Examining the Prevalence of Self-Reported Foodborne Illnesses and Food Safety Risks among International College Students in the United States

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Abstract

Foodborne illness and food safety risks pose health threats to everyone, including international college students who live in the United States and encounter new or unfamiliar foods. This study assessed the prevalence of self-reported foodborne illness among international college students by cultural regions and length of time in the United States. Eight land grant institutions were contacted for participation. Directors of international students and scholars (ISS) programs at participating institutions agreed to forward a link containing an online survey to international students enrolled at their respective universities. Cross-tabulations were used to determine percentages of self-reported foodborne illness and other food safety risks among respondents by cultural regions and length of time lived in the U.S. Results indicated that 28.6% respondents self-reported they have been sick due to foodborne illness within the past year in the U.S., 10.1% have sought medical attention, and 3.2% have reported a suspected foodborne illness, 30.8% and 29.8%, respectively, have avoided particular restaurants or foods for fear of foodborne illness. Foodborne illness may be a concern among international college students in the U.S. International students in cultural regions with high percentages of self-reported foodborne illness such as Latin America, Africa, Ex-Communist, Catholic Europe, Confucian, and South Asia were more at risk of foodborne illness than other population groups. The self-reported percentage of foodborne illness was higher among international students who had lived in the U.S. for 3 years or more, than those who had lived in the U.S. for 2 years or less. Health educators could focus efforts on reaching international college students with appropriate food safety messages during their early stages of acculturation to mitigate risks of foodborne illness.

Key Words: Self-Reported Foodborne Illness, Food Safety Risks, International College Students, and Cultural Regions.

Introduction

Foodborne illness and food safety risks continue to be a growing concern in many countries, particularly in the United States.[1] The Centers for Disease Control and Prevention (CDC) estimated that approximately 76 million people in the U.S. get sick, 325,000 are hospitalized, and 5,000 die from food-related illnesses each year. Known pathogens account for an estimated 14 million illnesses, 60,000 hospitalizations, and 1,800 deaths. Unknown agents account for the remaining 62 million illnesses, 265,000 hospitalizations, and 3,200 deaths. Mead et al.[2] reported a 27.9% prevalence of food-related illness in the United States general population. Researchers maintain that the prevalence of foodborne illness reported by Mead et al. may understate the problem. Many people do not seek medical help for foodborne illness; therefore, not all episodes of illness are included in official records.[3]

Foodborne illness and food hazards pose not only health threats to everyone[4] but also economic and social burden.[5] Threats of foodborne illness and food safety risk are a concern for international students who attend colleges in the United States. Encountering unfamiliar foods may lead to food safety problems when there is a lack of knowledge of best practices in handling, preparing, or storing certain foods.

College students engage in food safety behaviors that place them at greater risk of foodborne illness than other members of the general population.[6] A survey of college students in three U.S. geographic regions revealed that students believed that foodborne illness was not common and that food safety was the government's responsibility.[7] Yarrow explored food safety attitudes, beliefs, knowledge and self-reported practices of college students before and after educational intervention and found that foodborne illnesses may be underreported among college students.[8] Byrd-Bredbenner et al.[9] suggested that young adults may choose to ignore hazards associated with foodborne illness because of the common misconception that foodborne illness does not frequently occur in the home. Even if it does, it would affect just a small number of people and, in most cases, would not be reported or detected by public health surveillance systems.[10] Fein, Lin, and Levy[11] reported that young adults between the ages of 18-39 were more likely than other groups to believe they had experienced a foodborne illness.

Purpose of Study

The purpose of this study was to determine the prevalence of self-reported foodborne illness among international college students by cultural regions and by length of time lived in the U. S. The study further sought to determine if international students were likely to avoid particular foods or restaurants because of food safety concerns.

Methods

Participants and Demographic Data

The sample for the study was international students enrolled in eight land grant institutions. Participating institutions were (a) Colorado State University with 107 (12.2%) respondents, (b) Cornell University with 37 (4.2%) respondents, (c) Iowa State University with 86 (9.8%) respondents, (d) North Dakota State University with 174 (19.6%) respondents, (e) Oklahoma State University with 37 (4.2%) respondents, (f) The Ohio State University with 207 (23.6%) respondents, (g) University of Delaware with 128 (14.6%) respondents, and (h) Washington State University with 102 (11.6%) respondents.

