

**Nutrition Assistance Program Report Series**  
**The Office of Research and Analysis**

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*Characteristics and Dietary Patterns  
of Healthy and Less-Healthy Eaters in the  
Low-Income Population*

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## *Characteristics and Dietary Patterns of Healthy and Less-Healthy Eaters in the Low-Income Population*

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## EXECUTIVE SUMMARY

This report presents two types of information about healthy eaters and less-healthy eaters in the low-income population: (1) descriptive information about the sociodemographic and dietary characteristics of individuals in each group and (2) a description of distinct dietary patterns followed by individuals in each group, as identified through a cluster analysis of their dietary intake. We defined low-income individuals as those from households with income below 200 percent of the federal poverty level. We defined healthy eaters and less-healthy eaters based on scores on the Healthy Eating Index (HEI)-2005. Individuals with HEI-2005 scores of 70 (the 90th percentile in the general population) or greater were defined as healthy eaters and individuals with scores below 49 (the population median) were defined as less-healthy eaters.

Separate analyses were conducted for healthy eaters and less-healthy eaters in two age groups: adult (age 19 and above) and children (age 2-18). In addition, the descriptive analysis of sociodemographic and dietary characteristics includes separate tabulations for the low-income population overall and for subgroups of Special Nutrition Assistance Program (SNAP) participants and two groups of nonparticipants—individuals that were income-eligible for SNAP but were not participating (income-eligible nonparticipants), and other low-income nonparticipants.<sup>1</sup>

The first line of analysis addresses the following two research questions:

- Within the SNAP and low-income populations, what household and personal characteristics are associated with high diet quality, as reflected in a high overall score on the HEI-2005?
- Are there specific dietary characteristics that are associated with high diet quality?

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<sup>1</sup> Sample sizes of the SNAP participant and nonparticipant subgroups were too small to support separate cluster analysis. However, secondary analysis of the cluster analysis results does examine how SNAP participants and nonparticipants are represented in the dietary patterns identified for each of the major analysis groups (adult healthy eaters, adult less-healthy eaters, child healthy eaters, and child less-healthy eaters).

The second line of analysis addresses the following three research questions:

- What are the predominant dietary patterns of low-income healthy eaters (children and adults), and how do they compare to the dietary patterns of less-healthy eaters?
- How do dietary intakes and overall diet quality differ across healthy and less-healthy dietary patterns?
- How do sociodemographic characteristics (including SNAP participation, WIC participation, and food security status) of low-income individuals differ across the different healthy and less-healthy dietary patterns?

This summary presents key findings from the two lines of analysis and discusses potential implications for nutrition education for low-income populations. In addition to SNAP, the low-income populations examined in this report may receive nutrition education through WIC (pregnant women and mothers/caregivers of infants and children ages 0 to 5), or through the school-based nutrition programs.

#### A. Sociodemographic Characteristics of Healthy and Less-Healthy Eaters

Table 1 summarizes the key differences observed in the sociodemographic characteristics of adult healthy and less-healthy eaters in the low-income population. Among adults, healthy eaters were more likely than less-healthy eaters to be female, older than 60, foreign-born, not working, living in a one-person household, and to have high blood pressure, have high cholesterol, and have diabetes. Adult less-healthy eaters, on the other hand, were more likely to be male, ages 19 to 40, black, working at least 20 hours per week, and to have very low household food security, and have more than 2 hours of screen time per day. We did not find a difference between adult healthy eaters and less-healthy eaters in the proportion who were obese. Most of the differences observed in the sociodemographic characteristics of adult healthy eaters and less-healthy eaters overall were also observed in subgroups of SNAP participants, income-eligible nonparticipants, and other low-income nonparticipants.

Table 1. Summary of Key Differences in Sociodemographic Characteristics of Adult Healthy and Less-Healthy Eaters.

Healthy eaters (HEI $\geq$ 70) were more likely to:	Less-healthy eaters (HEI<49) were more likely to:
<ul style="list-style-type: none"> <li>• Be female</li> <li>• Be older than 60</li> <li>• Be foreign-born</li> <li>• Not be working</li> <li>• Live in a one-person household</li> <li>• Have high blood pressure</li> <li>• Have High cholesterol</li> <li>• Have diabetes</li> </ul>	<ul style="list-style-type: none"> <li>• Be male</li> <li>• Be age 19 to 40</li> <li>• Be black</li> <li>• Work at least 20 hours per week</li> <li>• Have very low household food security</li> <li>• Smoke</li> <li>• Have more than 2 hrs of screen time a day</li> </ul>

