

**Research and Professional Briefs**

# More Nutritious Food Is Served in Child-Care Homes Receiving Higher Federal Food Subsidies

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**ABSTRACT**

The US Department of Agriculture's Child and Adult Care Food Program (CACFP) serves 2.3 million children by providing monetary subsidies for food to participating child-care providers. This cross-sectional study tested the hypothesis that higher reimbursement rates for food result in higher food expenditures and higher nutritional quality of foods served in family child-care homes participating in CACFP. Sixty family home child-care providers were recruited in 2008-2009 from King County, Washington. Half the sample received higher reimbursements and the other half received the lower rates. Participants provided a 5-day menu of meals/snacks served and food shopping receipts. The nutritional quality of foods served was assessed from portion-standardized menus. Nutritional quality was quantified as the mean adequacy (mean percent of dietary reference intake) for seven nutrients of concern for child health. Food expenditures were calculated by linking menus with receipts. Student's *t* tests for independent samples and general linear models were used to test for between-group differences. The two groups of providers were socioeconomically and demographically similar with comparable professional backgrounds. However, higher reimbursement providers had significantly greater menu expenditures than the lower reimbursement group (\$2.36 vs \$1.96/child/day;  $P=0.031$ ). Reimbursement level was not associated with a difference in calories, but menus of higher reimbursement providers showed a significantly higher mean nutritional adequacy (64.5% vs 56.3%;  $P=0.033$ ). The finding that reimbursement rates were positively associated with food expenditures and the nutritional quality of

foods served suggests that raising CACFP reimbursements can improve child nutrition.

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**M**ore than 2.3 million children across the United States receive meals and snacks in child-care programs that participate in the Child and Adult Care Food Program (CACFP) of the US Department of Agriculture (USDA), at a cost of \$2.3 billion dollars in fiscal year 2008 (1). About 27% of the children in the CACFP are cared for in family child-care homes (1). CACFP issues monetary reimbursements to child-care providers for the meals and snacks they serve to children. To qualify for reimbursements, meals and snacks must conform to specific food-based meal patterns. In each state, CACFP guidelines may also specify some nutritional characteristics of foods and beverages served through lists of "creditable," or reimbursement-eligible, foods. Although limits on sugar and fat content are emphasized through the creditable food lists, CACFP requirements do not explicitly address nutritional targets for the overall menu. Foods actually served to children within CACFP requirements might vary considerably in both nutrient and energy density, depending on the foods chosen within the food patterns (2).

Since welfare reform in 1996, reimbursements in CACFP have followed a two-tier system designed to target resources to the neediest child-care providers. In general, providers can qualify for the higher reimbursement rates (Tier 1) if they personally meet low-income guidelines or if they live in a low-income area (3). Otherwise, care providers receive the lower (Tier 2) rate. In 2009-2010, the Tier 2 rate of reimbursement was less than half the reimbursement for Tier 1 providers serving the same meals (4).

Lower reimbursement rates may adversely affect child nutrition if care providers economize by selecting less costly foods. Observational and modeling studies have found that lower-cost foods and diets are associated with lower nutritional quality (5-9), and a recent study showed that higher micronutrient intakes by preschool children were associated with higher food costs (10). The aim of the present study was to test whether differences in reimbursement rates were associated with differences in food expenditures and the nutritional quality of foods served in CACFP family child-care homes.

**METHODS**

**Study Participants**

For this cross-sectional study, a sample of 60 child-care providers in King County, Washington, was recruited

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between July 2008 and September 2009. Eligible providers had to be currently part of CACFP, reside within King County and in either of two strata: lower and higher reimbursement. Lower-reimbursement participants received the standard Tier 2 rate from sponsoring agencies in King County. High-reimbursement participants were drawn from two groups, ie, Tier 2 providers who were sponsored by the city of Seattle, which paid these providers at a higher (Tier 1) reimbursement rate; and providers who did not personally meet low-income requirements but who had been classified as Tier 1 on the basis of their neighborhood's socioeconomic profile. Thirty providers in each strata were recruited. Contact information of providers was furnished by the Office of the Superintendent of Public Instruction, which is responsible for CACFP throughout Washington. All procedures were reviewed and approved by the University of Washington Human Subjects Division and written consent was obtained from participants.

