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Nutrient content of school meals before and after implementation of nutrition recommendations in five school districts across two U.S. counties

Patricia L. Cummings [a,b,*], Sarah B. Welch [c], Maryann Mason [c,d], Lindsey Burbage [b], Soyang Kwon [c], Tony Kuo [b,e]

[a] Department of Epidemiology, Jonathan and Karin Fielding School of Public Health, University of California Los Angeles, 71-254 CHS, Los Angeles, CA 90024-1772, USA
[b] Division of Chronic Disease and Injury Prevention, Los Angeles County Department of Public Health, 3530 Wilshire Blvd., 8th Floor, Los Angeles, CA 90010, USA
[c] Mary Ann and J. Milburn Smith Child Health Research Program, Ann and Robert H. Lurie Children's Hospital of Chicago Research Center, Consortium to Lower Obesity in Chicago Children, 225 E. Chicago Avenue, Box 205, Chicago, IL 60611, USA
[d] Department of Pediatrics and Preventive Medicine, Northwestern University Feinberg School of Medicine, 680 N. Lake Shore Drive, Suite 157, Chicago, IL 60611, USA
[e] Department of Family Medicine, David Geffen School of Medicine, University of California Los Angeles, 10880 Wilshire Blvd., Suite 1800, Los Angeles, CA 90024-4142, USA

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ABSTRACT

Objective. To compare changes in nutrient levels of school meals before and after implementation of nutrition interventions at five school districts in two, large U.S. counties. School menu changes were compared against national school meal recommendations.

Methods. A large urban school district in Los Angeles County (LAC), California and four school districts in suburban Cook County (SCC), Illinois implemented school meal nutrition interventions. Nutrition analyses were conducted for school breakfast and lunch before and after changes were made to the meal programs. Means, % change, and net calories (kilocalories or kcal) offered as a result of the nutrition interventions were calculated.

Results. School districts in both counties made district-wide changes in their school breakfast and lunch menus. Menu changes resulted in a net reduction of calories, sugar, and sodium content offered in the meals. Net fewer calories offered as a result of the nutrition interventions were estimated to be about 64,075 kcal per student per year for LAC and 22,887 kcal per student per year for SCC.

Conclusions. Nutrition interventions can have broad reach through changes in menu offerings to school-aged children and adolescents. However, further research is needed to examine how these changes affect student food selection and consumption.

Introduction

The prevalence of childhood obesity in the United States (U.S.)[1] has doubled for children and tripled for adolescents in the past 30 years. This is approximately 17% (12.5 million) of all children and adolescents ages 2–19 who are now obese (NCHS, 2012; Ogden and Carroll, 2010). Combating childhood obesity has been challenging due in part to the many and complex factors that are involved — the food environment being the most important of these factors (Drewnowski, 2004). For children and adolescents, school nutrition programs are a major component of the food environment. Recognizing the central role that school nutrition can play in protecting health, a number of recent federal initiatives have invested substantively in school-based nutrition interventions aimed at improving the quality of foods served in school breakfast and lunch programs (Briefell et al., 2009; Bunnell et al., 2012; USDA, 2010). Improving the nutritional quality of food through the establishment of nutrient limits and other healthy food procurement practices in schools has emerged as a viable strategy for assuring a balanced diet and reducing childhood obesity in the U.S. (Briefell et al., 2009; Robles et al., 2013). National agencies, such as the Institute of Medicine (IOM)[2] and the Alliance for a Healthier Generation, are supportive and have recommended this strategy as a way to lower caloric content in school meals, while preserving or improving their nutritional value (Alliance for a Healthier Generation, 2011; IOM, 2009).

* Corresponding author at: Los Angeles County Department of Public Health, 3530 Wilshire Blvd., 8th Floor, Los Angeles, CA 90010, USA. Fax: +1 213 351 2713.
E-mail addresses: pcummings@ph.lacounty.gov (P.L. Cummings), swelch@luriechildrens.org (S.B. Welch), mmason@luriechildrens.org (M. Mason), lburbage@ph.lacounty.gov (L. Burbage), skwon@luriechildrens.org (S. Kwon), tkuo@ph.lacounty.gov (T. Kuo).

