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Marjorie Freedman  
*San Jose State University*

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**Development, Evaluation and Validation of Environmental Assessment Tools to  
Evaluate the College Nutrition Environment  
Marjorie R. Freedman**

**Objective:** To develop, evaluate and validate two nutrition environment assessment tools (surveys), for specific use in combating overweight on college/university campuses.

**Participants and Methods:** Invitations to complete surveys were emailed to food service and health center directors at 47 universities, Winter 2008. Overall response rate was 48%. Responses from the 39 individuals who completed tool evaluations at the end of each survey were analyzed. Follow-up interviews and site visits performed through Summer 2008 validated responses.

**Results:** The majority of respondents (64%) indicated tools were effective at assessing their nutrition environments; 78% believed these types of assessment tools to be important to their school.

**Conclusion:** Food service and health center directors support use of nutrition environment assessment tools and found them effective at clarifying existing nutrition programs, policies, and food offerings on their campuses. Conducting assessments using these tools could improve university nutrition environments by identifying areas needing improvement.

## INTRODUCTION

Currently, over 30% of college students are overweight or obese.<sup>1</sup> Lifestyle and environmental influences on eating behaviors are key contributing factors.<sup>2</sup> Recognizing that diet and eating behaviors are influenced by availability and accessibility of foods, there is increasing interest in developing policies and environments that support healthful eating.<sup>2-6</sup> Assessment is the first step in affecting environmental change.<sup>7</sup> Environmental assessment tools have been developed for use in child-care, school and after-school settings, restaurants, workplaces and grocery stores.<sup>4,8,9</sup> To date, no tools assess university nutrition environments. This paper describes development, validation and evaluation of two college/university based environment assessment tools focusing on nutrition services, programs and the food environment, for specific use in combating overweight and obesity in this venue.

## METHODS

### Tool Development

Assessment tools were developed with input from the director of dining services and the student health center, as well as the campus dietitian. The first tool, the University Nutrition Environment Assessment Tool (U-NEAT), contained 41 questions modified from existing, validated tools used to assess nutrition environments,<sup>8,9</sup> as well as California state standards that define healthy foods available for sale outside school lunch programs in K-12 schools.<sup>10</sup> U-NEAT assessed food availability (eateries and vending machines) and pricing, food service practices (portion sizes, healthful options, cooking techniques), nutrition standards and policies, and provision of nutrition information (Tables 1a-c). The second tool, the University Nutrition Program Assessment Tool (U-NPAT), had 31 questions, which collected information on nutrition assessments, non-academic nutrition education and information provided to the campus

community, health center staffing, and nutrition policies (questions not shown; both surveys available at [www.sjsu.edu/healthycampus](http://www.sjsu.edu/healthycampus)). Paper copies of both assessment tools were initially mailed to food service and health service directors at local colleges and universities to establish readability, completeness, and accuracy. Based on responses, assessment tools were revised and then distributed to a broader audience using an on-line survey (SurveyMonkey.com, Portland, OR). The [blinded for review] Institutional Review Board for human subjects approved the study protocol. Participants provided informed consent prior to completing the on-line survey.

**TABLE 1a. Sample Questions Showing how Food Availability was Determined Using the University Nutrition Environment Assessment Tool (U-NEAT)**

1. Indicate which of the **following sites** provide food for sale or consumption on your campus, the earliest and latest time open, whether open on weekends, and whether students can use dining dollars to purchase food at that site. (Choices included: all-you-can-eat cafeterias; à la carte style cafeterias/ restaurants; cafés or sandwich shops; fast food franchises; smoothie bars; ice cream shops; food carts; campus bookstores; “grocery stores” or “markets” where packaged and/or prepared food is sold; produce stands or farmers' markets).
2. Are there food and/or beverage **vending machines** on your campus? If so, where are they located? (Choices included: dorms; dining hall/cafeterias; classroom buildings; libraries; Student Union; exercise facilities; exterior areas; student health center)
3. Are healthy **vended foods** [defined as containing  $\leq 35\%$  of calories from fat (excluding nuts, nut butters, legumes, seeds, and cheese);  $\leq 10\%$  of calories from saturated fat (excluding cheese);  $\leq 35\%$  sugar by weight; and 250 calories/serving] available on campus? Are healthy **vended beverages** [defined as fruit and vegetable based drinks with  $\geq 50\%$  fruit juice without added sweeteners; water without added sweeteners; 2%, 1%, or non-fat milk, soy, rice, or other non-dairy milk; electrolyte replacement drinks with  $\leq 42$  g added sweetener/20 oz serving] available on campus?
  - If yes, what percent of vending machines on your campus have healthy food or beverage options? In individual vending machines, what percent of items meet healthy guidelines? What is the cost of healthy foods compared to other foods in vending machines?
4. Are there places on campus where students can refill their **water** bottles?

