American Dietetic Association

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Original Research

Dietary Intake in Head Start vs Non–Head Start Preschool-Aged Children: Results from the 1999-2004 National Health and Nutrition Examination Survey

EMILY M. BUCHOLZ, MPH; MAYUR M. DESAI, PhD, MPH; MARJORIE S. ROSENTHAL, MD, MPH

ABSTRACT

Objective To determine whether dietary intakes of children enrolled in Head Start programs differ from those of children not attending preschool or children in non–Head Start programs.

Design Using data from the 1999-2004 National Health and Nutrition Examination Survey, low-income, 3- to 5-year-old children were categorized into one of four preschool groups: Head Start (n=184), non–Head Start (n=189), past preschool (n=193), and no preschool (n=384). Total nutrient intakes were calculated using 24-hour parental recalls.

Statistical analyses performed Mean macronutrient and micronutrient intakes were compared across groups and the percentage of children not meeting Recommended Dietary Allowances (RDAs) were calculated. Multivariate logistic regression was used to evaluate the relationship between preschool group and likelihood of not meeting dietary guidelines.

Results Many children did not meet the RDA for folate (20.5%), vitamin A (39.7%), vitamin E (79.7%), calcium (40.2%), iron (28.8%), and potassium (90.8%). Compared with the other preschool groups, Head Start children had lower mean protein, saturated fat, riboflavin, calcium, and phosphorous intakes. The greatest differences in intake were observed between Head Start participants and no-preschool children. Multivariate analyses demonstrated an association between Head Start and inadequate intake of protein, thiamin, riboflavin, niacin, calcium, and selenium.

Conclusions Compared with other low-income children, those in Head Start programs appear to be at greater risk for not meeting the RDA for several key vitamins and minerals. These differences in diet quality may present an opportunity for Head Start programs to enhance nutrition in this student population.

J Am Diet Assoc. 2011;111:1021-1030.

E. M. Bucholz is a medical student, M. M. Desai is an assistant professor, Division of Chronic Disease Epidemiology, and M. S. Rosenthal is an associate research scientist, Department of Pediatrics, and assistant director, Robert Wood Johnson Foundation Clinical Scholars Program, Yale School of Medicine, New Haven, CT.

Address correspondence to: Emily M. Bucholz, MPH, Yale School of Medicine, 333 Cedar St, New Haven, CT 06511. E-mail: emily.bucholz@yale.edu

Manuscript accepted: January 24, 2011.

0002-8223/$36.00

doi: 10.1016/j.jada.2011.04.009

Preschool-aged children are at risk for inadequate nutrition and, among low-income preschoolers, the risk is even greater: 30% of preschool-aged children living below the poverty line are overweight or at risk of overweight (1) compared with 26% of all 2- to 5-year-olds (2). Children living in poverty are also at higher risk of micronutrient deficiencies, particularly zinc and iron (3-5). Given that the preschool years are when children begin exercising greater control over what they eat and establish eating patterns that may last a lifetime (6-9), the environmental context of a preschool-aged child may play a key role in lifetime nutrition.

Nationwide, 60% of all US children receive at least some child care outside of the home, and one half of these children spend 35 hours or more each week in out-of-home child care (10). As a result, many children consume more than one half of their daily food intake in out-of-home care. Head Start (HS), a federally funded preschool program serving low-income children, aims to "promote school readiness by enhancing the social and cognitive development of children through the provision of educational, health, nutritional, social and other services to enrolled children and families" (11). This program may serve as an opportunity to enhance nutritional intake. All HS programs are required to comply with federal Program Performance Standards that address the identification of children's nutrition needs, menu planning and dietary requirements for meals served in the classroom, feeding practices and nutrition education, food safety and sanitation, and family education around child nutrition (12).

Despite risk of inadequate nutrition for low-income preschool-aged children and the emphasis HS places on health, there is a paucity of literature on the nutritional benefits of HS participation. The purpose of this study was to examine, using a nationally representative sample of low-income children, whether dietary intakes of children enrolled in HS programs differ from those of chil-

dren not attending preschool or children in non-HS preschool programs.

