



Maternal and Child Health Nutrition Faculty and Trainees Work Collaboratively with Community Partners to Assess Afterschool Nutrition Environments

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Abstract

Purpose The purpose of this paper is to describe a collaborative service learning experience (SLE) which was part of the degree requirements of the Public Health Nutrition Graduate Program at the University of Tennessee. The SLE was collaboratively developed by the University of Tennessee's maternal and child health (MCH) nutrition leadership education and training (NLET) Program Director and the Knox County Health Department's healthy weight program manager. **Description** The SLE was a semester long project that included instructional time and fieldwork. Coursework focused on development of a community nutrition needs assessment, how to interpret and analyze assessment data, and how to use assessment data for program planning and policy development. Fieldwork consisted of interacting with an interprofessional team, assessing the nutrition environment at two afterschool sites, conducting a plate waste study to determine the amount of food consumed by children at the sites' dinner meals, interpreting and analyzing data, and developing and presenting recommendations for improvement. **Assessment** Trainees successfully completed all aspects of the SLE. They completed a community needs assessment of the neighborhoods surrounding the two afterschool program sites, conducted nutrition environment audits, including meal observations, and measured and analyzed plate waste from dinner meals served at the sites. Using the data gathered and collected, they prepared suggestions for nutrition environment improvements and policy development for community partners. **Conclusion** The SLE allowed trainees to develop MCH competencies and professional skills required in public health nutrition, while providing valuable data that subsequently was used to establish nutrition-related policies and interventions.

Keywords Child nutrition · Afterschool programs · Plate waste · Collaboration/partnerships

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Significance

Collaboration between the University of Tennessee's MCH NLET Program and the Knox County Health Department led to the development of a successful SLE for graduate nutrition trainees. The project provided trainees with didactic and experiential activities to develop MCH competencies. Findings from the SLE project, which indicated that plate waste was very high for all meal components at both sites, led to nutrition environment and policy changes at the sites. These data have been used in subsequent collaborative pilot projects and grant proposals to increase acceptance and consumption of healthy foods and beverages among minority, low-income children who are at risk for food insecurity.

Purpose

The purpose of this paper is to describe a service learning experience (SLE) for three graduate-level public health nutrition trainees that was developed collaboratively by the University of Tennessee's maternal and child health (MCH) nutrition leadership education and training (NLET) Program and the Knox County Health Department (KCHD) in Fall 2015. This SLE was developed to provide didactic and field-work activities for trainees to enhance MCH competencies related to the core functions of public health, i.e. assessment, assurance, and policy development. The trainees used knowledge gained during coursework to complete a targeted community nutrition needs assessment, practiced assessment methods and competencies in a community setting, and made policy and nutrition environment intervention recommendations. The trainees gathered community nutrition-related demographics and health statistics about the target populations via internet searches using the protocol from *Moving to the Future: Developing Community-based Nutrition Services* (Probert 1996). The target population included two Nutrition Education Activity Training (N.E.A.T.) afterschool sites and the surrounding neighborhoods (zip code-level and county-level data were obtained). The objectives of the assessment were to (1) describe the target populations, (2) conduct nutrition environment audits at the two sites, (3) conduct a plate waste study of dinner meals at the sites, and (4) develop an action plan for community partners to improve the nutrition environment and provide policy recommendations to increase consumption of dinner meals. The plate waste study determined the mean grams of dinner meal components wasted. Subsequently, trainees used these calculations to estimate the mean amount of food and calories consumed by children in the afterschool program and compared the estimated mean calories consumed with dinner meal calorie recommendations for children ages 5–10 years old.

Description

This collaborative project was part of the MCH NLET trainees' Public Health Nutrition Graduate Program requirements. This assessment project allowed students to apply knowledge and practice skills gained in the classroom in a community setting. This SLE stressed the integration of theory, practice, and civic learning in the course curriculum and reciprocity between all partners involved (Kronick and Cunningham 2013). In addition to providing trainees with experiential learning, this collaborative project aimed to improve and enrich components of the N.E.A.T. Program. The N.E.A.T. Program was established in 2006 with a focus on nutrition and physical activity education for low-income youth at high risk of overweight or obesity who attended associated afterschool programs across Knox County, (KCHD, 2018).

In 2015, the KCHD developed the "N.E.A.T. Approved" designation, which required participating afterschool providers to incorporate environmental and policy changes at their sites to promote healthy eating and active living. Sites are required to make continual progress through the tier-system (Bronze, Silver, and Gold), within a specific timeframe to ultimately achieve N.E.A.T. Approved Gold status. This Gold designation requires afterschool providers to incorporate nutrition and physical activity environmental policies that apply to all facets of the afterschool site. N.E.A.T. Approved policies align with the Healthy Out-of-School Time Coalition's Healthy Eating Physical Activity (HEPA) standards (NAA, 2011), U.S. Department of Agriculture (USDA) Food and Nutrition Service criteria (USDA, 2012), and Healthy Kids, Healthy Future childcare goals (The Nemours Foundation 2018).