Table 1 provides a summary of the demographic characteristics of the survey participants. A total of 904 international students responded to the survey; 51.3% of the respondents were male and 48.7% were female. More respondents (27.8%) indicated they had lived in the United States for less than 1 year, while 18.0% had lived for 1 year but less than 2 years, 15.1% had lived for 2 years but less than 3 years, 9.7% had lived in the U.S. for 3 years but less than 4 years, another 9.9% had lived for 4 years but less than 5 years, and 19.6% had lived in the U.S. for 5 years or more.

Instrumentation and Data Collection

Survey items were designed to examine the prevalence of self-reported foodborne illness and food safety behaviors among international students. Respondents were asked if they had (a) been sick from a foodborne illness in the past year, (b) reported a suspected foodborne illness to public health authorities, (c) sought medical attention for a foodborne illness, (d) avoided particular restaurants, and (e) avoided foods in the United States because of fear of foodborne illness. Response choices for these five questions were "yes" or "no". Demographic

items in the survey included gender, country, age, institution, and length of time lived in the United States. The survey was tested for validity and reliability using a pilot-test of 58 international students and revised to eliminate misunderstandings and ambiguities. Based on the pilot-test results and suggestions by food safety educators, technical terms such as "foodborne illness" and "food safety" were defined.

Cooperation letters were sent to the offices of international students and scholars (ISS) programs of eight institutions with a large international student population. The directors of ISS programs at the participating universities issued cooperation letters, indicating willingness to forward the online survey to international students enrolled at their universities through their ISS list-servs. The researchers sent copies of the following documents to the Institutional Review Board offices of the participating institutions: (a) the initial IRB approval letter, (b) the survey instrument, (c) cooperation letters from the ISS directors, (d) an informed consent cover letter, and (e) an introductory email text to the online survey. After institutional approvals, an introductory message containing the link to the online survey was emailed to the directors of ISS programs at the participating institutions to be forwarded to international students. A reminder was sent 1 week later to solicit additional responses.

Data Analysis

The raw data was cleaned, collapsed, and recoded before analysis. Unusable records were deleted from the data set. Respondents from 105 countries were grouped into eight cultural regions using Inglehart-Welzel's Cultural Map of the World based on the World Values Surveys.[12-15] Each respondent was placed in one of the following regions: Confucian, Protestant Europe, English Speaking, Catholic Europe, Ex-Communist, South Asia, Latin America and Africa.[12-15]

Statistical analyses were conducted using SPSS software (Statistical Package for the Social Sciences, Version 16.0). Descriptive statistics were used to describe demographic characteristics of the study participants and responses to survey items. Cross-tabulations were used to examine the relationships and percentages of responses of variables by cultural regions and by length of time lived in the United States. Frequencies were used to analyze the number of responses for into each of the yes/no variables.

Results

General Findings

Table 2 summarizes the general results of the five survey items among international students in the United States. As shown in Table 2, 28.7% of survey respondents had been sick from a foodborne illness within the past year, 3.5% of the participants had reported a suspected foodborne illness to public health authorities, and 10.1% had sought medical attention because of foodborne illness. In addition, 30.3% of the respondents reported avoiding a particular restaurant, and 29.3% avoiding particular foods because of the fear of foodborne illness.

Findings by Cultural Regions

The percentage of self-reported foodborne illness among international students by cultural regions (Table 3) was: Confucian with 26.6%, Protestant Europe with 18.2%, English Speaking with 24.0%, Catholic Europe with 28.6%, Ex-Communist with 36.1%, South Asia with 25.9%, Latin America with 39.7%, and Africa with 39.4%. The percentage of international students who were most likely to report a suspected foodborne illness to public health authorities was lowest for the following groups: Confucian (5.3%), Protestant Europe (3.0%), Catholic Europe (3.4%), South Asia (2.6%), and Africa (4.6%). None of the international students from English Speaking, Ex-Communist, and Latin America regions reported an illness to public health authorities. However, more participants from Latin America (13.8%), Ex-Communist (11.1%), and the Confucian (11.9%) regions indicated they had sought medical attention for foodborne illness in the U.S. A surprisingly high percentage of participants indicated they had avoided particular restaurants or particular foods because of the fear of foodborne illness. International students from Catholic Europe (36.7%), Ex-Communist (45.7%), Latin America (34.4%), and Africa regions (35.5%) were more likely to avoid a particular restaurant and a particular food in the U.S. because of foodborne illness or the fear of foodborne illness.

