Food Insecurity Is Linked to a Food Environment Promoting Obesity in Households With Children

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ABSTRACT

Objective: To determine the extent to which the presence and accessibility of healthful and less healthful foods in children's homes vary with level of food security.

Methods: A total of 41 parents or primary caregivers who had at least 1 child ages 2–13 and resided in a low-income area with limited food access completed a home food inventory and a validated measure assessing household food security.

Results: Compared with food-secure participants, marginal or low/very low food-secure caregivers reported significantly more obesity-promoting foods in the home, more microwavable or quick-cook frozen foods, and greater access to less healthful foods in the kitchen (all $Ps < .05$).

Conclusions and Implications: Given the greater presence and accessibility of less healthful foods, targeting home food environment may improve diet quality and health status in children of low-income, food insecure households.

Key Words: food security, home environment, home food inventory, childhood obesity (*J Nutr Educ Behav*. 2013;45:780-784.)

INTRODUCTION

Food insecurity, or inaccessibility to nutritionally adequate foods owing to financial or other resource limitations,[1] has emerged as an important public health concern. United States (US) Department of Agriculture estimates from 2011 indicate that 14.9% of households (17.9 million) qualified as food insecure, an increase from 11.9% in 1995.[2] Of households with children, 10% were characterized by child food insecurity in 2011.[2] Although food insecurity is inconsistently associated with child obesity risk,[3] evidence suggests that children in food-insecure households experience poor diet quality, lower health status, decreased cognitive development, emotional and behavioral problems, and subsequent accumulation of body fat in adulthood.[4]

An association exists among food security, income, and diet quality, with lower food security and income associated with decreased healthful food intake and variety.[3,5] When assessing food-purchasing decisions in high-poverty neighborhoods, food-insecure families identified price as the most salient factor influencing their purchases.[6] Nutrient-dense foods (eg, fruits, vegetables, whole grains, nonfat or low-fat milk, and lean meats) cost significantly more per calorie than energy-dense foods (eg, soft drinks, salty and sugary snacks, pastries, and packaged and frozen foods).[5,7-9] In addition to price, low-income households with children place greater importance on preparation convenience and shelf-life.[10] Consequently, food-insecure individuals more frequently consume sugar-sweetened beverages, fast food, and energy-dense foods, and report lower fruit and vegetable intake compared with those who experience food security.[5,11]

Home food availability serves as an important determinant of eating behavior and diet quality for food-insecure children.[12] The literature reports that food-insecure individuals consume poorer-quality foods and demonstrate difficulty obtaining nutrient-dense healthy foods for the home, but a paucity of in-home food environment assessments exist. It remains unclear how the availability of healthful and less healthful foods in the home varies across levels of food security. Therefore, the present study compared high, marginal, and low/very low food-security households with children on the availability and accessibility of healthful and less healthful foods derived from a validated home food inventory.

METHODS

Participants and Recruitment

Participants were adults who self-identified as the primary household food shopper, the individual who makes at least 50% of food purchases for the household. Recruitment occurred through flyers posted on Rush University Medical Center campus, research fairs conducted at local Boys and Girls Clubs, referrals from a large primary care pediatric medicine practice, and word of mouth. Inclusion criteria consisted of being a parent or primary caregiver with at least 1 child ages 2–13 and living within a 4.3-square-mile documented food desert region, a predominantly low-income

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area with limited food access,[13] near the Rush University Medical Center. Exclusion criteria included an inability to provide written consent in English, ineligibility to work in the US, living with a household member with major dietary restrictions or history of bariatric surgery, or living in temporary housing (ie, homeless shelter or transitional housing). All included parents and primary caregivers provided written informed consent. The Rush University Medical Center Institutional Review Board approved this study.

Procedures

Included parents and primary caregivers attended an in-person assessment at the research facility to complete surveys on food security and socioeconomic and demographic factors. Study staff then provided instructions on completing the home food inventory and asked parents and primary caregivers to complete the form at home within 2 days. Parents and primary caregivers returned the inventories during a second visit to the research facility, at which time $25 compensation was dispensed.

