sponges clean			
Gender		8.9	.003
Females	6.6		
Males	12.8		
Throw out suspicious leftovers			
Gender		10.9	.001
Females	5.7		
Males	12.1		
Wash cutting boards after contact with meat			
Gender		10.1	.002
Females	5.5		
Males	11.6		
Education		4.0	.045
College and above	5.0		
High school or less	8.3		

Discussion

Our study findings suggest that the sample of older adults we surveyed would benefit from food safety education topics targeting temperature control, food package sell-by/use-by dates, and cross-contamination. These findings align with those of Roy et al. (2016), who identified similar gaps related to safe food handling practices among community-residing older adults (e.g., those living in retirement communities or attending congregate meals) in the Midwest.

As others have done, we explored whether differences in safe food handling practices existed between respondents having different sociodemographic characteristics. Our findings showed food safety behaviors to be associated with gender, race/ethnicity, age, marital status, and education.

Gender was associated with several food safety practices, which may be attributable to lower food safety awareness regarding recommended safe food handling practices and/or risk perception among men. Research has indicated that males, compared to females, generally pay less attention to potential food safety hazards (Newman, Leon, Rebolledo, & Scallan, 2015) and are less likely to practice recommended food safety behaviors related to hand washing and cross-contamination prevention (Cates et al., 2009). Similarly, Anderson, Verrill, and Sahyoun (2011) reported that females are more likely than males to practice effective hand-washing behaviors and less likely to eat suspicious leftover and potentially risky food.

Race/ethnicity was associated with safe food handling practices related to temperature control (i.e., obtaining cold foods last at the grocery store) and food selection (i.e., reading package dates). Chang, Groseclose, Zaidi, and Braden (2009) conducted a 10-year ecological analysis and discovered that persons of color had a higher incidence of food-borne infections, which the researchers hypothesized was associated with socioeconomic status, food safety knowledge, and cultural differences. However, contrary to those findings and ours, Anderson et al. (2011) reported that older persons of color had better food safety practices compared to White older adults regarding hand washing, knowing the temperature of the refrigerator, understanding the importance of using a food thermometer, and not serving rare hamburgers. These researchers also reported that older persons of color had a higher perception of personal food safety risk compared to White older adults (Anderson et al., 2011). Due to these conflicting findings, further investigation is warranted to determine the role of race/ethnicity related to food safety behaviors so that culturally appropriate education programs can be developed.

Age, marital status, and educational status also influenced safe food handling practices in our sample of older adults. Anderson et al. (2011) reported that adults aged 60 years and older were more likely to follow recommended food safety practices than those younger than age 60. However, we found that adults between 71 and 80 years old were not likely to follow safe meat-thawing practices. In contrast to our findings related to marital status, Anderson et al. (2011) reported that older adults who live alone were less likely to follow recommended food temperature control practices.

Finally, we found that education status was associated with cutting board hygiene practices. Those with less education were less likely to report washing cutting boards, compared to those who were more educated. Our finding linking lower education with this food handling practice differs from other research examining education's influence on food safety practices. Anderson et al. (2011) reported that those with higher education were less likely to follow specific safe food handling practices than those with less education; for example, they found that higher education was associated with higher likelihood of eating potentially hazardous foods (e.g., undercooked hamburger). Given these contradictory findings, more research examining the role educational status has in safe food handling among older adults should be conducted.

Limitations

The findings we report here are not generalizable due to the limited diversity of the participants and the survey questionnaire used. Majorities of study participants were White, were female, and resided in rural areas; these population segments are representative of older adults in the Midwest state under study but not nationally (U.S. Census Bureau, 2017). Additionally, convenience sampling from a group of older adults participating in a SNAP-Ed program may have resulted in recruiting older adults who were more interested in and aware of recommended health behaviors, including safe food handling practices. Furthermore, it is unknown whether the participants who responded "no" or "sometimes" selected the answer because they were not practicing the stated behavior or because they did not select and/or prepare their own food. Finally, the results presented here are based on self-report data, which may have included more affirmative responses due to social desirability bias. Despite these limitations, the study findings provide insight on what food safety topics may have applicability with community-residing older adults.

Implications and Conclusions

Our study findings suggest a need for food safety education for older adults targeting several recommended food handling practice concepts. Specific concepts to be covered include temperature control, cross-contamination, and product selection practices. In providing older adult-focused food safety education, program developers should pay special attention to creating food safety materials and curricula that relate to the target audience factors of gender, race/ethnicity, age, marital status, and education level.