The N.E.A.T. Approved sites provided evening meals to enrolled children. The meals were prepared at and distributed by a central community kitchen; reimbursement was obtained through the Child and Adult Care Food Program (USDA, 2015). Several afterschool site leaders expressed concern that many children did not consume the dinner meal; thus, this SLE provided trainees opportunities to work with community partners on a project that was the first step to improve consumption of dinner meals.

Assessment

The University of Tennessee (UT) Institutional Review Board determined that because trainees did not collect data from human participants, human subject approval was not necessary. Trainees began their community needs assessment by gathering online data on nutrition-related demographics and health statistics for the two zip codes

surrounding the two selected afterschool sites (Public school review 2015a; Public school review 2015b, USDA, 2014, USCB, 2015), when available, and for Knox County, Tennessee (USCB, 2015). They compared these findings to the State of Tennessee, the United States (USCB, 2015), or if applicable, to Healthy People 2020 (USDHHS, 2014). Table 1 provides select nutrition-related demographics and health statistics on the target population.

Prior to the initial plate waste assessment date, trainees developed an agenda and facilitated a meeting with site staff to provide an overview of the purpose of the assessment, environment audits, and plate waste collection methods. While supervised by the KCHD preceptor, trainees conducted a nutrition environment audit, which included observation of six dinner meals, and on four planned occasions, trainees collected dinner meal food waste using the individual weighed tray method (Buzby and Guthrie 2002). This collection occurred at the end of two different dinner meals at both sites. As part of the standard distribution of meals from the community kitchen, meals were served in three-compartment disposable containers. After the dinner meal, site staff instructed children to place their uneaten containers on a table instead of throwing them away. 50 uneaten containers were randomly collected by wrapping every third meal returned to the table. The containers were stacked in transport totes and taken back to ICAN GROW lab. At the lab, the assessment team weighed all meal components from three matched control meals supplied by the distribution kitchen that prepared the meals using Child and Adult Care Food Program standard portion sizes. Each uneaten food meal component was weighed twice to the nearest tenth of a gram, and the gram amount of the waste was entered into an Excel spreadsheet. This procedure was previously tested to insure that water evaporation from the meals was negligible

if completed within 3 h of waste collection. Meal 1 consisted of chicken chili, corn chips or wheat roll, spinach or peas, and corn; meal 2 consisted of a pizza burger with bun (hamburger patty with pizza sauce on a bun), roasted potatoes, and mixed vegetables or green beans.

Plate Waste Results

Table 2 shows the percentages of the chicken chili meal plate waste at both sites. Because the meals were evaluated on different days, there were some variations among the vegetable and grain components. Site 1 wasted more food overall and between each category, with the largest differences among chicken chili and corn. Approximately 88% of the chicken chili at Site 1 was wasted compared to 64% at Site 2. Site 1 wasted approximately 82% of corn; Site 2 wasted

Table 2 Plate waste percentages from Two N.E.A.T afterschool sites, November 2015

Food item	Site 1	Site 2
Meal 1		
Chicken chili	87.7%	64%
Corn	82.3%	55.6%
Spinach	–	78.6%
Peas	97.4%	–
Corn chips	–	2.44%
Wheat roll	43.1%	–
Meal 2		
Pizza burger	65.3%	50.9%
Roasted potatoes	66.74%	70.3%
Mixed vegetables	–	93.5%
Green beans	85%	–

Table 1 Selected nutrition-related demographics and health statistics for zip codes 37915 and 37923, Knox County, Tennessee, and Tennessee, 2015

	37915 Site 1	37923 Site 2	Knox County level data	Tennessee State level data
Median age	26.9 years	36.2 years	37.2 years	38 years
Male	44.8%	49.1%	48.6%	48.7%
Caucasian	22.5%	84.7%	85.6%	77.6%
African American	72.7%	6.1%	8.8%	16.7%
Hispanic	3.2%	6.1%	3.5%	4.6%
Median household income	\$11,667	\$55,149	\$47,543	\$44,621
Household income <\$25,000	70.1%	19%	26.1%	27.9%
Household income below the poverty line	55%	11.3%	14.6%	17.6%
Unemployed	8.8%	5.4%	4.4%	5.8%
Household without vehicle & supermarket > ½ mile away	40.5%	1%	4.9%	
SNAP participation	60%	8%	38%	46%
Eligible for free lunch	95%	48%	35%	50%
Eligible for reduced lunch	2%	5%	–	7%

approximately 56%. At Site 1, green peas and a wheat roll were also served; plate wastes for these items were about 97% of green peas and 43% of the wheat roll.

