

A CONTENT ANALYSIS OF FOOD SAFETY POLICIES AND PROCEDURES FOR STUDENT-LED FOOD EVENTS AT COLLEGES AND UNIVERSITIES IN THE UNITED STATES

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ABSTRACT

The purpose of this study was to identify similarities and differences in food safety policies and procedures for student-led food events in colleges and universities (CUs). Thirty-seven websites were analyzed using content analysis; food safety policies and gaps in existing food safety policies and procedures for student-led food events were identified. A lack of information about food safety policies and procedures for student-led food events was identified. The results of this study will be beneficial for improving food safety information on CUs' websites and assisting students who prepare for food safety compliance during student-led food events.

Keywords: content analysis, food safety, policies and procedures, student-led food events

INTRODUCTION

Annually, 9.4 million foodborne illnesses (FBIs), caused by 31 identified pathogens, result in 1,351 deaths and 55,961 hospitalizations in the United States (U.S.) (Scallan et al., 2011). Even though FBI outbreaks estimated by Scallan et al. (2011) were different from the report by the Centers for Disease Control and Prevention (2013) that accounted for 1,526 FBI outbreaks during 2009 and 2010, FBIs still represent a major public health issue in the U.S.

Ensuring food safety at college and universities (CUs) is important because food is served to many customers on campus and therefore, contaminated food could affect a large number of people. With respect to food safety on campus, many researchers have found that a lack of food safety awareness among college students is a factor in non-compliance with proper food safety practices (Byrd-Bredbenner, Maurer, Wheatley, Cottone, & Clancy, 2007; Green & Knechtges, 2015; Hertzman, Stefanelli, & Farrish, 2008; McArthur, Holbert, & Forsythe, 2007; Sanlier, 2009). College students' appear to have both insufficient food safety knowledge as well as poor safe food handling practices (Egan et al., 2007; Hertzman, Kitterlin, Farrish, & Stefanelli, 2011; Sanier & Konaklioglu, 2012; Stein, Dirks, & Quinlan, 2010; Yarrow, Remig, & Higgins, 2009). Factors contributing to unsafe food handling practices among college students include a lack of cooking experience (Morrone & Rathbun, 2003), poor personal hygiene (Byrd-Bredbenner et al., 2007), and lack of self-confidence about cooking (Byrd-Bredbenner, Maurer, Wheatley, Schaffner, Bruhn, & Blalock, 2007).

Even though some factors contributing to unsafe food handling practices have been identified, college students' food handling practices could likely be improved by establishing a positive food safety culture. According to previous studies, such a culture would encourage improvement of food handling practices (Taylor, 2011; Yiannas, 2009). This study adopted the concept of organizational culture, defined as a collaborative awareness of an organization with

respect to policies, procedures, and practices (Schein, 1985). As a part of organizational culture, food safety culture could play a crucial role in providing proper guidelines for food safety interventions (Yiannas, 2009). Thereby, many CUs had established food safety policies and procedures to both control college students' food handling practices and address FBI incidences and/or allegations.

Food Safety Policies and Procedures at CUs

This study focused on food safety policies and procedures for student-led food events at CUs. Because there is no widely known definition for describing a student-led food event, it can be seen that some CUs presented an individual scope toward student-led food events, and varying definitions and scope of food events may result in the establishment of differing food safety requirements for student-led food events. Thereby, researchers of this study defined a student-led food event as any event organized by a registered student organization where food will be prepared and/or provided to consumers either on or off campus.