HEI = Score on Healthy Eating Index-2005

Table 2 summarizes key differences in the sociodemographic characteristics of child healthy and less-healthy eaters in the low-income population. Among children, healthy eaters were more likely than less-healthy eaters to be ages 2 to 5, have a foreign-born household reference person, and have a married household reference person; less-healthy eaters were more likely to be ages 12 to 18, be black, and to have very low child food security. As with adults, we did not find an overall difference between child healthy and less-healthy eaters in the proportion who were obese; in fact, among income-eligible nonparticipants, healthy eaters were more likely than less-healthy eaters to be obese. Few additional differences between child healthy eaters and child less-healthy eaters were found across SNAP participants, income-eligible nonparticipants, and other low-income nonparticipants.

Table 2. Summary of Key Differences in Sociodemographic Characteristics of Child Healthy and Less-Healthy Eaters.

Healthy eaters (HEI $\geq$ 70) were more likely to:	Less-healthy eaters (HEI<49) were more likely to:
<ul style="list-style-type: none"> <li>• Be age 2 to 5</li> <li>• Have a foreign-born HH reference person<sup>a</sup></li> <li>• Have a married HH reference person<sup>a</sup></li> </ul>	<ul style="list-style-type: none"> <li>• Be age 12 to 18</li> <li>• Be black</li> <li>• Have very low child food security</li> </ul>

<sup>a</sup> The household (HH) reference person is defined as the first household member 18 years of age or older listed on the NHANES screener household member roster who owns or rents the residence where members of the household reside.

HEI = Score on Healthy Eating Index-2005

There were some notable similarities in findings from the separate analyses completed for adults and children. For example:

- Being foreign-born was associated with being a healthy eater among adults, while having a foreign-born household reference person was associated with being a healthy eater among children. This is consistent with research that shows that individuals in immigrant households who consume culturally traditional diets rather than Westernized diets tend to have healthier diets overall (Ayala et al. 2008; Montez and Eschbach 2008).
- Being black was associated with being a less-healthy eater among both adults and children. This could reflect differences in food preferences, nutrition knowledge, and access to healthful foods among blacks, relative to other racial/ethnic groups.
- Having very low household food security was associated with being a less-healthy eater among adults, while having very low child food security was associated with being a less-healthy eater among children. The fact that very low household food security was not associated with being a less-healthy eater among children suggests that adults in households with very low food security may give priority to their children's diets.

We used multivariate analysis to further explore several findings from the descriptive analysis that were counterintuitive. This included, for both adults and children (overall), the lack of an association between being a healthy eater and the likelihood of being obese and, for adults, the positive association between being a healthy eater and having a chronic health condition. After accounting for possible confounders such as age, sex and race/ethnicity, we found that, among adults, having diabetes was still positively associated with being a healthy eater, while having high blood pressure or cholesterol were not. The multivariate analyses did not detect any association between being a healthy eater and the likelihood of being obese, either for adults or for children.

### **Key Implications for Nutrition Education**

- Based on findings from this analysis, nutrition education efforts focusing on low-income populations should target individuals with one or more of the following characteristics: male, US-born adult, teenager or young adult, black, and very low household or individual food security.
- Adults with known health conditions, particularly diabetes, may be more likely than other adults to improve their eating habits as a way of managing their disease. Thus, individuals who have a disease diagnosis comprise another meaningful subgroup for nutrition education—they may be particularly motivated to change dietary behaviors.
- Our results regarding healthy eating and obesity should not be over-interpreted, given the descriptive nature of our study and several data limitations. Reviews by Newby and Tucker (2004) and Togo et al. (2001) have also shown inconsistent findings between

dietary patterns and weight status. However, a number of more recent reports have found such association in both adults (e.g., Newby et al. 2003; Schulze et al. 2006) and children (e.g., Larowe et al. 2007; Ritchie et al. 2007).

## B. Dietary Characteristics of Healthy Eaters and Less-Healthy Eaters

Key dietary characteristics that distinguish adult healthy and less-healthy eaters in the low-income population are presented in Table 3. Among adults, healthy eaters were more likely than less-healthy eaters to eat breakfast; eat three meals daily; use dietary supplements; consume milk of any type; consume fruit, fresh fruit, and fruit juice; consume vegetables and whole grains; consume nuts and seeds; have higher mean scores on all HEI-2005 components; obtain smaller shares of their total daily calories from foods suggested for occasional consumption; and consume diets with high levels of nutrient density. Adult less-healthy eaters were more likely to eat in restaurants three or more times per week; consume alcoholic beverages three or more times per week; consume sugar-sweetened beverages; obtain larger shares of calories from snacks, mixed dishes, added sugars, and discretionary solid fats; and consume diets that had high levels of energy density. Most of these differences were consistent for SNAP participants and the two groups of nonparticipants included in the analysis.