Both sites had approximately the same amount of food waste overall, but differed among meal components. Site 1 had approximately 65% plate waste for the pizza burger; site 2 had roughly 51%. At site 1, roasted potatoes waste was nearly 67% and 85% for green beans. At site 2, roasted potato waste measured around 70% and 94% for mixed vegetables.

Caloric Assessment of the Meals

The estimated mean calories consumed compared to dinner meal calorie recommendations for children ages 5–10 years are shown in Table 3. The calories for each meal component were supplied by the distribution kitchen's custom nutrition report. The calories consumed were calculated by subtracting the waste mean gram amounts of each meal component from the mean gram amounts of the sample meals; subsequently, the percentage consumed was determined and then multiplied by the total calories served for each component. N.E.A.T. Approved guidelines require a daily average of between 550 and 650 calories to be served at the dinner meal (KCHD, 2015).

Conclusion

The aim of this SLE was to allow trainees to gain practical experience by completing a community nutrition needs assessment that combined online nutrition-related data collection, nutrition environment audits, including meal observations, and plate waste assessments to provide afterschool staff, the community distribution kitchen, and KCHD personnel with recommendations to improve meal consumption at two afterschool sites. Based on nutrition-related demographic and health statistic data gathered (Table 1), trainees determined that the target population at both sites were at risk for low socioeconomic status, low food security,

overweight and obesity, and inadequate dietary intake of fruits and vegetables. Further, they determined that plate waste for meals was very high at both sites. Although there is a dearth of literature on plate waste in afterschool sites, there is literature on plate waste studies in schools. According to a summary on school lunch plate waste studies with similar age groups, an average waste of 30–40% for fruits and vegetables and 24% for “mixed dishes” is typical (Buzby and Guthrie 2002). Plate waste for the vegetables dishes at the afterschool sites in this study measured around 15–50% higher compared to percentages from other studies done with school lunches. Although plate waste was high for all meal components, vegetables had the largest percentage of waste. Higher vegetable waste was normal for other school plate waste studies (Buzby and Guthrie 2002), but the amount wasted was much higher at these two sites compared to other settings. After analyzing the data gathered from online sources, conducting the nutrition environment audit, and conducting the plate waste assessment, trainees made recommendations to the afterschool site personnel and the KCHD staff, which included the following:

1. The nutrition environment audit indicated that the structure of the mealtime process at the two sites was markedly different. At Site 2, meals and milks were distributed to all children in the dining area; prior to meals, the children and staff participated in a pre-meal secular chant; staff interacted with children during the meal; each child was required to take and open the dinner meal and milk, and after the meal, all children were responsible for assisting in cleaning the dining area. At Site 1, meals and milks were distributed only to children who requested them; children were allowed to take milk only, a meal only, both, or none; they were not required to open the meals or milks after taking them; children ate at sporadic times; staff did not sit with children while eating. Although plate waste was high at both sites, it was slightly lower at Site 2 for the main entrees; meal observations indicated that children at Site 2 seemed to consume more of their meals. Therefore, the assessment team recommended that a mealtime protocol be developed and used at the afterschool sites.
2. The nutrition environment audit indicated that community partners brought in full-size candy bars and other snacks prior to the dinner meal. Although children were told to wait to eat the candy after their dinner meals, most did not. Thus, the assessment team suggested the development of a healthy snack policy along with a list of healthy snacks and non-food items that could be provided to community partner.
3. Plate waste assessments indicated that much of the food served at the dinner meals was wasted. Thus, the assessment team recommended that the KCHD con-

Table 3 Caloric assessment of meal components served compared to estimate meal components consumed at two N.E.A.T. afterschool sites, November 2015

Food Item	Site 1	Site 2
Meal 1		
Chicken chili served	597.47 kcal	582.2 kcal
Chicken chili consumed	122.91 kcal	311.91 kcal
Meal 2		
Pizza burger served	604.78 kcal	654.28 kcal
Pizza burger consumed	209.86 kcal	271.81 kcal

tinue to work with the community distribution kitchen to improve menu items to increase the acceptability and consumption of meals. Furthermore, some of the children were not familiar with the meals offered or how to consume them. For example, many children did not realize the pizza sauce should be placed on the hamburger to make a “pizza burger”. Taste tests, surveys, or focus groups with children could assist in developing healthy menus that are more acceptable.

