

Eating When There is Not Enough to Eat: Eating Behaviors and Perceptions of Food Among Food-Insecure Youths

Rachel Widome, PhD, MHS, Dianne Neumark-Sztainer, PhD, RD, MPH, Peter J. Hannan, MStat, Jess Haines, PhD, MHSc, RD, and Mary Story, PhD, RD

Food insecurity, or not having access to enough food for an active, healthy life because of a lack of resources, is a continuing problem in the United States.¹ The US Department of Agriculture monitors the extent and severity of food insecurity in US households through the food security section of the annual, nationally representative Current Population Survey. According to this survey, in 2006, 10.9% of households experienced food insecurity at some point during the year.¹ Households with children tended to be more affected by food insecurity and were nearly twice as likely to report food insecurity during at least part of the past year as were households with no children under the age of 18 years (15.6% versus 8.5%, respectively).¹ Young children are often protected from hunger even in households that have very low food security; however, adolescents may be more vulnerable.¹

Growing up in a food-insecure household places burdens on youths. Even after controlling for family income, adolescents living in food-insecure households have lower psychosocial functioning² and a greater risk of having suicidal symptoms³ than do their food-secure counterparts. Because of the increasingly prevalent childhood obesity epidemic in the United States,^{4,5} the effect of food security on both weight outcomes and predictors of obesity is of special interest. Youths who are racial/ethnic minorities, low income, or both are at greater risk for overweight.^{6–8} Several studies have found evidence for a paradoxical association between household food insecurity and overweight status in both children^{9–11} and adults.^{12–15} Other studies found no relation between food insecurity and weight in children,^{16–19} and several studies found a negative association.^{20,21} These mixed results may be because households that are characterized as food insecure likely fall at various points on a spectrum of food insufficiency and have differing coping strategies.²² Two possible interconnected mechanisms relating to eating habits that might explain why individuals who are food insecure weigh more than those who are food

Objectives. We explored differences in adolescents' eating habits, perceptions, and dietary intakes by food security status.

Methods. As part of Project EAT (Eating Among Teens), we surveyed 4746 multiethnic middle and high school students in 31 primarily urban schools in the Minneapolis–St. Paul, Minnesota, area during the 1998–1999 academic year. Participants completed in-class surveys. We used multiple regression analysis to characterize associations between behaviors, perceptions, nutritional intake, and food security status.

Results. Compared with food-secure youths, food-insecure youths were more likely to perceive that eating healthfully was inconvenient and that healthy food did not taste good. Additionally, food-insecure youths reported eating more fast food but fewer family meals and breakfasts per week than did youths who were food secure. Food-insecure and food-secure youths perceived similar benefits from eating healthfully ($P=.75$). Compared with those who were food secure, food-insecure youths had higher fat intakes ($P<.01$). Food-insecure youths were more likely to have a body mass index above the 95th percentile.

Conclusions. The eating patterns of food-insecure adolescents differ in important ways from the eating patterns of those who are food secure. Policies and interventions focusing on improving the foods that these youths eat deserve further examination. (*Am J Public Health.* 2009;99:822–828. doi:10.2105/AJPH.2008.139758)

secure have been suggested.^{9,18,21} The first is that energy-dense foods are often cheaper in the United States and therefore may be more frequently purchased by families with limited resources to buy food.^{23–25} The second mechanism is that individuals facing periodic hunger and fearing food scarcity may tend to overeat when food is available.²⁶

Little is known about how food security status may influence family meal frequency, fast food use, and eating breakfast, all of which are eating habits that likely influence health. Family meal consumption is important because it has been associated with a higher quality diet^{27–29} and a lower likelihood of being overweight in adolescents.^{30,31} Additionally, family meals have been linked to adolescents having fewer high-risk behaviors, such as substance use and violence, as well as a lower risk for depression and suicide.³² Neumark-Sztainer et al.²⁷ found that lower socioeconomic status was related to a lower frequency of family meals per week. Fast-food meals tend to be high in fat,

and it has been speculated that fast food in children's diets may adversely affect their dietary quality in ways that contribute to obesity.^{33–35} Breakfast consumption has been shown longitudinally to be protective against overweight in adolescents,³⁶ and past research has shown that compared with adolescents of lower socioeconomic status, those of higher socioeconomic status are more likely to eat breakfast.³⁷

Elucidating how household food insecurity influences eating behaviors could lead to policies and interventions that are better targeted at improving the nutritional status of youths. Using data gathered for Project EAT (Eating Among Teens), we sought to assess barriers to healthy eating as well as the availability of healthy and unhealthy foods among food-secure and food-insecure adolescents. We also aimed to compare eating habits and nutritional intake between these 2 groups. We hypothesized that food-insecure adolescents would report eating habits that were less healthy, poorer nutritional intakes, decreased

healthy food availability in the home, and greater perceived barriers to healthy eating.