Varying levels of food safety policies and procedures may exist in CUs, and some delegate the management of food safety at student-led events to entities such as Environmental Health and Safety and Risk Management (University of California-San Francisco, 2017; Texas State University, n.d.; University of Minnesota, 2015). Some CUs have food safety policies and procedures in place to address food safety issues during student-led food events while others do not. For example, Texas A&M University (Texas A&M University Standard Administrative Procedure, 2004), the University of Massachusetts (University of Massachusetts Environmental Health and Safety, n.d.), and Iowa State University (Iowa State University Office of Risk Management, 2016) all have both food safety training and requirements for food-handler permits in place for student-led food events, while Auburn University (n.d.) and California State Polytechnic University at Pomona (n.d.) appear to have only food permits in place, and the University of Alabama (n.d.) has both a food handler's permit and food safety inspections in place for such events. Because the Internet is a useful information source for researchers and practitioners, various ways of administering food safety policies and procedures for student-led food events at CUs could be analyzed by investigating institution websites.

Student-led food events are held at many CUs in the U.S., but food safety policies and procedures for student-led food events are not always in place (Kang & Rajagopal, unpublished). Moreover, because no known studies have utilized content analysis to explore food safety policies and procedures for student-led food events in CUs, the purpose of this study was to identify both similarities and differences in food safety policies and procedures for student-led food events in U.S. CUs. The study aimed to answer the following research questions: 1) What are the common food safety policies and procedures that create food safety cultures for student-led food

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events in CUs, and 2) What are the differences in food safety policies and procedures that create food safety culture for CU student-led food events?

METHODS

Sample Selection

The sample was obtained from lists of registered higher education institutions provided by the United States Department of Agriculture National Institute of Food Agriculture (2016) and the Association of Public and Land-Grant Universities (n.d.). Based on a prior questionnaire (Kang & Rajagopal, unpublished), 75 valid questionnaires were returned from 231 CUs in the U.S. (i.e., a 32.5% response rate). Among the 75 participants, 55 (73.3%) reported they allowed food to be prepared and/or served to the public during student-led food events, while 20 participants (26.7%) reported they do not (Table 1). Among 55 participants that allowed student-led food events, 40 participants indicated that their institutions had established food safety policies and procedures for student-led food events at unit, department, and/or college levels. This study extensively analyzed food safety policies and procedures (e.g., environmental health and safety, risk management, event administration, student organization) from the websites of these 40 CUs that had established food safety policies and procedures for student-led food events in place.

Data Collection

The website of each CU in the sample (n=40) was examined by performing content analysis to identify commonly used terms and content gaps associated with food safety policies and procedures. The investigation showed that 37 out of 40 participating CUs provided the contents of food safety policies and procedures on their websites. Three CUs that provided no food safety policies on their websites were sent emails requesting them to share their food safety policies and procedures for student-led food events with the researchers of this study.

Website information related to food safety policies and procedures for student-led food events were procured reflecting a variety of data types, including textual, graphical, and documentation formats (e.g., food handler's permit form, food-event checklist chart, temporary handwashing station diagram). The food safety information on CUs' websites was copied and transferred to Microsoft® Word, and separate documents were also copied and transferred to Microsoft® Word. CU data associated with food safety policies and procedures were saved separately in a file and analyzed by qualitative data-analysis software (MAXQDA Version 13); graphical data was directly imported to qualitative data-analysis software (MAXQDA Version 13).

Content Analysis

Content analysis is "a research technique for the objective, systematic and quantitative description of the manifest content of communication" (Berelson, 1952, p. 18). Content analysis is known as a method for supporting empirical research claims because coding

schemes can be explained by quantifying manifest coding units as an objective method of analysis (Bryman, 2012). Data can be divided into quantifiable units to ensure that coding units' frequencies can be counted when identifying data demonstrated in manifest content (Bryman, 2012; Miles, Huberman, & Saldana, 2014). Content analysis is a useful tool for investigating trends and patterns in documents (Miles, Huberman, & Saldana, 2014). For example, Stemler and Bebell (1998) conducted a content analysis of mission statements of K-12 schools to examine whether academic test scores of such institutions align with their mission statements. The researchers of the present study chose content analysis because it is a useful tool for analyzing unobtrusive data (Lune & Berg, 2017).