Findings by Length of Residence

Table 4 presents the percentages of self-reported foodborne illness among international college students by the length of time lived in the United States. The percentages of self-reported foodborne illness by length of time lived in the U. S. were highest for 3 but less than 4 years (37.3%), 4 but less

than 5 years (37.0%), 2 but less than 3 years (32.8%), and for 5 years or more (30.8%). The percentages of foodborne illness reported to public health authorities were highest for international students who had lived in the U.S. for less than 1 year (4.7%), and 1 but less than 2 years (3.9%). However, international students who had lived in the U.S. for 2 but less than 3 years (14.0%) and for 4 but less than 5 years (13.4%) had sought medical attention more often for foodborne illness than others (See Table 4).

Respondents who had lived in the United States longer reported avoiding restaurants and particular foods at a higher rate than those who had lived in the US for a short period of time. Students were least likely to avoid a particular restaurant if they had lived in the U.S. for less than 1 year (20.5%) or for 1 year but less than 2 (27.2%). The same groups reported avoiding a particular food because of the fear of foodborne illness: (a) those who had lived in the U.S. for 2 but less than 3 years (31.3%), (b) for 3 but less than 4 years (34.1%), (c) for 4 but less than 5 years (41.9%), and (d) for 5 years or more (31.0%) than those who have lived in the U.S. for less than 1 year (22.1%) or for 1 year but less than 2 (26.6%).

Discussion

A total of 28.7% of the study sample had self-reported being sick from a foodborne illness within the past year in the U.S., 10.1% had sought medical attention, and 3.5% had reported a suspected foodborne illness to public health authorities; whereas 30.3% and 29.3% have avoided particular restaurants and foods for fear of foodborne illness. These findings indicated that foodborne illness was a concern among international students. The 28.7% incidence of self-reported foodborne illness among international students within 1 year was higher than the percentage (1.8%) or incidence of foodborne disease reported among domestic college students in three campuses by Unklesbay et al.,[7] and the annual incidence rate (27.9%) of foodborne illness for the U.S. general population reported by Mead et al.[2] The incidence of self-reported foodborne illness among international students could also be comparable to the 17% incidence rate of diarrhea among (n = 354) college students in Morrone and Rathbun's[6] study of health education and food safety behavior at Ohio University, although the cases of diarrhea were not tested for the cause or contributing factors.

The study found that international students from some cultural regions were more at risk and more vulnerable to the threats of foodborne illnesses than other population groups. The cultural groups with the highest percentages of self-reported foodborne illness were Latin America, Africa, Ex-Communist, Catholic Europe, Confucian, and South Asia. Students from these cultural regions are more likely to benefit from food safety educational strategies or training. According to a study by Fein, Lin, and Levy,[11] consumers who think they had recently experienced a foodborne illness were likely to increase their knowledge, concern, and awareness about food safety issues to avoid future experiences. When foodborne illness occurred at home, it usually affects a small number of people that may be unlikely to be detected by the public health authorities.[10] Most often consumers may not be aware of a foodborne illness because many cases go unreported or are mistaken for some other illness.[16]

When consumers suspect that they may have contracted a foodborne illness in a public restaurant, they may choose to avoid the restaurant or a particular food because of the experience. Of those participating in this study, 30.3% had avoided particular restaurants and 29.3% had avoided particular foods for fear of foodborne illness or as personal measures for mitigation. The trend for reporting foodborne illness to public health authorities tended to decline as participants lived longer in the U.S. while the trend for avoiding particular restaurants and particular foods tended to increase. More respondents from the Confucian and Africa cultural regions, who had been sick from a foodborne illness, had reported illness to public health authorities. Meanwhile, respondents from the Confucian, Ex-Communist, South Asia, Latin America, and Africa regions had sought more medical attention because of foodborne illnesses than respondents from other cultural regions. And more students from Catholic Europe, Ex-Communist and Africa had avoided either a particular restaurant or a particular food because of the fear of foodborne illness and other food safety risks than those from the other cultural regions.