Measures

Parent and primary caregiver age, gender, race and ethnicity, education level, household income, marital status, number of household members, and current food assistance receipt were assessed via self-report. The 2008 update of the US Department of Agriculture's Household Food Security Survey[14] was administered to assess perceived restriction in the quantity, quality, or desirability of diet resulting from financial limitations. The survey consisted of 18 items. The sum of affirmative responses provided a total food security score that classified households into 1 of 4 categories: high (0), marginal (1–2), low (3–7), and very low food security (8–18). Because only 4 parents and primary caregivers were categorized as very low food security, the categories of low and very low food security were collapsed into a single category.

The Home Food Inventory of Fulkerson and colleagues[15] was used to document the presence of 190 foods in the home. Parents and primary caregivers indicated whether a food item was present using a checklist format with yes/no response options. The scale provided scores for home availability of 30 food groups and the accessibility of healthful and less healthful foods in the kitchen and refrigerator.[15] A summative score of 71 obesity-promoting foods (ie, discretionary caloric beverages, regular-fat dairy, snacks, desserts, candy, and microwavable or quick-cook frozen foods, but not including frozen vegetables or fruits) yielded an obesogenic home food availability score, with higher scores representing greater availability. The authors evaluated whether food security status was associated with the obesogenic home food availability score, the presence of foods in 7 obesity-relevant food categories, and access to healthful and less healthful foods in the kitchen (ie, visible and readily accessible on the countertop, on top of the refrigerator, and on the table) and refrigerator. Previous assessments determined that participant-completed inventories show high agreement with staff-completed inventories, and therefore serve as valid and convenient measurements of home food environment.[15] In addition, food category scores are significantly and positively correlated with dietary intake within corresponding food groups.[15]

Data Analysis

Descriptive statistics (means and SDs) characterized the study sample and home food availability. Fisher's exact test compared household food security groups on income and food assistance. Linear regression models compared individuals with marginal and, separately, low/very low household food security with those with high food security on home food availability. The primary dependent variable, the obesogenic home food availability score, was tested at $\alpha = .05$. Food security groups were also compared on 11 other food outcomes, with an adjusted α of $P < .02$ (total family-wise $\alpha = .22$). All continuous variable distributions were examined for normality and none exhibited potentially problematic skewness or kurtosis. Models were adjusted for potential confounding variables, including household income, race and ethnicity, marital status, number of household members, and food assistance receipt. Data were analyzed using Stata 11 statistical software (StataCorp LP, College Station, TX, 2009).

RESULTS

A total of 41 parents and primary caregivers contributed data to the analyses (Table 1). The mean household food security score was 3.5 (SD 3.4) of a possible 18, with parents and primary caregivers categorized into high (n = 10), marginal (n = 7), and low/very low (n = 24) food security groups. Food security groups differed on household income ($P = .02$), with lower income among marginal and low/very low food security groups. Groups did not differ on food assistance receipt ($P = .73$), with 2 of 10 (20%) high, 3 of 7 (43%) marginal, and 11 of 24 (46%) low/very low food security participants receiving food assistance.

Overall, parents and primary caregivers reported the presence of 32.7 (SD 11.6) of the 71 items contributing to the obesogenic home food availability score. Lower obesogenic home food availability scores were associated with smaller household size ($\beta = -2.2$, $t = 2.3$, $P = .04$) and Hispanic ethnicity ($\beta = 12.0$, $t = -2.8$, $P < .01$, compared with African American race). Hispanics also reported significantly smaller household sizes compared with African Americans (3.1 vs 4.4 household members, $P = .03$, respectively). In covariate-adjusted models, compared with parents and primary caregivers with high food security, significantly greater obesogenic home food availability scores were reported by parents and primary caregivers with marginal ($\beta = 14.3$, $t = 2.3$, $P = .03$) and low/very low ($\beta = 12.4$, $t = 2.4$, $P = .03$) food security. A larger number of microwaveable or quick-cook frozen foods were indicated by marginal ($\beta = 3.5$, $t = 2.7$, $P < .01$) and low/very low ($\beta = 3.5$, $t = 3.2$, $P < .01$) food-secure parents and primary caregivers than by those with high food security. In addition, greater access to less healthful foods in the kitchen was reported by marginal ($\beta = 2.6$, $t = 2.7$, $P < .01$) and low/very low ($\beta = 2.3$, $t = 2.9$, $P < .01$) food-secure parents and primary caregivers compared with those with high food