Data Analysis

Data associated with food safety policies and procedures were directly copied from CU websites. Computer-assisted qualitative data analysis software, MAXQDA Version 13, was used to perform content analysis. MAXQDA is a professional software used for qualitative data analysis of textual, graphical, audio, and video data (Franzosi, Doyle, McClelland, Rankin, & Vicari, 2013).

After identifying the coding schemes, the coding units identified were clustered to discover emergent themes. Prior to identifying themes, the identified coding schemes were classified by using the five major FBI risk factors identified by United States Food and Drug Administration (FDA) (2009) as *a priori* sub-categories of *food safety risk*: (a) contaminated equipment, (b) food from unsafe sources, (c) inadequate cooking, (d) improper food handling, and (e) poor personal hygiene (Table 2). Because coding schemes for this study were identified by a single coder, *a priori* subcategories identified by FDA (2009) were employed to overcome limitations of inter-coder reliability or inter-coder agreement of emergent coding units from multiple coders. Accordingly, an index of coder agreement such as Cohen's kappa (Cohen, 1960) was not computed. Despite a limitation of a single coder, Campbell, Quincy, Osserman, and Pedersen (2013) stated coding schemes identified by a single coder would be useful to reduce coding errors. For this study, coding schemes identified by a single coder were reviewed by other researchers of this study to agree with emergent coding schemes. Similar to what Lune and Berg (2017) described, researchers of this study employed the FDA's five major FBI risk factors as subcategories to classify the identified coding schemes.

Individually-identified keywords and frequent phrases were then classified into each coding scheme. To analyze the identified coding schemes by content analysis, the research method conducted by Ambrozic, Jevsnik, and Raspor (2010) was adopted to apply consistent criteria for selection of coding schemes from commonly mentioned words on CUs' websites. Graphical data were also classified into each coding scheme (Figure 1).

A code matrix tool utilizing the MAXQDA software generated an extensive chart that presented word frequency counts, and a code co-

Table 1: Food Safety Policies and Procedures for Student-led Food Events at CUs (n=42-75)

Current food safety procedures for student-led food events	n	(%)
Permission to prepare and/or serve food to the public during student-led food events		
Yes	55	(73.3)
No	20	(26.7)
Existence of food safety policies and procedures for student-led food events at the unit/college/department level ^a		
Yes	40	(75.5)
No	7	(13.2)
I don't know	6	(11.3)

^a Total response is less than 75 due to unanswered question.

Table 2: Commonly Mentioned Words associated with Student-led Food Events (n=37)

Theme	Subcategory	Coding Scheme	Commonly mentioned words
Food Safety Risk	Contaminated equipment	Contamination	Cross-contamination; separate serving utensils
	Food from unsafe sources	Vendor	Registered vendor; licensed source; reliable supplier; authorized vendor; contracted vendor; approved source; no home canned food
		Inadequate cooking	TCS ³
	Improper food handling	Non-TCS ³	Bake sales; baked goods; dry food; candies; cakes without cream; cookies
		Food Safety Practices	Hair restraint; sanitize the area; food safety knowledge; protect food; no jewelry; clean cloths
		Use a thermometer	Check internal temperature; minimum internal temperature
Poor personal hygiene	Handwashing	20 seconds; temporary handwashing facilities; soap; hot water; paper towel	
	Gloves	Disposable food handling gloves; Ready-to-eat food; food safe (non-latex) gloves	
Food Safety Policies	Policies	Guidelines	Food safety regulations; accordance with the state; campus policies
		Event-scope	Private event; public event; food event; registered student organization
	Food handling permit	Food Waiver Form	Food services waiver; waiver of policy; third-party vendor-donated food and drink; exemption from permit
		Event Application Form	Temporary event; event authorization form
		Environmental Health and Safety	Food handler permit; permitted; a temporary food facility; temporary permit; temporary food facility permit; Environmental Health and Safety approval
		Local Health	Food handling permit from the Local Health Department; Local Health Department Sanitarian; County Health Department Requirements
	Inspection	Inspection	Inspection; monitor; observation; conduct routine inspections; maintain sanitation inspection
	Education Sanitation	Training	Train volunteers; Food safety training; online food safety training
		Dishwashing	A three-compartment sink; 1 tablespoon chlorine bleach in 1-gallon warm water; using plastic cutting boards-not wood; Utensils and dishes should be air dried
	Waste Handling	Waste Handling	Durable and lined garbage containers; liquid waste into a sanitary sewer or collect in a portable container; do not put discarded grease in the sanitary sewer
Epidemiology		FBI	Common symptoms; diarrhea; abdominal cramping; fever; a headache; vomiting; stools
		FBI-source	Bacteria; parasites; viruses; dirty hands; harmful microorganisms
FBI incident/allegation procedures		Checklist	Report any incidents such as foodborne illness to the Safety/Risk Manager; the Director of Health Services and the Vice President for Student Affairs; foodborne illness diagnosis; medical diagnosis within three months
Allergy	Food Allergy	Nuts; Peanut; Egg; Milk; Wheat; Soy; fish; shellfish; allergic reaction; eliminate the use of latex gloves	