The cross-tabulations indicated that international students who had lived in the U.S. longer than 1 year self-reported higher percentages of foodborne illness. For example, those who have lived in the U.S. for 3 but less than 4 years and for 4 but less than 5 years self-reported the highest percentages of foodborne illness (37.3% and 37.0% respectively). This may have occurred because, during the first 2 years of attending college in the U.S., most students may be living in student housing and eating at college food service facilities. In the following years, students may venture out into the community and experience new,

unfamiliar foods and restaurants. They also reported higher percentages for avoiding particular restaurant (35.8% and 40.7% respectively) and particular food (34.1% and 41.9% respectively) for fear of foodborne illness than other groups. Respondents who had lived in the U.S. for less than 1 year had reported more (4.7%) suspected foodborne illness to public health authorities.

The focus of the research was to assess or determine the prevalence of self-reported foodborne illness among international college students by cultural regions and length of time living in the United States. The researchers did not ask respondents for information on clinical diagnosis involving medical/lab verification of symptoms and etiology of foodborne illness. Therefore, the study neither addresses the types of agents nor specific food vehicle responsible for causing foodborne illness among international students. Although international students were asked if they had ever avoided a particular food in the U.S. due to fear of foodborne illness, no data were collected on specific foods avoided by participants.

Another limitation of this study was that response rates could not be calculated for the participating institutions because of lack of information on the actual number of international students enrolled in the institutions. Additionally, the researchers were unable to determine if all students at the participating institutions were included in the international students and scholars (ISS) listservs used to distribute the online survey. Therefore, a response rate for each institution could not be determined.

Limitations

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Conclusions and Recommendations

The risk of foodborne illness may be higher for international college students who encounter new and unfamiliar food products in the U.S. for the first time. The risk was especially true for students from the Latin America, Africa, Ex-Communist, Catholic Europe, Confucian, and South Asia cultural regions who self-reported foodborne illness at a rate higher than the U.S. national average in Mead's[2] study. Our study found that international students who had stayed longer in the U.S. self-reported higher percentages of foodborne illness and were more likely to avoid particular foods and restaurants for fear of foodborne illness. Self-reported foodborne illness increased after the first 2 years in the U.S. and students reported avoiding particular restaurants and particular food for fear of foodborne illness.

Colleges and universities present a salient setting for promoting food safety awareness for international students. International students could benefit from exposure to food safety education and health awareness programs. Even though there are health education programs on many campuses, food safety issues are generally not emphasized in the health programs,[6] whereas knowledge and awareness of food safety risks and safe food handling practices are important in reducing foodborne illness.[17] Based on the findings of this study, designing health education programs to include and promote food safety risk messages for international students across different cultural groups would be useful in reducing the risks of foodborne illness. Such educational intervention programs may be implemented during orientation programs or at early stages of acculturation in the U.S.

An integral part of the overall food safety initiative is providing food-safety education to a variety of audiences,[17,18,19] including international students. Food safety awareness for consumers is essential in reducing foodborne illness; without food safety knowledge, foodborne illness cannot be significantly

reduced.[17-19] To target specific consumers or cultural regions in the most appropriate way, food safety educators need to be able to understand food safety perceptions and food safety behaviors of consumers within a specific or targeted population.[20] Therefore, the challenge will be to create educational interventions that address the risks relevant to international students from each of the various cultural regions.

Developing food safety awareness programs for international students is one way of reducing the prevalence of foodborne illness and mitigating food safety risks for this population. Students from cultural regions that self-reported high percentages of foodborne illness are more likely to benefit from food safety educational strategies. An early informational strategy or training intervention during their first or second years in the U.S. will help to decrease the high percentages of foodborne illness reported by those who have lived in the U.S. for more than 2 years.

All international students could benefit from food safety education and awareness programs. Students from cultural regions with higher percentages of foodborne illness are more likely to need intervention programs. Further research is needed to identify specific curriculum content for students from each cultural region. Educators and curriculum designers would benefit from knowing the specific foods that are unfamiliar to each cultural group.

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References

1. Gauci C, Gauci AA. What does the food handler in the home know about salmonellosis and food safety? *J Roy Soc Health*. 2005;125(3):136-142.

2. Mead PS, Slutsker L, Dietz V, et al. Food-Related illness and death in the United States. CDC *EID*. 1999;5(5):607-625.

3. Vogt DU. Food safety issues in the 109th Congress. Congressional Research Service. 2005;CRS Report RL31853.

4. Satcher D. Food safety: A growing global health problem. *JAMA*. 2000;283:1817.

5. Antle JM. Benefits and costs of food safety regulation. *Food Policy*. 1999;24(6):605-623.

6. Morrone M, Rathbun A. Health education and food safety behavior in the university setting. *J Environ Health*. 2003;67(7):9-15.