[1] U.S. = United States.

[2] IOM = Institute of Medicine.

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Although studies of school-based nutrition interventions are abundant in the literature (Doak et al., 2006; Katz et al., 2008; Roseman et al., 2011), few have described the core elements of design or the process by which these approaches can be implemented successfully in practice. To date, there are limited comparisons of nutrient changes in school menus after the implementation of school meal standards consistent with the Institute of Medicine, Alliance for a Healthier Generation, or the U.S. Department of Agriculture (USDA)[3], especially for communities with a high prevalence of child obesity.

In 2011, a large, urban school district in Los Angeles County (LAC)[4], California incorporated IOM recommendations in their menu planning of school meals for the school year (SY)[5] 2011–12. Four school districts in suburban Cook County (SCC)[6], Illinois implemented similar changes in their school meal programs; these changes aligned with the Alliance for a Healthier Generation school meal recommendations. In both counties, the nutrition interventions were implemented in advance of the USDA Final Rule for the National School Breakfast and Lunch Programs (NSBP/NSLP)[7] (USDA, 2012). Both counties were also awardees of the Centers for Disease Control and Prevention's (CDC's)[8] *Communities Putting Prevention to Work* (CPPW)[9] program during 2010–2012 (Bunnell et al., 2012). Because the reach and impact of these nutrition strategies are often not well characterized in the literature, we described key meal program changes by nutrient categories for the five school districts that modified their SY 2011–12 menus to meet nutrition standards recommended by the IOM and the Alliance.

Methods

Nutrition interventions, school year 2010–11 to 2011–12

In addition to following the IOM and Alliance recommendations, LAC and SCC included other strategies as part of their nutrition interventions (Table 1). These nutrition interventions were developed and implemented using food-based menu planning and aligned closely with anticipated changes to the USDA nutrition standards for school meals (USDA, 2012). For this comparison, LAC and SCC were selected for the following reasons: 1) school districts in both counties have parallel missions and similar operational scope; 2) LAC is one of, and SCC is located within one of, the largest counties in the nation and both have the most diverse student populations in the U.S. (Table 2); 3) they implemented comparable district-wide nutrition interventions that utilized healthy food procurement strategies (Table 1); 4) they periodically evaluated their school meal programs using nutrient analysis to monitor food quality; and 5) they were awardees of the national CPPW program during 2010–2012.

Nutrient analysis in Los Angeles County

In order to ensure adherence with the USDA nutrition standards, nutrient analyses of meal program menus are routinely performed by participants of the NSBP and NSLP. Through a data-sharing agreement with the Los Angeles Unified School District (LAUSD)[10] Food Services Branch (FSB)[11], the Los Angeles County Department of Public Health (DPH)[12] gained access to the nutrient analysis data for the months of October 2010 and October 2011, corresponding to the pre- and post-menu changes that took place as part of the school-based nutrition interventions implemented in LAC. The nutritional analysis was performed using the OneSource Point-of-Service software (Horizon Software International, Duluth, Georgia). OneSource uses the USDA food nutrient database to analyze recipes of food items on the menu; the database is continually updated to align with the NSBP and NSLP requirements. LAC analyzed the following nutrients: total fat, saturated fat, trans-fat, food energy (kilocalories or "kcal"), sugar, carbohydrates, cholesterol, dietary fiber, protein, iron, calcium, sodium, and vitamins A and C. In this article, we present nutrient data only for those collected by both LAC and SCC — i.e., trans-fat, carbohydrates, cholesterol, iron, and calcium were not included in the comparison analysis.