Limitations

This SLE project provided trainees with a SLE that helped develop competencies and skills while also assisting local afterschool sites, the KCHD, and the community distribution kitchen staff to assess consumption of healthy meals among some of the area’s most vulnerable children. Although it was deemed successful, there are several limitations to the project. First, although trained prior to beginning the assessment, this was the trainees’ first experience conducting a community assessment. Analyzing community nutrition assessment data is complex, and the trainees’ conclusions and recommendations may not be the same as a larger, more experienced assessment team. To assist the trainees, the MCH NLET Program Director and the KCHD Program

Manager provided ongoing feedback, answered questions as they arose, and encouraged trainees to reflect and think critically about the data, the nutrition environment audit, and the plate waste results prior to making recommendations. Further, although the same menu items were planned for each of the afterschool sites, what was actually served was different; thus, the plate waste amounts for some meal components could not be averaged across sites. In addition, the trainees’ presence at the sites during the meals may have disrupted the children’s normal amount of consumption. Because the children were aware of the assessment team’s presence, it may have influenced the children to eat more or less. Lastly, because the assessment team could not collect demographic data, the plate waste data and estimations of consumption could not be analyzed by demographic variables, such as age, sex, or race/ethnicity.

Strengths

Service learning strategies provide valuable opportunities in graduate education and training programs for students and trainees, faculty, and community partners (Watson-Thompson 2016). This project allowed trainees to demonstrate proficiency in the integration of theory, practice, classroom lessons, and real-world experiences. The assessment allowed



Date: _____
Dear Boys and Girls Club Partner:

We are pleased to announce that Boys and Girls Club has teamed up with N.E.A.T. Approved and the Knox County Health Department! N.E.A.T. Approved works to create a healthy environment for our students. Promoting physical activity and healthy eating help encourage healthy habits. Help us make the healthy choice the easy choice!

Because we are teaming up with N.E.A.T. Approved, we are asking that if you want to bring in food as an incentive during your program, that it meets the N.E.A.T. Approved snack guidelines. Here are some ideas:

- Lay’s Baked Chips
- Nature Valley Granola Bars
- Low-fat string cheese
- Mr. Nature Raisins
- 100 Calorie Pack Whole Grain Goldfish
- PopCorners Popcorn
- Fresh fruit and veggies
- Low-fat/fat free milk
- Olde Tyme Pretzels
- Nature Valley Trail Mix Fruit n’ Nut Bar

Feel free to offer non-food incentives such as stickers, pencils, erasers, jump ropes, foam footballs, or Frisbees!

_____, pledges to promote the health and well-being of Boys and Girls Club members by offering healthy foods or other non-food items as incentives. I will not provide candy, cakes, soda or other “junk” foods to members before, during, or after my program activity.

Signature: _____
Program Director



N.E.A.T. Approved Mealtime Guidelines

1. Sit and talk with students during mealtimes
2. Place food out immediately before serving
3. Encourage students to try everything
4. Encourage students to wait until after dinner to eat any snacks
5. Encourage students/staff to help each other open meals
6. Recite the Boys and Girls Club Code before mealtimes
7. Make mealtimes the main event!



Let’s create a happy and healthy mealtime environment for our students!



Fig. 1 N.E.A.T partnership pledge and N.E.A.T. Approved mealtime guidelines

trainees to: (1) develop public health nutrition skills by conducting a community nutrition needs assessment, (2) gaining competency in assessing plate waste and dietary intake via objective measures, (3) communicate assessment findings to a diverse audience, and (4) provide recommendations to community partners.

As planned, the project was mutually beneficial to both trainees and community partners. The anonymous course evaluation responses (~73% response rate) indicated that most trainees thought that the SLE project was the course aspect that contributed most to their learning. Further, assessment data and subsequent recommendations have been beneficial to community partners as well; they have been used to develop grant proposals and policies and to conduct interventions to improve dinner meal consumption. Two notable policy changes that directly resulted from the assessment recommendations were the development of a community partners' pledge and the N.E.A.T. Approved mealtime guidelines (Fig. 1). The pledge was distributed to all afterschool partner organizations, many of which had previously provided candy and/or other sweets after activities at the afterschool sites. The mealtime guidelines became part of the N.E.A.T. Approved designation criteria, and all sites are routinely monitored to assure compliance.

Most recently, in collaboration with the KCHD, the MCH NLET trainees, director and a faculty member evaluated pilot policy changes at two afterschool sites. At one site, afterschool staff assisted children with opening milks and packaging; at a second site, program educators ate with children, assisted with opening milks and packaging, and discussed the importance of eating healthy meals. Although preliminary data show no significant differences between these sites and the control site, the academic and community partners are committed to continued efforts to assure that participating children consume healthy dinner meals.

This project highlights the importance of engaging community partners in graduate education, especially MCH training programs. It central to the development of future public health leaders and provides opportunities to improve the health status of MCH populations.

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