METHODS

Project EAT is an observational study of the socioenvironmental, personal, and behavioral determinants of dietary intake and weight status among a large and ethnically diverse population.⁸ As part of Project EAT, we surveyed 4746 middle and high school students in 31 primarily urban (27 inner-city and 4 inner-ring suburban) schools in Minneapolis–St. Paul, MN, during the 1998–1999 academic year. Participants completed in-class surveys that included questions on benefits and barriers to healthy eating, food availability, and food security.

Measures

We assessed the main outcome of food security with 2 items that were adapted from the 1999 US Department of Agriculture Food Security/Hunger Core Module: 3-Stage Design, With Screeners.³⁸ The first item, which we will refer to as “hunger frequency,” was “How often during the last 12 months have you been hungry because your family couldn’t afford food?” The response categories were (1) almost every month, (2) some months but not every month, (3) only 1 or 2 months, and (4) I have not been hungry for this reason. The second item, which we will refer to as “home food adequacy,” was “Which of these statements best describes the food eaten in your home in the last 12 months?” The response categories were (1) often we don’t have enough to eat, (2) sometimes we don’t have enough to eat, (3) we have enough to eat but not always the kinds of foods we want, and (4) we always have enough to eat and the kinds of foods we want.

We assessed perceived barriers and benefits to eating healthy using 3 scales that measured the perceived inconvenience of healthy eating, preferences toward healthy foods, and the perceived benefits of healthy eating. These items were developed from focus groups conducted before the Project EAT study.³⁹ The scale ($\alpha=0.71$) measuring the perceived inconvenience of healthy eating was composed of the following items: (1) I am too busy to eat healthy foods, (2) I am too rushed in the morning to eat a healthy breakfast, (3) eating healthy meals takes too much time, and (4) I don’t have

time to think about healthy eating. Preference toward healthy food was measured by a scale ($\alpha=0.53$) composed of the following items: (1) I like the taste of potato chips and other salty snack foods, (2) milk tastes good to me, (3) most unhealthy foods taste better than healthy foods, (4) I like the taste of most fruits, (5) most vegetables taste bad, and (6) most healthy foods just don’t taste that great. The perceived benefits of healthy eating were measured by a scale ($\alpha=0.83$) composed of the following items in answer to the prompt “The types of food I eat affect”: (1) my health, (2) how I look, (3) my weight, (4) how well I do in sports, and (5) how well I do in school. Response options for all of the perceived barriers and benefits to eating healthy items were strongly agree, agree, disagree, and strongly disagree.

We ascertained household food availability via 2 scales developed from the Project EAT formative focus groups.³⁹ One scale measured the availability of healthy food in the youths’ homes ($\alpha=0.63$) and included the following items: (1) fruits and vegetables are available in my house, (2) vegetables are served at dinner in my house, (3) we have fruit juice in our house, and (4) milk is served at meals in my house. The second scale measured the home availability of unhealthy food ($\alpha=0.80$) and included the following items: (1) we have “junk food” in our house, (2) potato chips or other salty snack foods are available in my home, (3) chocolate or other candy is available in my home, and (4) soda pop is available in my home. Response options for all food availability items were never, sometimes, usually, and always.

We determined fast food intake by the item, “In the past week, how often did you eat something from a fast food restaurant (like McDonald’s, Burger King, Hardee’s, etc.)?” Family meal frequency was determined by the item, “During the past seven days, how many times did all, or most, of your family living in your house eat a meal together?” The response options for both of these questions were never, 1–2 times, 3–4 times, 5–6 times, 7 times, and more than 7 times. We recoded these options to 0, 1.5, 3.5, 5.5, 7, and 8 times, respectively. Breakfast eating was assessed by the item, “During the past week, how many days did you eat breakfast?” The responses were never, 1–2 times, 3–4 times, 5–6 times, and 7 times, and we recoded these to 0, 1.5, 3.5, 5.5, and 7 times, respectively.