Data for the month of October were used for both school years because they: 1) allowed for assessments at two time points spaced apart by a 12-month interval, and 2) accounted for a 4–6 week start-up window, during which time the new menu underwent selected adjustments. The 900 + schools (grades kindergarten [K]–12) of the LAUSD were included in the analysis for LAC. Detailed methods for the analysis methods have been described elsewhere (Cummings et al., 2014). Briefly, the analysis examined mean levels, 95% confidence intervals (CIs), and changes in nutrient content for student meals served during SY 2010–11 (n = 931 schools) and SY 2011–12 (n = 947 schools). The difference in number of schools included reflects the availability of the data for the two different academic years.

In SY 2010–11, four different meal categories were offered by the FSB: elementary breakfast, elementary lunch, secondary breakfast, and secondary lunch. Elementary grades include K–5 and secondary grades include 6–12. FSB served the same breakfast offerings for elementary and secondary grades in SY 2011–12; thus, these categories were combined for this school year. Each meal in each category (e.g., elementary lunch, secondary lunch) was offered to students as an assortment of entrées, at least one side option, milk, and condiments. Using estimation methods published previously by Cummings et al. (2014), nutritional content of the entrées, milk, and condiments were averaged and all sides were added into the total. These daily estimates were averaged for the entire month. For secondary school meals, the three lunch entrée options were averaged and for elementary school meals the two lunch entrée options were averaged. All analytic calculations were performed using the SAS statistical software package, version 9.3 (SAS Institute, Cary, North Carolina, USA). The LAC protocol was reviewed and approved by the Los Angeles County Department of Public Health Institutional Review Board (IRB).[13] Since nutrient analysis data contained no individual identifying information, they were considered "exempt" by the IRB.

Nutrient analysis in suburban Cook County

Four school districts (n = 42 schools, grades prekindergarten [PK]–8) were randomly selected from a sample of seven eligible school districts in SCC to participate in SCC's CPPW Model Communities' Program. To be eligible, districts had to include elementary schools; as a result, the four participating districts in the program were strictly elementary school districts with a grade range of PK through 8. Each school district in SCC was required to post-menus and nutritional content online or make the information available to the public upon request. Menus for each of the four participating districts for the time periods May–June 2011 and March–May 2012 were collected and verified for adherence through observational audits during mealtime, randomly sampling approximately 25% of the schools, yielding 10 schools from the four districts. Utilizing similar nutritional analysis software as LAC, the main dish entrée, any side dishes listed on the menu, and the lowest calorie milk option for school meal nutrients were estimated as part of the daily totals. In cases where a range of side dishes were offered, only one of each was used in the calculation (e.g., for schools where students may choose up to 2 fruits or vegetables and up to 2 bread options, only 1 piece of fruit and 1 piece of bread was included in the calculation). This is based on the assumption that most students, on average, will take one of each side offered. Daily nutrient averages for each week were estimated by summing the daily total for each school and dividing by the total number of school days with menu data for that specific week. These weekly estimates were averaged for the three weeks. Unlike LAC, the selected school districts in SCC are small and preferred not to be identified by name. Thus, in the analysis they are labeled as District A, B, C, and D. The SCC protocol was reviewed and approved by the Ann and Robert H. Lurie Children's Hospital of Chicago Research Center Institutional Review Board.

Comparison

All LAUSD schools in LAC and all schools in the four selected school districts in SCC were included in the comparison described for the school years (SY) 2010–11 to 2011–2012. To compare the changes in nutrient levels after

[3] USDA = U.S. Department of Agriculture.
[4] LAC = Los Angeles County.
[5] SY = School Year.
[6] SCC = suburban Cook County.
[7] NSBP/NSLP = National School Breakfast Program/National School Lunch Program.
[8] CDC = Centers for Disease Control and Prevention.
[9] CPPW = Communities Putting Prevention to Work.
[10] LAUSD = Los Angeles Unified School District.
[11] FSB = Food Services Branch.
[12] DPH = Los Angeles County Department of Public Health.
[13] IRB = Institutional Review Board.