### Recruitment and Study Procedures

After initially announcing the study in child-care organization newsletters, invitation letters were mailed to the homes of eligible participants. Of 321 invitation letters mailed, 95 elicited responses. Of these, 75 met eligibility criteria and 63 completed the study. Three were subsequently excluded for failing to follow study protocols. Data on each provider's professional, demographic, and socioeconomic characteristics were collected with in-person surveys.

### Menu Analyses

All menus were initially analyzed for adherence to CACFP meal component requirements. Adherence was defined as the percentage of required food and beverage groups served at breakfast, lunch, and two snacks for each menu day. Subsequent analyses were conducted after excluding all beverages on the grounds that CACFP only provides reimbursements for milk or 100% fruit juice. By contrast, regulations give less specific guidance around food, so care providers have greater discretion in selecting foods that comply with CACFP food pattern requirements. Milk served with breakfast cereals was not excluded. The exclusion of juice from the present analyses could introduce bias because providers are allowed to substitute juice for whole fruit at some meals. However, in the present sample, juice was used at a similar rate between groups, as described below.

All reported foods were standardized to portion sizes appropriate for children 3 to 5 years, as specified by CACFP. For menu items that did not have recommended serving sizes (eg, butter, condiments, sweets), portions were standardized to a fixed level. For example, butter and ketchup were standardized at ½ teaspoon. Ice cream was standardized as one-half of a MyPyramid serving (33 g) (11). Menu items were analyzed for nutrient composition with FoodProcessor SQL dietary assessment software (version 10.5.0, 2008, ESHA Research, Salem, OR).

### Menu Nutrient Characterization and Adequacy Score

The nutritional quality of menus was quantified using a mean adequacy ratio (MAR) (12,13). The MAR was based

on seven nutrients of specific concern for child health. The selection of these nutrients was guided by the 2005 Dietary Guidelines for Americans (14) and by the peer-reviewed literature on nutrient deficiencies in children. These were magnesium (14), potassium (14), zinc (15-18), iron (15,17,19), vitamin E (18,20,21), folate (18,22) and total fiber (14,23). Two other nutrients of concern, calcium (14,17,22,24) and vitamin D (18,19,25) were excluded from this MAR because milk, a key source of these nutrients, was excluded along with all beverages.

The MAR was computed as the average of percent daily reference intakes for the seven nutrients in 1,000 kcal energy. The daily reference intake for each nutrient was based on the Institute of Medicine's standards for children aged 4 to 8 years as follows: vitamin E, 7 mg; iron, 10 mg; magnesium, 130 mg; potassium, 3,800 mg; zinc, 5 mg; folate, 200 µg; and fiber, 25 g. Menus that met or exceeded the recommended levels for these seven nutrients would have a MAR of ≥100%. Menus were also characterized in terms of percent energy from macronutrients and in energy density, calculated as available energy divided by the weight (kcal/g) of foods served (5,26,27).

### Food Expenditures

Expenditures were computed for each provider's standardized 5-day menu by linking each food served with the corresponding provider's food shopping receipts collected for 4 weeks. On average, each provider's receipts provided expenditure data for 80% of the foods and beverages on their menus. The balance of prices was drawn from either other providers' receipts or from the Web sites of local Safeway supermarkets (Safeway Inc, Pleasanton, CA), Amazon Fresh (an Internet-only food retailer [Seattle, WA]), or Sam's Wholesale Club (Bentonville, AR), three food sources used by the present sample of providers.

The expenditure for each food item was computed by multiplying the gram weight served (standardized portion) by the ratio of the purchase price over total grams purchased, correcting for edible portion (28). For example, the expenditure associated with a half-cup portion of fresh apple purchased for \$1.49/pound was  $54.5 \text{ g} \times \$1.49 / (454 \text{ g} \times 0.76) = \$0.235$ . Portion expenditures were totaled to create a daily expenditure. Mean daily expenditures for each provider were computed based on all 5 days of menus.

### Statistical Analysis

Means and standard deviations were computed to characterize the energy and nutrient characteristics of all provider menus. Menu energy, grams, MAR, and menu expenditures were all normally distributed, so parametric statistics were used in testing for differences between higher and lower reimbursement providers. Student's *t* tests for independent samples were used to test for differences in menu nutrient characteristics and expenditures between the groups. In further analyses of MAR, the key dependent variable, a general linear model was used to test for differences between the two groups while adjusting for covariates. Covariates in the general linear model were energy and the care provider's age, educational attainment, household income, number of children

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