Table 3. Summary of Key Differences in Dietary Characteristics of Adult Healthy and Less-Healthy Eaters.

Healthy eaters (HEI $\geq$ 70) were more likely to:	Less-healthy eaters (HEI<49) were more likely to:
<ul style="list-style-type: none"> <li>• Eat breakfast</li> <li>• Eat three meals daily</li> <li>• Use dietary supplements</li> <li>• Consume milk of any type</li> <li>• Consume fruit, fresh fruit, and fruit juice</li> <li>• Consume vegetables and whole grains</li> <li>• Consume nuts and seeds</li> <li>• Have higher mean scores on all HEI -2005 components</li> <li>• Obtain smaller shares of their total daily calories from foods suggested for occasional consumption</li> <li>• Consume diets high in nutrient density</li> </ul>	<ul style="list-style-type: none"> <li>• Eat in a restaurant 3+ times per week</li> <li>• Consume alcoholic beverages 3+ times per week</li> <li>• Consume sweetened beverages of any type</li> <li>• Obtain larger shares of calories from: snacks, mixed dishes, added sugars, and discretionary solid fats</li> <li>• Consume diets high in energy density</li> </ul>

HEI = Score on Healthy Eating Index-2005

Key differences in the dietary characteristics of child healthy and less-healthy eaters in the low-income population are presented in Table 4. Findings for children were, for the most part, consistent with those reported for adults. More often than in adults, however, no statistically significant differences were found between healthy eaters and less-healthy eaters among SNAP participants, even though differences between healthy eaters and less-healthy eaters were noted for one or both groups of SNAP nonparticipants.

Table 4. Summary of Key Differences in Dietary Characteristics of Child Healthy and Less-Healthy Eaters.

Healthy eaters (HEI $\geq$ 70) were more likely to:	Less-healthy eaters (HEI<49) were more likely to:
<ul style="list-style-type: none"> <li>• Eat breakfast</li> <li>• Eat three meals daily</li> <li>• Consume milk of any type</li> <li>• Consume fruit, fresh fruit, and fruit juice</li> <li>• Consume vegetables and whole grains</li> <li>• Have higher mean scores on all HEI-2005 components except total grains</li> <li>• Obtain smaller shares of their total daily calories from foods suggested for occasional consumption</li> <li>• Consume high nutrient density diets</li> </ul>	<ul style="list-style-type: none"> <li>• Eat in a restaurant 1+ times per week</li> <li>• Consume sweetened beverages of any type</li> <li>• Obtain larger shares of calories from: snacks, mixed dishes, added sugars, and discretionary solid fats</li> <li>• Consume high energy density diets</li> </ul>

HEI = Score on Healthy Eating Index-2005

### Key Implications for Nutrition Education

Not surprisingly, given that healthy eaters were defined based on HEI-2005 scores, the analysis found that increased consumption of foods encouraged in the 2005 *Dietary Guidelines* (fruits, vegetables, and whole grains, for example) and decreased consumption of foods that contribute to calories from solid fat, alcoholic beverages, and added sugar (sugar-sweetened beverages, for example) were associated with being a healthy eater. Thus, encouraging consumption of recommended foods and avoidance or moderation of foods that contribute substantial amounts of calories from discretionary solid fat, alcohol, or added sugars is a solid foundation for nutrition education efforts. In addition, results of our analysis suggest that nutrition educators working with

low-income populations may wish to promote specific dietary behaviors, in addition to encouraging food choices that are consistent with the *Dietary Guidelines*. For example, we found that eating breakfast, eating three meals daily, and limiting the number of meals eaten at restaurants were all significantly associated with being a healthy eater.

### C. Dietary Patterns of Healthy and Less-Healthy Eaters

We used cluster analysis to examine empirically whether meaningful dietary patterns could be identified for healthy and less-healthy eaters in the low-income population. As in the descriptive analyses of sociodemographic and dietary characteristics, healthy and less-healthy eaters were defined based on HEI-2005 scores (same definition used in the previous analysis) and separate analyses were conducted for adults and children.