We assessed nutritional intake with the self-administered 149-item Youth and Adolescent Food-Frequency Questionnaire (YAQ). A subset of students ($n=334$) from the Project EAT sample did not complete the YAQ survey because of time constraints or absenteeism. The validity and reliability of the YAQ have been tested in a random sample of (primarily White) children (aged 9–18 years) in the Nurse’s Health Study and were found to be within acceptable ranges for dietary assessment tools^{40,41}; however, the validity and reliability of the questionnaire may be more modest among African American adolescents.⁴² The mean correlation for energy-adjusted nutrients between the YAQ and 24-hour recalls was 0.45, and the mean energy intake from the 24-hour recalls was only 1% higher than that from the YAQ.⁴⁰ The following nutritional information was assessed with the YAQ and used in our study: fat (percentage of calories from both total fat and saturated fat), calcium, fruit, vegetable (excluding fried potatoes, including deep yellow or green vegetables), and grain (including whole grain) intake. These nutrients were selected for analysis because they have been targeted as nutrition objectives for Healthy People 2010.⁴³

Height and weight were measured by trained research staff in a private area with standardized equipment and procedures. Body mass index (BMI) values were calculated as weight in kilograms divided by height in meters squared. Gender- and age-specific cutoffs based on reference data from the Centers for Disease Control and Prevention growth tables were used to classify respondents as overweight (BMI \geq 95th percentile).⁴⁴

Age, grade level, gender, and race/ethnicity were measured by self-report. Race/ethnicity was assessed with the question, “Do you think of yourself as White, Black/African American, Hispanic or Latino, Asian American, Hawaiian/Pacific Islander, or American Indian?” Because of small numbers, we grouped youths who indicated Hawaiian/Pacific Islander into an “Other/Multiple” category that also included youths who indicated more than 1 race/ethnicity.

Data Analysis

We report the demographic breakdowns for each category of the 2 food security items. We used multiple linear regression to calculate mean values and their associated 95%

confidence intervals (CIs) to characterize the associations between behaviors, perceptions, and nutritional intakes and food security status. Scales of perceived benefits and barriers to healthy eating and food availability were standardized so that the mean for the whole sample was equal to zero and the standard deviation was equal to 1. All regression models were adjusted for race/ethnicity, grade level, and gender. Percentages of youths meeting each Healthy People 2010 goal were reported for each of the food security categories of the 2 food security questions. We used the Mantel-Haenszel χ^2 trend test (1 degree of freedom) when examining the hunger frequency item. We used the χ^2 test (3 degrees of freedom) to test for significant differences between home food adequacy categories because this measure is not strictly ordinal. SAS version 9.1.3 was used for all analyses (SAS Institute Inc, Cary, NC).

RESULTS

In response to the hunger frequency item, 8.4% of adolescents reported being hungry at least once in the past year because their family could not afford food (Table 1). For home food adequacy, 4.4% of the adolescents reported that often or sometimes they do not have enough to eat. Both food security items were significantly correlated with ethnicity, public assistance, and eligibility for free or reduced price lunch (results not shown).

The associations between perceived benefits and barriers to healthy eating and food security as assessed by the hunger frequency and home food adequacy items are shown in Table 2. Youths who reported a hunger frequency of “almost every month” in the past year were more likely than youths in the rest of the sample to report both inconvenience and food preference as barriers to healthy eating. However,

how these youths scored on the benefits of healthy eating scale did not differ significantly from the youths who reported no hunger in the past year. Youths who reported any frequency of hunger were significantly less likely to report high availability of both unhealthy and healthy foods in their households. Adolescents who reported that their households “always have enough to eat and the kinds of foods we want” were significantly less likely than the rest of the sample to indicate that inconvenience and food preference were barriers to eating healthy. Youths who reported any home food inadequacy had a lesser availability of both unhealthy and healthy foods in their households.