³ According to the amendment of FDA Food Code 2013, “potentially hazardous food/TCS” was replaced to “TCS” as a universal term.

occurrence model was also employed to identify relationships between codes of risk factors of FBIs and food safety policies for student-led food events in CUs. Word frequency counts method was used to identify the most frequent words associated with food safety policies and procedures because word frequency count method is recognized as the most appropriate approach for performing content analysis (Lune & Berg, 2017).

RESULTS AND DISCUSSION

Categories and Coding Units

Data from CUs’ websites were analyzed to identify coding schemes and themes. Table 2 presents the three identified themes associated with student-led food events at CUs: (1) “*food safety risk*”, (2) “*food*

safety policies”, and (3) “*epidemiology*.” The theme of “*food safety risk*” consisted of the five major risk factors of FBIs (FDA, 2009), namely, “*contaminated equipment*,” “*food from unsafe sources*,” “*inadequate cooking*,” “*improper food handling*,” and “*poor personal hygiene*”. Each subcategory reflected coding schemes using commonly mentioned words associated with the theme. For example, commonly mentioned words related to “*food from unsafe sources*” emerged from “*registered vendor*,” “*licensed source*,” “*reliable supplier*,” “*authorized vendor*,” “*contracted vendor*,” “*approved source*,” and “*no home canned food*.” Similar to the method used in exploring commonly mentioned words; “*inadequate cooking*” contained four coding units: “*Time/Temperature Control for Safety Food (TCS)*,” “*non-TCS*,” “*perishable food*,” and “*time and temperature*