7. Unklesbay N, Sneed J, Toma R. College students' attitudes, practices, and knowledge of food safety. *J Food Prot*. 1998;61(9):1175-1180.

8. Yarrow LK. *Food Safety Attitudes, Beliefs, Knowledge and Self-Reported Practices of College Students before and after Educational Intervention* [Dissertation]. Manhattan, KS: Kansas State University; 2006.

9. Byrd-Bredbenner C, Maurer J, Wheatley V, Cottone E, Clancy M. Food safety hazards lurk in the kitchens of young adults. *J Food Prot*. 2007;70(4):991-996.

10. Jay LS, Comar D, Govenlock, LD. A video study of Australian domestic food-handling practices. *J Food Prot*. 1999;62(11):1285-1296.

11. Fein SB, Lin CT, Levy AS. Foodborne illness: Perceptions, experience, and preventive behaviors in the United States. *J Food Prot*. 1995;58(12):1405-1411.

12. Inglehart RF, Baker W. Modernization, cultural change, and the persistence of traditional values. *Am Socio Rev*. 2000;65(1):19-51.

13. Inglehart RF, Welzel C. The theory of human development: A cross-cultural analysis. *Eur J Polit Res*. 2003;42(3):341-379.

14. Inglehart RF, Welzel C. *Modernization, Cultural Change, and Democracy: The Human Development Sequence.* New York: Cambridge University Press; 2005.

15. Inglehart RF. Mapping global values. In: Inglehart RF, ed. *Measuring and Mapping Cultures: 25 Years of Comparative Value Surveys*. Boston, MA: Brill; 2007.

16. Terpstra MJ, Steenbekkers LP, Maertelaere NC, Nijhuis S. Food storage and disposal: Consumer practices and knowledge. *Br Food J.* 2005;107(7):526-533.

17. Redmond EC, Griffith C J. Consumer food handling in the home: A review of consumer food safety studies. *J Food Prot*. 2003;66(1):130-161.

18. Finch C, Daniel E. Food safety knowledge and behavior of emergency food relief organization workers: Effects of food safety training intervention. *J Environ Health*. 2005;67(9):30-34.

19. Redmond EC, Griffith CJ. Consumer perceptions of food safety risk, control and responsibility. *Appetite*. 2003;43(3):309-313.

20. Fischer AR, Frewer LJ, Nauta M. Towards improving food safety in the domestic environment: A multi-item rasch scale for the measurement of the safety efficacy of domestic food-handling practices. *Risk Anal*. 2006;26(5):1323-1338.

Table 1. Demographic and Other Selected Characteristics of Study Population

Characteristics of Survey Respondents	*n*	%
Gender (*n* = 880)*		
1. Male	451	51.3%
2. Female	429	48.7%
Age groups, years (*n* = 881)*		
1. 18 to 20 years old	90	10.2%
2. 21 to 23 years old	171	19.4%
3. 24 to 26 years old	207	23.5%
4. 27 to 29 years old	174	19.8%
5. 30 or older	239	27.1%
Cultural Regions (*n* = 837)*		
1. Confucian	258	30.8%
2. Protestant Europe	34	4.1%
3. English Speaking	26	3.1%
4. Catholic Europe	30	3.6%
5. Ex-Communist	36	4.3%
6. South Asia	319	38.1%
7. Latin America	67	8.0%
8. Africa	67	8.0%
Length of time lived in the U.S (*n* = 879)*		
1. Less than 1 year	244	27.8%
2. 1 year but less than 2 yrs	158	18.0%
3. 2 years but less than 3 yrs	133	15.1%
4. 3 years but less than 4 yrs	85	9.7%
5. 4 years but less than 5 yrs	87	9.9%
6. 5 years or more	172	19.6%

* Number of respondents per item is indicated in parentheses.

Table 2. Percentages of Self-Reported Foodborne Illness among International College Students in the U.S.