METHODS

Data Source

Data from the National Health and Nutrition Examination Survey (NHANES) were used to assess dietary intake in US preschool-aged children. Conducted by the National Center for Health Statistics, NHANES is a nationally representative, cross-sectional survey of the civilian, noninstitutionalized population of the United States. It uses stratified, multistage probability sampling to oversample low-income individuals, certain age groups, and races/ethnicities (13). For this study, data from three NHANES cohorts was combined: 1999-2000, 2001-2002, and 2003-2004.

NHANES collects detailed demographic, socioeconomic, dietary, and health-related data through in-home interviews and clinical assessments at a mobile examination center. For children younger than age 6 years, these interviews were conducted using parent or guardian proxies. A detailed description of these methods is available elsewhere (11,13).

Selection of Participants and Measures

The sample consisted of all children aged 3 to 5 years living in poverty (200% of the federal poverty line and below) who had available dietary intake data (N=950). We limited the sample to children whose annual family income fell at or below 200% of the federal poverty line for household size and year to compare children of similar socioeconomic status while still including the majority of children in HS programs.

Preschool Status

Participants were categorized into one of four groups according to history of preschool attendance using the following questions: "Is sample person [SP] now attending HS?" "Does SP now attend day care or preschool?" and "Did SP ever attend day care or preschool?" The four categories used were HS (children currently in HS), non-HS preschool (children in a non-HS preschool/child care program), past preschool (children who previously attended but no longer attend a preschool/child care program), and no preschool (children who have never attended a preschool/child care program).

Dietary Intake and Serum Micronutrient Levels

The NHANES total nutrient databases were used to estimate nutrient intakes for each group of children. Information on individual foods consumed by participants was collected by trained NHANES personnel using 24-hour parental recalls and then converted to total nutrient intakes using the US Department of Agriculture's Food and Nutrient Database for Dietary Studies (14).

Before 2003, a single dietary interview was administered during the mobile examination center exam to assess individual food and total nutrient consumption on 1 day only. Since then, NHANES has added an additional 24-hour recall to collect data on 2 days of intake, using both in-person and telephone interviews. Due to differences in the number of days for which dietary information was available for children in this study, analyses were restricted to the 1-day in-person data collected in the mobile examination center.

To estimate the prevalence of children not meeting the recommended intake levels for specific macro- and micronutrients, total nutrient intakes were compared to age-specific standards. The standards used were Dietary Reference Intakes for protein and all reported micronutrients as defined by the Institute of Medicine's Food and Nutrition Board guidelines (15). Because low-income children are already at high risk of nutrient deficiencies, the more stringent criteria Recommended Daily Allowances (RDAs) were employed, as opposed to Estimated Average Requirements. RDAs are calculated to meet the need of 97% to 98% of individuals whereas Estimated Average Requirements only meet the needs of 50% of individuals. When RDAs were not available, Adequate Intakes were used. In the case of sodium, the tolerable Upper Level was used as a cut-off because of concerns over excess sodium. Guidelines for fat intakes were defined as not exceeding 35% to 40% of total energy from fat and 10% from saturated fat based on the US Department of Agriculture's Dietary Guidelines for Americans 2005 (16).

When available, serum concentrations of micronutrients were examined to determine whether differences in reported dietary intakes between preschool groups could be explained by differential misreporting. Methods describing the measurement of these variables and their associated errors are published elsewhere (13). Because NHANES collected different serum micronutrients in each of the three cohorts, the sample size and number of cohorts used for the analysis of each vitamin or mineral are indicated.

Covariates

The association between preschool group and several demographic, socioeconomic, and health-related variables was examined. These variables included child sex, age, race/ethnicity, insurance status, birthplace, and body mass index classification (overweight: >95th percentile, at risk for overweight: >85th to <95th percentile, or normal: <85th percentile) (17). Consistent with NHANES data collection, race/ethnicity was categorized as non-Hispanic white, non-Hispanic black, Mexican American, and other. Socioeconomic variables included household size, presence of adult smoker(s) in the household, household poverty level, household Special Supplemental Nutrition Program for Women, Infants, and Children and/or food stamp receipt, the education level and birthplace of the household reference person, whether the child's mother was a teenager while pregnant, smoked during pregnancy, or breastfed the child as an infant, and the child's use of dietary supplements. Finally, to determine the possibility of differential recall based on day of the week, a dummy variable indicating weekend vs weekday recall was examined. Covariates associated with preschool enrollment (at the $P<0.10$ level) were included in the final multivariate models.