**TABLE 1b. Sample Questions Showing How Food Service Practices, Policies Relating to Food, and Sustainability Were Determined Using U-NEAT**

1. Do chefs/food service personnel practice any of the following **low-fat food preparation** and purchasing guidelines? (Choices included: spoon solid fat from chilled meat and poultry broth before using; use specifications requiring lower fat content in ordering pre-prepared foods such as hamburgers, pizza, chicken nuggets; rinse browned meat with hot water to remove grease before adding to other ingredients; remove skin from poultry before or after cooking; roast, bake, or broil meat rather than fry; roast meat and poultry on rack so fat will drain; use low-fat or reduced-fat cheese on pizza; prepare vegetables using little or no fat; cook with nonstick spray or pan liners rather than with grease or oil; offer low-fat salad dressings).
2. Do cafeteria meals include at least one **low-fat option** (< 3g fat/serving) at each meal?
3. Is there any effort made by food service personnel to control **portion size** of food and/or beverages available at any of the settings previously listed?
4. Does your school have any **policies** that dictate **nutrition standards** for specific foods available on your campus? (For example, nutrition policies could require low-fat or whole grain options at every meal, or fruit available at certain locations.) Does your school have nutrition standards/policies regarding vending machines?
5. Is there an active **sustainability** movement or policies relating to organic and/or locally produced foods on your campus? Is fresh produce delivered on your campus to individuals (CSA or produce box)? Are there efforts being made to reduce food waste on your campus?

**TABLE 1c. Sample Questions Showing How Provision of Nutritional Information Was Determined Using U-NEAT**

1. Is any **nutrition information** available for foods and/or beverages sold on your campus? If yes, what information is typically available? (Choices include: total calories; fat; saturated fat; trans fat; protein; carbohydrates; fiber; sodium; calcium).
2. Where is **nutrition information** available for foods/beverages available on your campus and how is information presented? (Choices include: available online, upon request, at point of purchase, with a healthy food logo, or on a poster or bulletin board.)
3. Are **healthy options promoted** in any of the following ways? (Choices include: special symbol or highlight on menus; promotional posters/advertisements; identifying markers near foods; placement in prominent areas; competitive pricing; taste-testing; emails, online bulletins).
4. Does your school have a **website** or online resource that provides information relating to availability and/or nutritional quality of foods? If yes, what information is available? (Choices include: nutritional content of foods/beverages; meal calorie counter; serving size guide; suggestions for healthy options at campus dining locations; maps indicating where healthy food is available; weight loss support (tracking, advice); articles/resources about nutrition and healthy eating; information about food allergies.)

### **Subjects and Tool Evaluation**

Email invitations were sent to 94 food service and health center directors at 47 colleges and universities inviting them to complete U-NEAT and U-NPAT. Individuals were chosen

primarily from the [blinded for review area] to facilitate on-site validation and in-person interviews, but also included schools listed on the Healthy Campus Clearinghouse website.<sup>11</sup> At the end of each survey, respondents were asked to evaluate the tool by answering 10 questions that asked whether they 1) thought the tool was effective in assessing food availability, nutrition programs and policies, and food service practices; 2) thought this type of assessment tool was important to their school; 3) would be likely to use such a tool in the future; 4) found it easy to use; and 5) needed help from others to answer questions.

## **Tool Validation**

Construct, content and face validity was evaluated at the study's beginning and end by eliciting feedback from experts in university food service and health service, as well as experts in assessment tool development and use (Jim Grizzel, personal communication, March, 2008 and Karen Glanz, June, 2008). Evaluation questions provided a format for respondents to indicate their perception of individual questions and overall tool usefulness and readability. In-depth informational interviews, lasting 30-60 minutes, were conducted with 4 respondents, using an interview tool that allowed for specific feedback on question readability and completeness, as well as content and face validity. This ensured that the language and format of the instrument was understandable and reasonable from the respondents' point of view, and that items on the questionnaire represented the larger domain covered. Criterion validity was evaluated at the same schools via follow-up site visits that evaluated accuracy and completeness of responses with respect to the food landscape (food service venues, hours, and vending machines), food service practices (portion size control, availability of healthful food options) and provision of and nutrition information and promotion of healthful food options.

