RESEARCH
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What Do Children Eat in the Summer? A Direct Observation of Summer Day Camps That Serve Meals

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ABSTRACT

Background More than 14 million children in the United States attend summer camp annually, yet little is known about the food environment in day camps.

Objective Our aim was to describe the nutritional quality of meals served to, brought by, and consumed by children attending summer day camps serving meals and snacks, and to describe camp water access.

Design We conducted a cross-sectional study.

Participants/settings Participants were 149 children attending five summer camps in Boston, MA, in 2013.

Main outcome measures Foods and beverages served were observed for 5 consecutive days. For 2 days, children's dietary intake was directly observed using a validated protocol. Outcome measures included total energy (kilocalories) and servings of different types of foods and beverages served and consumed during breakfast, lunch, and snack.

Statistical analyses performed Mean total energy, *trans* fats, sodium, sugar, and fiber served per meal were calculated across the camps, as were mean weekly frequencies of serving fruits, vegetables, meat/meat alternates, grains, milk, 100% juice, sugar-sweetened beverages, whole grains, red/highly processed meats, grain-based desserts, and salty snacks. Mean consumption was calculated per camper per day.

Results Camps served a mean (standard deviation) of 647.7 (134.3) kcal for lunch, 401.8 (149.6) kcal for breakfast, and 266.4 (150.8) kcal for snack. Most camps served red/highly processed meats, salty snacks, and grain-based desserts frequently, and rarely served vegetables or water. Children consumed little (eg, at lunch, 36.5% of fruit portions, 35.0% of meat/meat alternative portions, and 37.6% of milk portions served) except for salty snacks (66.9% of portions) and grain-based desserts (64.1% of portions). Sugar-sweetened beverages and salty snacks were frequently brought to camp. One-quarter of campers drank nothing throughout the entire camp day.

Conclusions The nutritional quality of foods and beverages served at summer day camps could be improved. Future studies should assess barriers to consumption of healthy foods and beverages in these settings.
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IN RECENT YEARS, PUBLIC HEALTH EFFORTS TO IMPROVE child nutrition and prevent obesity have focused on many of the spaces where children learn and play, including schools, afterschool programs, and child-care centers.[1-7] Less attention has been given to summer camps, a crucial source of child care and enrichment during the summer months for an estimated 14.3 million US school-aged children.[8]

The summer months can be a critical period for excess weight gain,[9-12] especially for overweight children and for black and Hispanic children.[9,11] Improvements in weight loss, percent body fat, cardiovascular fitness, and fasting insulin conferred by school-based interventions can be lost during the summer months.[10] Ensuring that children have access to healthy eating environments during these vulnerable summer months is essential, and attending camp can promote healthier eating and physical activity opportunities, particularly for low-income youth.[13] However, little is known about the food and beverage environment in the summer camp setting.[14,15] A recent observation of foods and beverages brought in by campers for lunch in a sample of summer day camps that did not provide meals found that sweets, salty snacks, and sugary drinks were common.[14] To the authors' knowledge, no studies have documented the food environment or dietary intake in summer day camps that provide meals to children.

This research brief describes foods and beverages served to and consumed by children at five Boston, MA, summer day camps that provided meals. Because recent studies have demonstrated that foods from outside of school and

out-of-school meal programs can be less healthy,[16-18] the study also examined the extra foods and beverages children brought into the summer camp. Lastly, because drinking water access is a crucial component of a healthy beverage environment, this study evaluates access to drinking water at the camps.

METHODS

Sample and Study Design

The convenience sample for this cross-sectional study included 149 children attending 5 summer day camps in Boston in July through August of 2013. The camps' directors were originally recruited by the Boston Public Health Commission to participate in a modified version of the Out of School Nutrition and Physical Activity initiative.[5,19,20] Camps were eligible if they were located in Boston, served snacks and meals, were open Monday through Friday for July and August, provided full-day general programming, and served children from Boston in kindergarten through 5th grade. Boston Public Health Commission identified seven initial potential camps for participation in the Out of School Nutrition and Physical Activity initiative that were located in low-income neighborhoods throughout Boston. Between 33 and 137 children were enrolled in each participating camp; children could enroll for up to 6 weeks. The meals were provided by the same contracted foodservice vendor, which supplies meals for a large share of Boston summer camps; the vendor provided all pre-prepared and packaged items. Participating camps served similar foods and beverages, but items varied by camp.