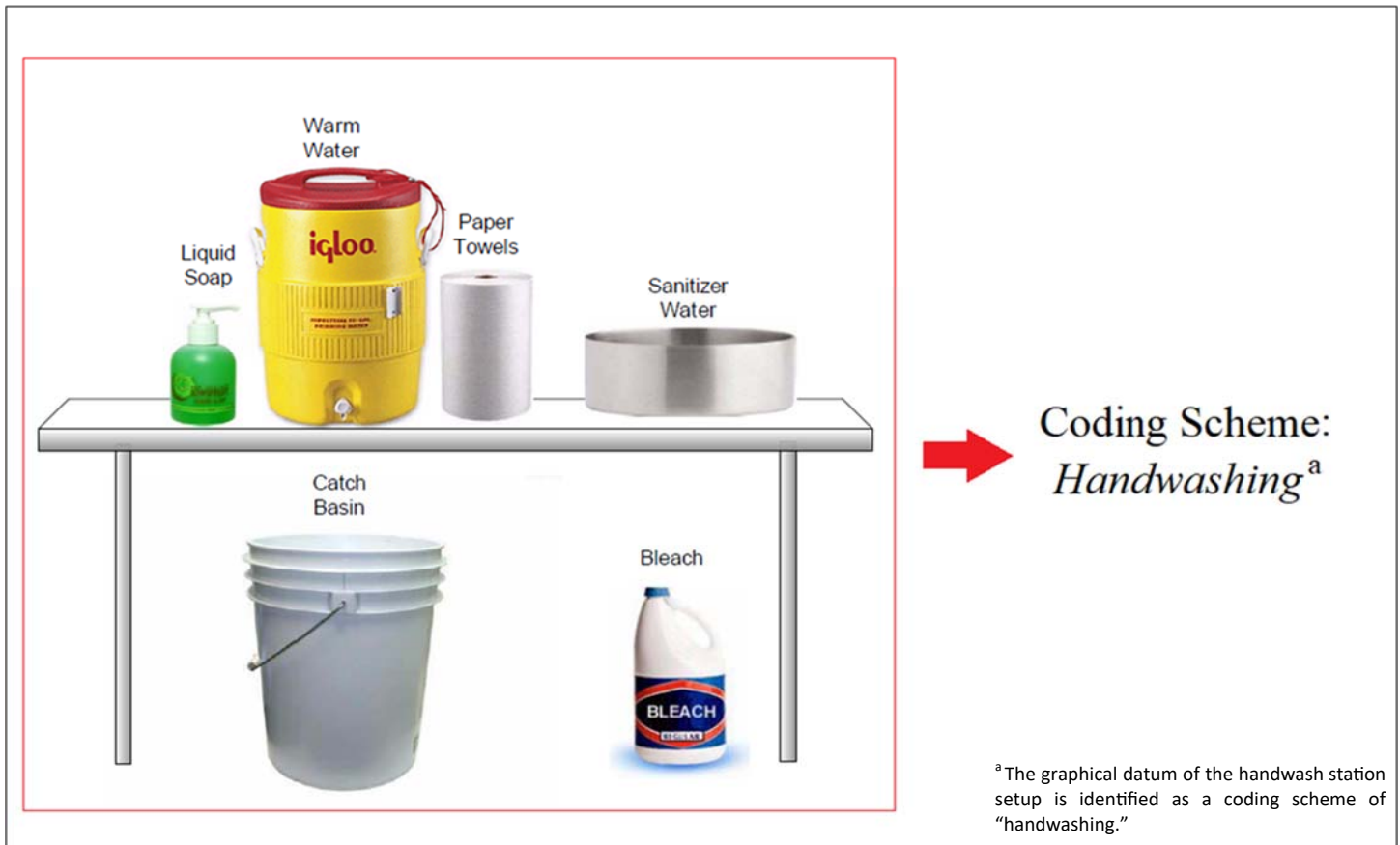


Figure 1: Example of determining a coding scheme from graphical datum

control." In accordance with the amendment of Food Code (FDA, 2017), "potentially hazardous food/TCS" was replaced with TCS as a universal term in this study even though the CU websites presented "perishable food."

As shown in Table 2, the study investigated CUs' various methods of permitting student-led food events. Student-led food events, for example, could either be approved by the entity (e.g., Environmental Health and Safety, Risk Management) or by the Local Health Department. Some other CUs required the only submission of an application form to gain permission to host a student-led food event. Even though food safety culture could play an important role in implementing food safety guidelines (Yiannas, 2009), various requirements for hosting student-led food events at each CU might create a different food safety culture that would produce disparate levels of food safety preparedness for CUs' student-led food events. High levels of standards (e.g., completion of food safety training and food safety quiz, requirements of food handler's permit and temporary handwashing station) for student-led food events' preparedness could motivate students to follow safe food handling practices by creating a positive culture at events (Arendt, Strohbehn, and Jun, 2015). In addition, methods of permitting student-led food events can differ according to the types of foods served. For example, most CUs have a food waiver form in place for non-TCSs (e.g., baked goods, cookies, and candies) because non-TCSs are not subject to time or temperature control to be considered safe for consumption (Knechtges, 2012).