Additionally, future surveys should include questions inquiring about specific food handling behaviors, such as those related to meal preparation and grocery shopping. Furthermore, research exploring safe food handling practices among racially and ethnically diverse older adults should be pursued.

Author Note

LeLee Yap is now a clinical dietitian at Florida Hospital Orlando in Orlando, Florida.

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References

- Anderson, A. L., Verrill, L. A., & Sahyoun, N. R. (2011). Food safety perceptions and practices of older adults. *Public Health Reports, 126*(2), 220–227.
- Brownson, R. C., Baker, E. A., Leet, T. L., Gillespie, K. N., & True W. R. (Eds.) (2011). Evidence-based public health. (2nd ed.) New York, NY: Oxford University Press.
- Cates, S. C., Kosa, K. M., Karns, S., Godwin, S. L., Speller-Henderson, L., Harrison, R., & Draughon, F. A. (2009). *Food safety knowledge and practices among older adults: Identifying causes and solutions for risky behaviors.*

Journal of Nutrition for the Elderly, 28(2), 112–126.

Chang, M., Groseclose, S. L., Zaidi, A. A., & Braden, C. R. (2009). An ecological analysis of sociodemographic factors associated with the incidence of salmonellosis, shigellosis, and E. coli O157:H7 infections in US counties. *Epidemiology & Infections*, 137, 810–820.

Francis, S. L., Martin, P., & Taylor, K. (2011). Revising an Extension education website for limited resource audiences using social marketing theory. *Journal of Extension*, 49(6), Article 6FEA7. Available at: <http://www.joe.org/joe/2011december/a7.php>

Francis, S. L., & Taylor, M. L. (2009). A social marketing theory-based diet-education program for women ages 54 to 83 years improved dietary status. *Journal of American Dietetic Association*, 109(12), 2052–2056.

Francis, S. L., Taylor, M. L., & Haldeman, L. M. (2009). Nutrition education improves morale and self-efficacy for middle-aged and older women. *Journal of Nutrition for the Elderly*, 28(3), 272–286.

Gettings, M. A., & Kiernan, N. E. (2001). Practices and perceptions of food safety among seniors who prepare meals at home. *Journal of Nutrition Education*, 33(3), 148–154.

Lefebvre, R. C., & Rochlin, L. (1997). Social marketing. In K. Glanz, F. M. Lewis, & B. K. Rimer (Eds.). *Health behavior and health education*, (2nd ed., pp. 384–402). San Francisco, CA: Jossey-Bass Publishers.

Newman, K. L., Leon, J. S., Rebolledo, P. A. & Scallan, E. (2015). The impact of socioeconomic status on foodborne illness in high-income countries: A systemic review. *Epidemiology & Infections*, 143, 2473–2485.

Partnership for Food Safety Education. (n.d.). The core four practices. Retrieved from <http://www.fightbac.org/food-safety-basics/the-core-four-practices/>

Roy, A. L., Francis, S. L., Shaw, A., & Rajagopal, L. (2016). Promoting food safety awareness for older adults by using online education modules. *Journal of Extension*, 54(1), Article 1TOT8. Available at: <http://www.joe.org/joe/2016february/tt8.php>

Snow, G., & Benedict, J. (2003). Using social marketing to plan a nutrition education program targeting teens. *Journal of Extension*, 41(6), Article 6FEA4. Available at: <http://www.joe.org/joe/2003december/a4.php>

SteelFisher, G., Blendon, R., Hero, J., & Ben-Porath, E. (2013). Adoption of self-protective behaviors in response to a foodborne illness outbreak: Perspectives of older adults. *Journal of Food Safety*, 33(2), 149–162.

University of Hawaii Cooperative Extension Service. (2006). *Be safe: A home guide to help keep food safe*. Retrieved from <http://www.ctahr.hawaii.edu/oc/freepubs/pdf/FN-5.pdf>

U.S. Census Bureau. (2017). *Quick facts: Iowa*. Retrieved from <http://www.census.gov/quickfacts/table/WTN220212/19>

U.S. Department of Agriculture Economic Research Service. (2013). Rural-urban continuum codes. Retrieved from <https://www.ers.usda.gov/data-products/rural-urban-continuum-codes/>

U.S. Department of Agriculture & U.S. Food and Drug Administration. (2011). *Food safety for older adults*. Retrieved from <http://www.fda.gov/Food/FoodborneIllnessContaminants/PeopleAtRisk/ucm312705.htm>

U.S. Food and Drug Administration. (2017). *Food safety: It's especially important for at-risk groups*. Retrieved

from <http://www.fda.gov/Food/FoodborneIllnessContaminants/PeopleAtRisk/ucm352830.htm#FS3>

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