The associations between food security and selected eating patterns are shown in Table 3. The overall *P* values were significant for the associations between breakfast and eating family meals and both of the food security

TABLE 1—Description of Project EAT Adolescents, by Food Security Status: Minneapolis–St. Paul, MN, 1998–1999

	Hunger Frequency ^a					Home Food Adequacy ^b				
	Row Total, No.	Almost Every Month, % (No.) or %	Some Months, % (No.) or %	One or Two Months, % (No.) or %	Zero Months, % (No.) or %	Row Total, No.	Often Inadequate, % (No.) or %	Sometimes Inadequate, % (No.) or %	Adequate but not Always the Kinds of Food Wanted, % (No.) or %	Adequate and the Kinds of Foods We Want, % (No.) or %
Overall	4589	1.2 (53)	2.8 (128)	4.4 (200)	91.7 (4208)	4615	1.3 (60)	3.1 (145)	33.8 (1560)	61.8 (2850)
Race/Ethnicity										
White	2243	0.5	1.0	3.5	95.0	2246	0.5	2.3	37.7	59.5
Black	816	1.8	3.8	4.3	90.1	829	1.9	4.1	25.5	68.5
Hispanic	264	0.0	2.7	3.8	93.6	266	2.6	1.9	27.4	68.0
Asian	871	2.1	5.4	6.1	86.5	875	1.9	4.5	36.3	57.3
Native American	158	2.5	3.8	7.0	86.7	161	2.5	3.7	26.7	67.1
Other/Multiple	180	1.7	6.1	6.1	86.1	181	2.2	3.3	27.6	66.9
Gender										
Male	2297	1.3	3.1	4.5	91.0	2314	1.2	3.4	32.5	62.8
Female	2292	1.0	2.4	4.2	92.4	2301	1.4	2.9	35.1	60.7
Grade level										
Middle school	1544	1.4	3.8	4.6	90.3	1561	1.9	3.7	30.3	64.2
High school	2997	1.0	2.3	4.2	92.56	3005	1.0	2.7	35.8	60.5
Public assistance										
Yes	490	3.7	6.9	10.0	79.4	491	2.0	5.3	37.3	55.4
No	3534	0.6	1.5	3.4	94.5	3548	1.0	2.5	33.6	62.9
Free lunch										
Yes	1149	2.0	4.5	7.1	86.3	1155	1.4	4.7	36.7	57.2
No	2208	0.6	1.0	2.4	96.1	2216	0.5	1.85	32.76	64.89

Note. The number of adolescents in each demographic category varies slightly for each food security outcome because of missing responses.

^aAssessed by the question, “How often during the last 12 months have you been hungry because your family couldn’t afford more food?”

^bAssessed by the question, “Which of the following best describes the food eaten in your household in the last 12 months?”

TABLE 2—Adjusted Standardized Means of Perceived Benefits and Barriers to Healthy Eating and Food Availability Scales, by Food Security Category: Project EAT, Minneapolis–St. Paul, MN, 1998–1999

	Hunger Frequency ^a				P, for Trend	Home Food Adequacy ^b				P ^c
	Almost Every Month, Mean (95% CI)	Some Months, Mean (95% CI)	One or Two Months, Mean (95% CI)	Zero Months, Mean (95% CI)		Often Inadequate, Mean (95% CI)	Sometimes Inadequate, Mean (95% CI)	Adequate but not Always the Kinds of Food Wanted, Mean (95% CI)	Adequate and the Kinds of Foods we Want, Mean (95% CI)	
	Perceived barrier									
Convenience	0.51 (0.23, 0.79)	0.37 (0.19, 0.55)	0.07 (-0.07, 0.20)	-0.02 (-0.05, 0.01)	<.001	0.24 (-0.03, 0.51)	0.38 (0.21, 0.54)	0.15 (0.10, 0.20)	-0.11 (-0.14, -0.07)	<.001
Food preference	0.45 (0.17, 0.73)	0.05 (-0.12, 0.23)	0.01 (-0.13, 0.15)	-0.02 (-0.05, 0.02)	.008	0.14 (-0.13, 0.41)	0.09 (-0.08, 0.26)	0.11 (0.06, 0.16)	-0.08 (-0.12, -0.05)	<.001
Perceived benefits of healthy eating	0.00 (-0.27, 0.28)	0.00 (-0.18, 0.18)	-0.05 (-0.19, 0.09)	0.01 (-0.03, 0.04)	.745	-0.09 (-0.35, 0.18)	-0.07 (-0.24, 0.10)	-0.02 (-0.07, 0.03)	0.02 (-0.02, 0.06)	.380
Healthy food available in home	-0.79 (-1.06, -0.53)	-0.57 (-0.74, -0.40)	-0.45 (-0.58, -0.32)	0.06 (0.03, 0.09)	<.001	-0.39 (-0.64, -0.14)	-0.73 (-0.89, -0.57)	-0.21 (-0.26, -0.17)	0.18 (0.14, 0.21)	<.001
Unhealthy food available in home	-0.38 (-0.65, -0.10)	-0.26 (-0.43, -0.08)	-0.22 (-0.36, -0.09)	0.03 (0.00, 0.05)	<.001	-0.27 (-0.53, -0.01)	-0.32 (-0.48, -0.16)	-0.11 (-0.16, -0.06)	0.09 (0.05, 0.12)	<.001

