

## Eating on Campus: Assessing the Nutrition Environment for Students

### **I. Abstract**

The food environment is increasingly thought to have a major influence on eating behavior. University campuses offer a unique opportunity to study the extent to which food environments influence eating, but such studies must be based on reliable measures. The objective of this project is to use a standard and reliable instrument, the Nutrition Environment Measures Survey (NEMS), to describe dining venues on the Cal Poly campus, and to compare Cal Poly food stores with off-campus alternatives. The five student investigators on this multidisciplinary, team-based project will undergo training to use standard protocols to apply the NEMS to 18 campus dining venues, two campus food stores, and ~30 off-campus supermarkets, groceries, and convenience stores in San Luis Obispo. Repeat assessments will allow for evaluation of inter-rater and test-retest reliability. Statistical analyses will include calculating prevalence of healthy and unhealthy constructs from the NEMS, comparing overall scores across venues, and comparing scores between on- and off-campus stores. Findings will be used as a basis for future work to investigate the potential of modifying the Cal Poly food environment to facilitate students' healthful food choices.

### **II. Introduction**

The food environment is increasingly recognized as influencing eating behaviors by facilitating healthy or unhealthy choices depending on the food resources available. The Cal Poly campus is a uniquely informative setting to describe the effects of food environment on individual food choices. This is an issue of pressing importance given evidence that students often gain weight during college and that habits established during this period of

life can have effects that last into later adulthood. All first-year students eat their main meals on campus, and on-campus venues serve a substantial proportion of students even if they live off campus. Cal Poly has the additional advantage of academic departments with interests in improving food supply, nutrition, and health, with the potential for collaborations to make the campus a model for improving campus food environments. As such, the Cal Poly campus is a unique setting for intervention if evidence suggests that modifying the food environment can facilitate healthier eating.

Critical to any efforts to study food environments is their sound measurement. While many measures of the food environment have been developed, the most standardized and widely applied instrument currently available is the Nutrition Environment Measures Survey (NEMS), which focuses on the availability, affordability, and quality of healthful food choices. The NEMS has been used in a variety of settings as a basis for improving restaurant environments and access to healthy food choices, and in research to describe differences in nutrition environments across socioeconomically disparate neighborhoods.

We will use the NEMS to evaluate the Cal Poly food environment. This multi-disciplinary, team-based project combines its team members' interests in nutrition, public health, and statistics; capitalizes on their shared interest in the Cal Poly food environment; and will provide a hands-on opportunity to apply a standard and reliable measure of food environment as a basis for research and action.

### **III. Objective(s)**

1. To evaluate Cal Poly campus dining venues using the NEMS
2. To evaluate on-campus grocery/food stores and compare them with off-campus alternatives

#### **IV. Methodology**

Measures. The *NEMS for Campus Dining (NEMS-CD)* will be used to evaluate all 18 dining venues on campus, including dining hall cafeterias, food courts, and snack bars or cafes. The NEMS-CD was adapted from the NEMS for Restaurants (NEMS-R), a widely used instrument with demonstrated inter-rater and test-retest reliability that assesses facilitators of and barriers to healthful eating (e.g., pricing, availability of nutrition information, portion sizes, availability of healthy entrees, fruits, vegetables and beverages). The NEMS-CD includes additional items specific to a campus environment, including salad bar quality and dining contracts. The *NEMS for Stores (NEMS-S)* will be used to evaluate the two food stores on campus, as well as ~30 off-campus supermarkets, groceries, and convenience stores located in San Luis Obispo. Detailed information on the NEMS standard procedures for data collection and scoring are available at <http://www.med.upenn.edu/nems/>, as well as information on its development, reliability, and applications in research and practice.

Training. Two investigators from the team will be assigned to evaluate campus dining venues using the NEMS-CD, another two will evaluate on- and off-campus food stores using the NEMS-S, and one student will oversee data entry, management, and analysis. All investigators will complete the on-line NEMS training (8-10 hours). Investigators will practice using the standard procedures at selected off-campus dining venues or stores not being evaluated for the current project (e.g., in Avila Beach or Pismo Beach). They will then review practice results to clarify any deviations from data collection or scoring protocols. The number of items scored similarly by two investigators independently evaluating the same venue on the same day will be calculated. Additional food venues will be assessed

until the investigators achieve >80% agreement.

Data collection. Each investigator will visit each food venue unannounced on the same day between 11am-2pm on a weekday. After visiting each venue, investigators will discuss any unclear items and decide on a consensus score. Scoring procedures for both NEMS-CD and NEMS-S will follow standard protocols. Inter-rater and test-retest reliability will be determined by completing three assessments of each venue. Inter-rater reliability will be based on assessments by two investigators visiting each venue independently on the same day, and test-retest reliability will be based on re-assessments of each venue by one of the same investigators within two weeks of the initial evaluation. Data will be entered into Survey Monkey, checked for errors, and analyzed using Excel and SAS.

Statistical analyses. Prevalence of each NEMS-CD and NEMS-S item will be calculated and compared across venues using chi-square tests. Each venue's overall score will also be calculated, and distribution of scores will be described using ranges, means and standard deviations. ANOVA with post hoc Tukey's B and T tests will be used to test for significant differences between mean scores across venues, and between on-campus and off-campus stores. Inter-rater and test-retest reliability will be assessed by percent agreement and kappa coefficients.

## **V. Timeline**

The proposed project can be completed within a year. In **Month 1**, investigators will complete NEMS training and practice assessments. In **Months 2-3**, investigators will complete assessments of campus dining venues (using NEMS-CD) and on- and off-campus stores (using NEMS-S). Statistical analyses will be conducted during **Months 4-5**, with preliminary presentation of results expected during those same months. Preparation of

results for final presentation in the form of a manuscript, conference presentation, and final report will take place from **Months 6-7**.