Of the 37 CUs, 20 presented information related to food safety inspection. The criteria used for conducting food safety inspections for student-led food events was mostly lacking in the CUs' websites (Table 3), with most relying on checking for possession of valid

permits as a simple way to conduct food safety inspections. However, the information on those websites presented neither detailed checklists for food safety inspectors nor a food safety checklist for students seeking to host student-led food events. There also was a lack of detailed information about the frequency of conducting food safety inspections for student-led food events. For example, of the 20 CUs that presented information about food safety inspections, only five had in place information about randomly conducting food safety inspections, so information about food safety inspections did not provide much helpful information with respect to understanding the guidelines for food safety inspections during student-led food events. Despite a variety of online resources, a previous study (Hesse et al., 2005) showed 62.4% of study participants trusted their physicians when obtaining information, including food safety information. In addition, ongoing reminders about safe food handling would be beneficial for ensuring food safety compliance (Arendt et al., 2015). Thereby, direct and constant food safety intervention through food safety inspections for student-led food events would likely be more effective for ensuring food safety practices than solely providing food safety information on websites or through a mobile phone application.

A review of CU websites suggested that only fourteen of the CUs provide information about food safety training for student-led food events (Table 3). A lack of such training may affect food handlers' food safety knowledge because both food safety knowledge and practices can be improved through food safety training (Arendt et al., 2015; Green & Knechtges, 2015; Roberts et al., 2008; York et al., 2009), so food safety training may be recommended to improve both the retention of food safety knowledge and food safety practices of college students who host student-led food events. The actual method of conducting food safety training at CUs is of interest; some

Table 3: Code Matrix associated with Student-led Food Events at CUs (n=37)

Theme	Frequency ^a	Coding Scheme	Frequency ^a	Number of CUs
Food Safety Risk	284	TCS ^b	83	25
		Food from Unsafe Safe Source	35	21
		Handwashing	31	15
		Food Safety Practices	30	14
		Non-TCS ^b	29	18
		Improper Food Handling	16	11
		Inadequate Cooking	16	9
		Poor Personal Hygiene	12	9
		Contaminated Equipment	12	8
		Gloves	11	7
		Use a Thermometer	9	8
Food Safety Policies	373	Guidelines	141	33
		Food Handling Permit-EH&S ^c	73	23
		Food Safety Inspection	33	20
		Food Handling Permit-Local Health	28	12
		Event-scope	25	17
		Training	22	14
		Waste Handling	16	14
		Food Waiver Form	13	7
		Dishwashing	12	9
		Event Application Form	10	7
		Epidemiology	37	FBI Incidence/Allegation Procedures
Food Allergy	9			1
FBI ^d	4			4
Checklist	3			3
FBI Source	3			2

^a Frequency totals are 694.

^b According to the amendment of FDA Food Code 2013, “potentially hazardous food/TCS” was replaced to “TCS” as a universal term.

^c EH&S: Environmental Health and Safety

^d FBI: Foodborne Illness

CUs have online training in place, while others provide either face-to-face or hybrid food safety training. To maintain students’ retention of food safety knowledge, a weekly updated email about food safety information could be implemented with food safety training (Arendt et al., 2013).

Of the 37 CUs that presented food safety information on their websites, only nine (24.3%) CUs provided information about food safety procedures to help students address suspected FBI incidents (Table 3). The other 28 CUs (75.7%) that presented food safety information on their websites did not provide detailed information about food safety procedures. They only provided brief information to direct students to contact appropriate personnel (e.g., Director of Environmental Health and Safety, Vice President of Student Affairs) if they might confront an FBI issue. Detailed information on how to address FBI incidents is therefore lacking. Arendt et al. (2013) found several barriers to why consumers do not report FBI such as being unsure of the cause, the amount of time from consumption to illness, and lack of knowledge. Thereby, providing detailed information for reporting of FBIs or suspected FBIs for student-led food events would be helpful not only to create a positive food safety culture that motivates food safety behaviors but also to assist in tracking FBIs at a state and national level.