Note. EAT = Eating Among Teens; CI = confidence interval. Scales have been standardized so that for whole sample, mean = 0 and SD = 1. All estimates were adjusted for ethnicity, grade level (middle school vs high school), and gender.

^aAssessed by the question, “How often during the last 12 months have you been hungry because your family couldn’t afford more food?”

^bAssessed by the question, “Which of the following best describes the food eaten in your household in the last 12 months?”

^cType 3 sum of squares.

measures. Fully food-secure youths ate family meals and breakfast more often than did the other groups. Though none of the overall P values for fast food were significant, youths who reported a home food inadequacy of

“often” ate an average of approximately 2.15 (95% CI=1.74, 2.56) fast-food meals per week compared with 1.73 fast food meals eaten by youths who reported no hunger in the past year (Table 3). Youths who reported

hunger frequency during some months (2.03 [95% CI=1.75, 2.31]) ate slightly more fast-food meals than did those who were hungry every month (1.70 meals) or zero months (1.72 meals).

TABLE 3—Associations of Food Security and Eating: Project EAT, Minneapolis–St. Paul, MN, 1998–1999

	Hunger Frequency ^a				P, for Trend	Home Food Adequacy ^b				P ^c
	Almost Every Month, Mean (95% CI)	Some Months, Mean (95% CI)	One or Two Months, Mean (95% CI)	Zero Months, Mean (95% CI)		Often Inadequate, Mean (95% CI)	Sometimes Inadequate, Mean (95% CI)	Adequate but not Always the Kinds of Food Wanted, Mean (95% CI)	Adequate and the Kinds of Foods we Want, Mean (95% CI)	
	Fast Food	1.70 (1.27, 2.14)	2.03 (1.75, 2.31)	1.84 (1.62, 2.07)		1.72 (1.67, 1.77)	.088	2.15 (1.74, 2.56)	1.74 (1.48, 2.01)	
Family Meals	2.85 (2.13, 3.58)	3.37 (2.90, 3.84)	3.31 (2.94, 3.68)	4.19 (4.11, 4.28)	<.001	3.29 (2.60, 3.98)	2.76 (2.32, 3.19)	3.54 (3.40, 3.67)	4.53 (4.43, 4.62)	<.001
Breakfast	3.32 (2.60, 4.03)	3.35 (2.85, 3.81)	3.54 (3.18, 3.90)	3.91 (3.83, 3.99)	.001	3.39 (2.72, 4.06)	3.44 (3.02, 3.87)	3.64 (3.51, 3.77)	4.03 (3.93, 4.12)	<.001

Note. EAT = Eating Among Teens; CI = confidence interval. Means are the average number of events per week (either eating fast food or eating family meals) for each level of food security. All estimates are adjusted for ethnicity, grade level (middle school vs high school), and gender.

^aAssessed by the question, “How often during the last 12 months have you been hungry because your family couldn’t afford more food?”

^bAssessed by the question, “Which of the following best describes the food eaten in your household in the last 12 months?”

^cType 3 sum of squares.