## **VI. Final Products and Dissemination**

Results will be disseminated in the form of: (1) presentation at the Building Healthy Academic Communities National Summit, which will take place in Irvine, CA late in April 2015; (2) presentation at the Cal Poly College of Science and Mathematics Student Research Conference anticipated in May 2015; and (3) manuscript for submission to a peer-reviewed journal such as the Journal of College Health. Findings will additionally be used as the basis for an application for funding through the National Institutes of Health. Finally, findings will also have the potential to evoke change in the campus dining environment, and to support Cal Poly Campus Dining's efforts to improve college students' food environment.

## **VII. Budget Justification**

Funding is requested to cover costs of travel for up to 6 people to the Building Healthy Academic Communities National Summit, including: mileage (2 cars x 500 mi roundtrip x \$0.56/mi = **\$560**); gas (2 cars x 25 gal x \$4.50/gal = **\$226**); parking (**\$40**); lodging (3 rooms x 1 night x \$160/room/night = **\$480**); per diem (6 people x 2 days x \$55/day = **\$660**); incidentals (6 people x 1 day x \$7/day = **\$42**), for a total of **\$2008**. Additional funding is requested for travel to food stores in and near San Luis Obispo (avg 10 miles roundtrip x 40 supermarkets x 3 visits/supermarket x \$0.56/mile = **\$672**). Also required are supplies (paper, pencils, pens, highlighting markers, clipboards, files) (**\$300**), a Survey Monkey plan that will allow for data entry and export (\$26/month x 5 months = **\$130**), and funding for poster printing (2 x \$100 = **\$200**) and photocopying survey instruments (10 pages x 60 on- and off-campus venues x 3 visits x \$0.06/page = **\$108**).

# Warren J. Baker Endowment for Excellence in Project-Based Learning Robert D. Koob Endowment for Student Success

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## PROPOSAL BUDGET

<b>Student Applicant(s):</b> Kelsey DeGreef, Madison Fishler, Rachel Gipson, Kelly Koyano, and Jansen Lei	
<b>Faculty Advisor:</b> Marilyn Tseng	
<b>Project Title:</b> Eating on campus: Assessing the nutrition environment for students	<b>Requested Baker Endowment Funding</b>
<b>Travel</b> <span style="float: right;"><i>subtotal</i></span>	<b>\$ 2,680</b>
Travel: In-state	\$ 2,680
Travel: Out-of-state	\$
Travel: International	\$
<b>Operating Expenses</b> <span style="float: right;"><i>subtotal</i></span>	<b>\$ 608</b>
Non-computer Supplies & Materials	\$ 300
Computer Supplies & Materials	\$
Software/Software Licenses	\$
Printing/Duplication	\$ 308
Postage/Shipping	\$
Registration	\$
Membership Dues & Subscriptions	\$
Multimedia Services	\$
Advertising	\$
Journal Publication Costs	\$
<b>Contractual Services</b> <span style="float: right;"><i>subtotal</i></span>	<b>\$ 130</b>
Contracted Services	\$ 130
Equipment Rental/Lease Agreements	\$
Service/Maintenance Agreements	\$
<b>TOTAL</b>	<b>\$ 3,418</b>



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October 23, 2014

Christopher A. Dicus, PhD  
Faculty Fellow, Office of the Provost

Dear Dr. Dicus:

I am delighted to write a letter to support this team's application to study the nutrition environment at Cal Poly. Nutrition or food environments are an area of active interest in the fields of public health and nutrition. Less work has been conducted on college campuses although they are a perfect setting to investigate environmental effects on individual behaviors. Students, especially in their first year here, are mostly limited to choices available on campus, and it would be important to understand (1) how those choices fare using standard measures of the food environment, and (2) whether food environment scores are related to healthfulness of the diet. The team's proposed project addresses the first of those questions and is a necessary first step before exploring the second.

Also remarkable about this application are the students on the team. Each came to me with the same level of excitement for the topic, but for each student, the interest manifested in a different way. Kelly Koyano, a 4<sup>th</sup> year student in Nutrition, has been an active member and participant in the Nutrition Club, STRIDE activities, and PolyFit, including work in objective and physical assessments, and she spent last summer working in food production in camp settings. Rachel Gipson, a 3<sup>rd</sup> year Nutrition student and recent transfer from Gavilan College, is an avid foodie and member of the Real Food Collaborative on campus. Kelsey DeGreef, a 2<sup>nd</sup> year Nutrition student, is employed at Campus Dining and extremely knowledgeable about its workings and strengths, as well as students' varied reactions to it. Madison Fishler, a 1<sup>st</sup> year Nutrition student, arrived with a mature understanding of where her interests lie, and she is a member of the Campus Dining Committee. Finally, Jansen Lei, a 1<sup>st</sup> year student in Economics, came to me with an interest in public health and a background in statistics. All five students on the team, without exception, came with a strong interest to engage in a hands-on, Learn-by-Doing project with a tangible outcome and the potential to make a difference in their campus environment.

I am pleased to serve as their faculty advisor. I have conducted research in nutritional epidemiology and public health nutrition for the past 20 years and can offer guidance at each step of the project, from data collection to data entry and management to statistical analyses to dissemination of results. The project is relatively straightforward: all the venues to be assessed are local; the survey instrument to be used (while requiring substantial training) is a standard one; and no specialized equipment or supplies are required other than paper, pencils, and computers. I believe the team will be able to complete the project within the (short) timeline specified, and I am hopeful that they will all have a chance to present their work in at least two conferences and possibly even in a manuscript.

In summary, I can offer my fullest support for this application, and I look forward to working with this highly motivated team of student researchers.

Sincerely,

Marilyn Tseng, PhD  
Research Professor