## **RESULTS**

Overall 48% (n=45) of food service and health center directors provided information about their school environments, as prompted by the tool. However, only 39 of these individuals [19 (40%) for U-NEAT and 20 (43%) for U-NPAT], completed the 10-question evaluation of the tool, found at the end of the survey; these evaluations serve as the basis of this paper.

Respondents represented schools of all sizes, including community colleges, public and private colleges and universities in urban, suburban, and rural locations throughout the United States.

With respect to U-NEAT, the majority (67%) of respondents rated this tool effective, 67% stated food environment assessment is important, and 78% reported they would be likely to use such a tool in the future. Seventy-five percent of food service directors ranked the tool as most effective in assessing where food is available, existence of policies and standards, and availability of nutrition information. The tool was rated as neutral in assessing what foods and beverages are available in vending machines and availability of nutrition information. Fifty-three percent found the tool useful in identifying areas needing improvement. The tool was rated as easy to use by 75% of respondents with an average response time of 21 minutes; 61% were able to answer all questions themselves. Food service administrators completed 91% of surveys. Few registered dietitians work in university food service, and only 1 responded.

Overall, 60% respondents indicated U-NPAT was effective at assessing nutrition programs and policies; the majority (88%) indicated this type of assessment tool is important to their school, and 63% said they would be likely to use a similar tool in the future. The tool was

rated as effective in assessing 6 of 7 categories (assessments, nutrition programs, programs targeting overweight, professional staff, wellness policies, and institutional policies), with only online resources averaging a neutral rating. The tool was described by 73% of respondents as being easy to use, with an average response time of 17 minutes; 62% of respondents were able to answer all questions themselves. Health service administrators completed the majority (71%) of surveys. Campus dietitians, who often work in student health centers, completed the remainder.

Validation of tools, conducted through site visits confirmed that administrators provided accurate on-line responses to questions, and that tools measured what they set out to measure. In person interviews confirmed that administrators believed assessments were important, and that U-NEAT and U-NPAT were useful and easy to use.

## COMMENTS

A majority of respondents representing schools of different sizes, locations, and types, perceived both U-NEAT and U-NPAT as effective at clarifying existing nutrition programs, policies and food offerings on their campuses. Administrators confirmed importance and usefulness of tools for improving health in both tool evaluation questions and follow-up interviews. By identifying components of the food and nutrition information landscape, environmental influences on eating behaviors can be identified and targeted for improvement. Respondents indicated both tools effectively evaluated all three key components of the nutrition environment: policy, food accessibility and availability, and education. Site visits confirmed tools had construct, content and face validity.

The main limitation of this study is that of sampling bias, resulting from reliance on the Healthy Campus clearinghouse website for respondent sampling. It is possible that food and health service administrators at these schools have already established a desire to improve their food and health environments and may have a stronger than average interest in environmental assessment tools.

### **Implications for Use in College Environments**

Designers of organizational assessment tools have recognized the importance of including a broad range of respondents within each institution. For example, the School Health Index was designed to be completed by a committee of school employees.<sup>9</sup> Responses to U-NEAT and U-NPAT indicate this would be a good strategy for universities as well. Specific knowledge of school policies, vendor contract guidelines, food preparation standards, student and staff wellness programs, school curriculum, and administrative support for nutrition improvement are required to complete surveys. It is unlikely that one individual from food services and one from health services would have all this knowledge. Therefore, a committee composed of representatives from food service, health services, administration, and the student body should be responsible for conducting the overall school assessment, which would include using both tools. After completion, a comprehensive picture of the school's food environment would likely emerge. Creation of this assessment team would also facilitate communication about areas of weakness in the environment across campus departments and identify appropriate individuals to establish an ongoing wellness committee. Another option is to encourage undergraduate and graduate students working with their professor (perhaps as part of a

community nutrition or health education class) to conduct the assessment, eliminating potential bias and creating “pressure” to change the environment.

This research is a first but important step is assessing the college nutrition environment. Future research on university nutrition environments is warranted and should focus on tool refinements and data collection from a larger sample of schools. An online interactive tool (similar to ENACT<sup>8</sup>) that colleges can use to assess their nutrition environments, identify areas needing improvement, and learn of best practices on other campuses would be useful. Through these assessments and on-line resources, it is hoped that colleges develop policies, programs and ultimately environments that support healthful eating, which may ultimately help in the fight against overweight and obesity in these settings.

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