TABLE 4—Unadjusted Percentage of Youths Meeting Healthy People 2010 Targets for Nutrient and Food Intake, by Food Security Status: Project EAT, Minneapolis–St. Paul, MN, 1998–1999

	Hunger Frequency ^a					P, for Trend	Home Food Adequacy ^b				P ^c
	Healthy People 2010 Target, %	Almost Every Month, %	Some Months, %	One or Two Months, %	Zero Months, %		Often Inadequate, %	Sometimes Inadequate, %	Adequate but not Always the Kinds of Food Wanted, %	Adequate and the Kinds of Foods we Want, %	
BMI ≥ 95th percentile	5	17.4	24.3	16.5	14.2	.010	20.4	14.3	14.9	14.4	.670
Fat intake											
≤ 30% of calories from fat	75	39.5	43.0	42.9	53.1	<.001	43.8	46.0	50.5	53.7	.064
≤ 10% of calories from saturated fat	75	44.2	41.0	38.0	43.9	.331	45.8	38.7	41.5	44.9	.134
Calcium intake ≥ 1300 mg		37.2	29.0	31.5	36.5	.146	25.0	28.2	32.1	38.9	<.001
Fruit, vegetable, and grain intake											
≥ 2 servings fruit	75	51.2	41.2	39.8	46.1	.400	40.4	44.5	39.8	49.4	<.001
≥ 3 servings vegetables	...	27.3	21.2	15.3	14.2	.003	20.4	16.1	12.0	15.8	.008
≥ 3 servings vegetables ^d	50	25.0	14.4	12.5	9.4	<.001	18.4	12.7	7.9	10.6	.006
≥ 6 servings of grain ^e		11.1	5.7	3.8	4.6	.153	4.0	4.8	3.7	5.1	.236
Sodium intake ≤ 2400 mg		48.8	62.0	57.1	57.0	.974	56.3	60.5	62.2	54.0	<.001

Note. EAT = Eating Among Teens; BMI = body mass index.

^aAssessed by the question, “How often during the last 12 months have you been hungry because your family couldn’t afford more food?”

^bAssessed by the question, “Which of the following best describes the food eaten in your household in the last 12 months?”

^cWith 3 degrees of freedom.

^dOf which at least 1 is a deep yellow or green vegetable.

^eOf which 3 are whole grain.

Food-insecure adolescents were less likely to meet the Healthy People 2010 goal for percentage of calories from fat (Table 4). For the hunger frequency outcome item, food-insecure youths were less likely to meet the goal of less than 30% of calories from fat. Despite this, they appeared to be more likely to meet goals related to vegetable intake than were their food-secure peers, but percentages were well below the Healthy People 2010 targets for all groups. Additionally, youths who reported no hunger in the past year were least likely to have a BMI greater than or equal to the 95th percentile. For the home food adequacy outcome, food-insecure youths were less likely to meet the calcium goal, fruit goal, and possibly the goal of less than 30% of calories from fat. There were significant differences between groups for home food adequacy for the sodium intake goal. Youths reporting that they have enough food in their house but not always the kinds they want were most likely to meet the sodium intake goal. Youths who reported “often inadequate” food in their homes were most likely to meet vegetable goals.

DISCUSSION

We found that food-insecure youths had several known eating-related risk factors for overweight. Food-insecure youths consumed a greater percentage of calories from fat and ate fewer family meals and breakfasts. Our evidence suggested that these youths may also eat more fast-food meals. They also had less food available in the home (both healthy and unhealthy foods) and perceived greater barriers to eating healthfully than did their food-secure counterparts. However, encouragingly, they did not perceive fewer benefits from eating healthfully and appeared to eat significantly more vegetables than did their food-secure peers. The group with the largest percentage of youths with a BMI greater than the 95th percentile was the group reporting a hunger frequency of “some months but not every month.” Previous research has shown that adolescents from low-income households and those who are racial/ethnic minorities are at greater risk for overweight,^{6–8} and the impact of food insecurity on eating behavior

may be 1 mechanism behind this observed association.

Although no food security groups came close to the Healthy People 2010 target of 50% of adolescents eating 3 servings of vegetables with at least 1 serving being a deep-yellow or green vegetable, it is interesting that youths who reported that they were hungry nearly every month or often had inadequate food available in the home were more likely to achieve this goal than were the food-secure youths. This may be because of cultural factors or because these youths had access to more vegetables through assistance programs such as free or reduced-price school breakfast and lunch, food shelves, or meals served at shelters. Future research should explore this dietary strength.

As might be expected, youths reporting food insecurity also reported less home availability of healthy food, as reported previously in an analysis examining correlates of fruit and vegetable intake among Project EAT participants.⁴⁵ But food-insecure youths did not seem to have a greater absolute amount of unhealthy food in their homes. However, the proportion of

healthy to unhealthy food in food-insecure households appears to be less favorable, and this may influence adolescents' eating choices.