Subcategories and coding schemes were combined to examine the gravity of each theme associated with food safety policies and procedures for student-led food events. Table 3 presents clustered subcategories and coding schemes combined by each theme. As the figure shows, there were more clustered coding schemes under *food safety policies* than for *food safety risk* or *epidemiology*. The number of clustered coding schemes associated with a theme of *epidemiology* (n=37) was lower than for themes of *food safety policies* (n=373) and

food safety risk (n=284). The theme of *Epidemiology* represents the food safety procedures that report and/or address FBI incidents or allegations. Accordingly, the findings indicates a lack of information about food safety procedures that address FBI incidents or allegations during student-led food events. Furthermore, the majority of investigated CUs (97.3%, n=36) presented no information on their website related to how to handle and prevent allergic reactions during student-led food events.

Code Matrix and Code Co-occurrence Models

The code matrix table generated by MAXQDA reflects the number of CUs in each coding scheme represented (Table 3). For example, food safety guidelines were the most frequent coding scheme (n=141) and it was presented on 33 of 37 CUs’ websites. Similarly, as seen in Table 3, while information about food allergy appeared as a coding unit nine times, it was present on only one CU’s website. In other words, food allergy occurred as a code nine times on one website.

The most frequently mentioned theme was *food safety policies*, while the least frequently mentioned theme was *epidemiology*. As can be seen in Table 3, few CUs (n=9) presented information about FBI incidence and/or allegation. There was a general lack of information about how to address FBI incidence and/or allegation was identified on the websites.

MAXQDA also generated a code co-occurrence model (Figure 2), the purpose of which was to examine relationships between *food safety policies* and coding schemes of food safety risks. As shown in Figure 2, all coding schemes including subcategories were linked to the theme of *food safety policies*. This could be interpreted as meaning that food safety policies and procedures overarch all risk factors of FBIs and allergies associated with student-led events at CUs.

food safety observations and inspections may result in student inability to cope with FBI incidents or allegations. As previously mentioned, food safety professionals' observation or inspection of student-led food events would be recommended for correcting students' improper handling practices.

This study recommends the establishment of a food safety preparedness checklist for student-led food events, with three segments that address food safety prior to the event, on the day of the event, and after the event. A Delphi technique has been utilized as a method to collect data from the experts of the domain (Dalkey & Helmer, 1962). Thereby, to establish a food safety preparedness checklist for student-led food events, future studies may conduct an e-Delphi discussion with CUs' food safety professionals to tailor a food safety preparedness checklist for different types of student-led food events. Such a developed food safety preparedness checklist would benefit both students who host student-led food events and CU personnel who oversee student-led food events.

This study identified both a lack of detailed food safety information about how to address FBI incidents and/or allegations for student-led food events and a lack of easy access to food safety information on CU websites, so making such information available and easy to access by students is definitely needed. Implementation of a mobile application for delivering food safety information to students hosting student-led food events is recommended to improve accessibility to food safety information. A developed food safety preparedness checklist can be disseminated on the CU's website as well as a mobile application.

Limitations

The relatively small number of CUs investigated (n=37) poses a limitation to this study, mainly because of the lack of information about food safety policies and procedures found on the reviewed websites. Although information was obtained by searching for food safety terms (e.g., food safety policies, food event, Environmental Health and Safety, food handler permit, risk management, food safety guideline) on CU websites, difficulty related to access to such food safety information may have been a limiting factor as well.

As mentioned in the introduction section, another limitation of this study is the absence of a widely accepted definition for describing student-led food events. Both seeking a universal definition for a student-led food event and classifying the scope of student-led food events would be beneficial in defining the extent of food safety policies and procedures in the future.

Lastly, from an education perspective, involving graduate and/or undergraduate students in the development or refinement of food safety student-led events materials would provide opportunity for study and integration as a class assignment. By partnering with an institution, instructors could have students develop training videos, mobile applications, or other resources to assist in running student-led events. Intervention studies could then be utilized to study the effectiveness of these student developed materials.

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