Survey Items	Yes *n* (%)	No *n* (%)	Total *n**
Have been sick from a foodborne illness within the past year in the U.S.	245 (28.7%)	610 (71.3%)	855
Have reported a foodborne illness to public health authorities in the U.S.	30 (3.5%)	820 (96.5%)	850
Have sought medical attention for foodborne illness in the U.S.	86 (10.1%)	766 (89.9%)	852
Have avoided a particular restaurant in the U.S. because of foodborne illness	253 (30.3%)	582 (69.7%)	835
Have avoided a particular food in the U.S. because of fear for foodborne illness	254 (29.3%)	613 (70.7%)	867

* Total number of participants responding to each survey item.

Table 3. Percentages of Responses for Prevalence of Self-Reported Foodborne Illness Items by Cultural Regions and Survey Questions

		Cultural Regions**								
Items		1	2	3	4	5	6	7	8	Total%
Foodborne illness	No	73.4	81.8	76.0	71.4	63.9	74.1	60.3	60.6	71.5%
	Yes	26.6	18.2	24.0	28.6	36.1	25.9	39.7	39.4	28.5%
Total (*n*)*		*248*	*33*	*25*	*28*	*36*	*309*	*63*	*66*	*808*
Reported Illness	No	94.7	97.0	100	96.6	100	97.4	100	95.4	96.8%
	Yes	5.3	3.0	0	3.4	0	2.6	0	4.6	3.2%
Total (*n*)*		*246*	*33*	*25*	*29*	*36*	*306*	*65*	*65*	*808*
Sought Medical	No	88.1	97.1	95.8	93.1	88.9	91.9	86.2	89.2	90.3%
	Yes	11.9	2.9	4.2	6.9	11.1	8.1	13.8	10.8	9.7%
Total (*n*)*		*244*	*34*	*24*	*29*	*36*	*309*	*65*	*65*	*806*
Avoided a Restaurant	No	71.5	69.7	68.0	63.3	54.3	71.5	65.6	64.5	69.2%
	Yes	28.5	30.3	32.0	36.7	45.7	28.5	34.4	35.5	30.8%
Total (*n*)*		*239*	*33*	*25*	*30*	*35*	*302*	*64*	*62*	*790*
Avoided a Food	No	74.7	67.6	72.0	60.0	58.3	70.6	70.8	62.7	70.2%
	Yes	25.3	32.4	28.0	40.0	41.7	29.4	29.2	37.3	29.8%
Total (*n*)*		*253*	*34*	*25*	*30*	*36*	*313*	*65*	*67*	*823*

* Number of respondents per item by cultural regions.

**Cultural Regions: 1 = Confucian, 2 = Protestant Europe, 3 = English Speaking, 4 = Catholic Europe, 5 = Ex-Communist, 6 = South Asia, 7 = Latin America and 8 = Africa.

Table 4. Percentages of Self-Reported Foodborne Illness within the Past Year by Length of Time Respondents have lived in the U.S.

		Length of time lived in the U.S**						
Items		1	2	3	4	5	6	Total%
Foodborne illness	No	81.3	70.6	67.2	62.7	63.0	69.2	71.3%
	Yes	18.7	29.4	32.8	37.3	37.0	30.8	28.7%
Total (*n*)*		*235*	*153*	*128*	*83*	*81*	*169*	*849*
Reported Illness	No	95.3	96.1	96.9	96.4	97.5	97.6	96.5%
	Yes	4.7	3.9	3.1	3.6	2.5	2.4	3.5%
Total (*n*)*		*234*	*154*	*127*	*83*	*80*	*168*	*846*
Sought Medical	No	90.6	90.7	86.0	92.9	86.6	91.7	90.0%
	Yes	9.4	9.3	14.0	7.1	13.4	8.3	10.0%
Total (*n*)*		*233*	*151*	*129*	*84*	*82*	*169*	*848*
Avoided a Restaurant	No	79.5	72.8	63.9	64.2	59.3	64.8	69.7%
	Yes	20.5	27.2	36.1	35.8	40.7	35.2	30.3%
Total (*n*)*		*234*	*151*	*122*	*81*	*81*	*162*	*831*
Avoided a Food	No	77.9	73.4	68.7	65.9	58.1	69.0	70.8%
	Yes	22.1	26.6	31.3	34.1	41.9	31.0	29.2%
Total (*n*)*		*240*	*154*	*131*	*82*	*86*	*171*	*864*

* Number of respondents per item by length of time lived in the U.S.

** 1 = Less than one year, 2 = One year but less than two years, 3 = Two years but less than three years, 4 = Three years but less than four years, 5 = Four years but less than five years, 6 = Five years or more.