Prior to camps participating in the summer Out of School Nutrition and Physical Activity initiative, research staff visited the camps for 5 consecutive weekdays to collect information about nutrition, screen time, and physical activity practices and policies. Five of seven camps that were approached agreed to participate in data collection (71.4%); the two nonparticipating camps had competing programs during the proposed data-collection period. Parents/guardians provided written consent for child participation, while children verbally assented. Dietary intake at camp was assessed on 2 of the 5 observation days (randomly selected) due to resource constraints; this observation strategy has been used previously.[17] Of 228 eligible children, 186 consented to participate (82%). All participating children present during meals and snacks on the observation days (n=149) were observed for dietary intake at summer camp; absent children did not differ from observed children by age, sex, or race/ethnicity. Study procedures were approved by the Harvard T. H. Chan School of Public Health Office of Human Research Administration Institutional Review Board.

Measures

Foods and Beverages Served. Before visiting the camps, research assistants were trained on the use of a previously validated protocol for studying foods served and children's dietary intake in out-of-school settings.[21] On each of the 5 days observed, before each meal (breakfast, lunch, and afternoon snack), research assistants coordinated with camp staff to photograph and record each food and beverage that would be served. Research assistants recorded each item's name, size, brand, and flavor and noted whether any items were presented to children as a choice between several items (eg, a choice between chocolate and plain milk). Across the entire day, research assistants also recorded the same information for each food or beverage item brought in by children to the summer camp.

Dietary Intake. On 2 of the observation days, research assistants digitally photographed the leftovers of each food and beverage item—including both items provided by the camp and items brought by the child—for each participating child at every meal. Leftovers were photographed after children had moved on to a different camp activity. Research assistants also observed participating children during meals to note whether any items had been consumed that were not shown in the leftover photograph. Later, research assistants compared the photograph of each child's leftovers with the corresponding picture of the foods and beverages served for that meal, and estimated how much the child consumed of each item in increments of 10%. Comparison with standard serving sizes was possible because all of the items were prepackaged foods and beverages or whole fruits. This method was found to have excellent criterion validity when compared with weighed estimates of consumption.[21] For this component of the protocol, research assistants underwent 1 hour of initial training and also completed 20 practice estimations in order to ensure accuracy.

Nutrient Information. For each food and beverage item observed, nutrient information for a standard serving was collected. Nutrient information was obtained from foodservice vendors and manufacturer's websites. For generic items (such as whole apples), nutrient information from the US Department of Agriculture's National Nutrient Database for Standard Reference was used.[22]

Water Access. Research assistants recorded the type (eg, water fountain, insulated cooler), location, functional status, and perceived cleanliness for each drinking water source in the camp space.

Demographic Data. Participating children's age, grade level, sex, and race/ethnicity were reported by parents or guardians on consent forms.

Comparison to National Standards. To evaluate the nutritional quality of the meals served, foods and beverages were compared to a set of best practice standards. This approach was used to help identify easily interpretable, actionable changes to menu planning that camps could make, as this is an approach that has been shown to be effective in other out-of-school settings.[5,23]

Recently, the Institute of Medicine (IOM) developed science-based recommendations for another US Department of Agriculture meals program for child-care programs, the Child and Adult Care Food Program.[24] These recommendations provide best practice standards for child-care centers and other facilities providing meals to children and adults of different ages. In addition, these standards identify ideal meal patterns for facilities that serve multiple meals (ie, breakfast, snack, lunch) each day, making them applicable benchmarks for use in the evaluation of the quality of the meals served and consumed in this study of summer camps. The IOM