Adolescents who reported that they "often" did not have enough to eat or that they experienced hunger "some months" also reported eating more fast food than did those who were food secure. The overall *P* value across the food security categories, however, was not significant. In line with the idea that food-insecure families may choose more energy-dense foods,^{23–25} it follows that fast food may be eaten more often by food-insecure adolescents than by youths who come from food-secure families. Past research has shown that frequent consumption of fast food is associated with reduced availability of healthy food in the home,^{46,47} which could further impede healthy eating. Youths who stated that their families could not afford food "almost every month" reported similar fast food use as those who said they had not been hungry. It is possible that households where money for buying food is most severely and consistently limited might not be able to afford fast food, whereas households where the situation is less dire may be more able to rely on the strategy of choosing this energy-dense type of food. Interestingly, it was also this "some months but not every month" group that had the greater percentage of youths who were at or above the 95th BMI percentile.

Previous research has shown that youths from households with a higher socioeconomic status tend to eat family meals more frequently.²⁷ Our finding that food-insecure youths were less likely to eat family meals is consistent with this previous finding. Food-insecure households may eat fewer family meals because of limited or irregular food availability (for those experiencing more severe food security), as reported previously by Matheson et al.,²⁰ which may be less conducive to instilling a regular family meal routine. Additionally, food-insecure households may be generally more stressed and may have family members working hours that interfere with family mealtime. Eating family meals has been shown to correlate with eating healthy foods (fruits, vegetables, grains, and calcium-rich foods) during adolescence,²⁷ and these associations appear to carry forward into adulthood.²⁹ Interventions to remove barriers to family meals for food-insecure households should be explored.

Our study had several limitations. First, the survey did not include the full US Department of Agriculture Household Food Security Scale¹ and instead had just 2 items related to food security. However, an advantage of Project EAT is that the survey is completed by adolescents and not heads of households. Project EAT questions may target the adolescent's food security level better than questions asked of household adults, because food security issues may affect various members in a household to differing extents.¹ Additionally, because this study was cross-sectional, we were not able to test whether food security status temporally led to the various behaviors and perceptions or whether all of these issues shared a common cause. Finally, our sample size was somewhat limited by the low number of youths reporting that they had been hungry almost every month and the number reporting that they often do not have enough to eat.

The high prevalence of food insecurity in the United States demands interventions at both individual and structural levels. Our Project EAT estimate of 8.4% of adolescents experiencing hunger because their family could not afford food at least once in the past year is only slightly lower than the 2006 Current Population Survey estimate of 10.9% of households experiencing food insecurity at some point during the year. The United States is one of the wealthiest countries in the world as measured by both Gross Domestic Product (GDP) and GDP per capita.⁴⁸ We should not have any young persons reporting hunger because of inadequate resources for purchasing food. It is notable that whereas food-insecure youths saw greater barriers to healthy eating as far as both convenience and food preferences, they were similar to their food-secure peers as far as acknowledging the benefits of eating healthfully. Rather than educating food-insecure youths as to why they should eat healthfully, effort should be made to eliminate barriers to healthy eating. ■

About the Authors

At the time this research was completed, Rachel Widome was with the Healthy Youth Development–Prevention Research Center, Department of Pediatrics, Medical School, University of Minnesota, Minneapolis. Dianne Neumark-Sztainer, Peter J. Hannan and Mary Story are with the Division of Epidemiology and Community Health, University of Minnesota, Minneapolis. Jess Haines is with the Department of Ambulatory Care and Prevention, Harvard Medical School/Harvard Pilgrim Health Care, Boston, MA.

Requests for reprints should be sent to Rachel Widome, PhD, MHS, Center for Chronic Disease Outcomes Research (CCDOR), Minneapolis VA Medical Center, One Veterans Drive (152/2E), Minneapolis, MN 55417 (e-mail: widome@umn.edu).

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Contributors

R. Widome originated the research questions and took primary responsibility for writing and analysis. D. Neumark-Sztainer is the principal investigator of Project EAT and contributed to data interpretation and writing. M. Story and J. Haines provided expertise in adolescent nutrition and food security issues and contributed to writing the article. P. J. Hannan contributed to the data analyses.

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Human Participant Protection

Approval was obtained from the University of Minnesota institutional review board for Project EAT before the research began.

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