The cluster analysis revealed eight dietary patterns for adults (four for healthy eaters and four for less-healthy eaters) and eleven dietary patterns for children (six for healthy eaters and five for less-healthy eaters). The dietary patterns identified for each group are listed below:

- **Adult healthy eaters:** Beverages, Plant-Based, Breakfast and Sweets, and Low-Fat Milk.
- **Adult less-healthy eaters:** Soda and Pizza, Alcohol, Non-Carbonated Sugar-Sweetened Drinks, and Coffee.
- **Child healthy eaters:** Sweet Milk, Dairy Desserts, Soda, High-Fat Milk, 100% Fruit Juice, and Low-Fat Milk.<sup>2</sup>
- **Child less-healthy eaters:** Soda and Pizza, Sweets, High-Fat Dairy, Non-Carbonated Sugar-Sweetened Drinks, and Alcohol and Burgers.<sup>3</sup>

The name chosen for each dietary pattern reflects the food groups that differentiated the patterns within a given analysis group. Clearly, adult and child healthy eaters did not consume *perfect*

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<sup>2</sup> Because of very small sample sizes, the Soda (n=17) and Low-Fat Milk (n=15) patterns were not included in subsequent analyses that examined differences across clusters in nutrient intake, MyPyramid food groups and subgroups, HEI-2005 scores, and sociodemographic characteristics.

<sup>3</sup> Because of a very small sample size, the Alcohol and Burgers (n=12) pattern was not included in subsequent analyses that examined differences across clusters in nutrient intake, MyPyramid food groups and subgroups, HEI-2005 scores, and sociodemographic characteristics. All 12 individuals included in the Alcohol and Burgers pattern were ages 16 to 18.



diets, as some of the dietary patterns identified for healthy eaters are defined by one or more foods that many would consider “unhealthy” (for example, sugar-sweetened drinks or salty snacks). The presence of these foods in the dietary patterns of healthy eaters illustrates the fact that diet quality, as measured by the HEI-2005, is determined by the overall balance of healthy and less-healthy foods and the associated effects on intakes of saturated fat, sodium, discretionary calories from fats and sugars, and MyPyramid food groups, rather than by intakes of specific foods or food groups.

Table 5 provides a summary of the patterns, including the food group intakes that distinguished the patterns, the overall prevalence of the pattern within the analysis group (for example, adult less-healthy eaters), and the percentage of SNAP participants in the pattern.

### **Key Findings for Adults**

Within each of our key analysis groups (adult healthy eaters, adults less-healthy eaters, child healthy eaters, and child less-healthy eaters), we compared dietary and sociodemographic characteristics of individuals in each dietary pattern. Key findings for adults include the following:

- Adult healthy eaters consumed fewer calories, on average, than adult less-healthy eaters.
- Although dietary patterns for adult healthy eaters were characterized by some “unhealthy” foods, such foods were more frequent differentiators in the dietary patterns of less-healthy eaters.
- Patterns high in sugar-sweetened beverages were observed for both healthy eaters and less-healthy eaters.
- Variation in the prevalence of obesity across dietary patterns was observed for both adult healthy eaters (where prevalence ranged from 22 percent to 41 percent) and adult less-healthy eaters (19 percent to 36 percent). However, few of the differences were statistically significant. Among less-healthy eaters, the prevalence of obesity was significantly higher among adults in the Soda and Pizza and Non-carbonated Sugar-Sweetened Drinks patterns (34 and 36 percent, respectively), compared to adults in the Alcohol pattern (19 percent).
- Among adult healthy eaters, the Beverages pattern had the highest percentage of SNAP participants, while the Breakfast and Sweets pattern had the lowest percentage. The Beverages pattern also had the highest percentages of non-Hispanic blacks and Hispanics, the lowest percentage of US-born individuals, and the highest percentage of WIC participants.

Table 5. Summary of Dietary Patterns Identified for Healthy and Less-Healthy Eaters

Analysis Group/Dietary Pattern	Percent of Analysis Group	Percent of SNAP Participants	Defining Food Groups
<b>Adult Healthy Eaters (HEI <math>\geq</math> 70)</b>			
Beverages	38	25	Unsweetened high-fat milk, 100% fruit juice, non-carbonated sugar-sweetened drinks, non-diet sodas
Plant-Based	34	15	Soy milk and soy products, fresh melons and berries, salads and other raw vegetables, cooked non-starchy vegetables with added fat
Breakfast and Sweets	18	7	Coffee and tea, whole grain cereal, sweet breakfast foods, miscellaneous sugary foods
Low-Fat Milk	11	11	Unsweetened low-fat, reduced fat, and nonfat milk; diet drinks, eggs and eggs dishes
<b>Adult Less-Healthy Eaters (HEI &lt; 49)</b>			
Soda and Pizza	23	24	Non-diet sodas, pizza, hamburgers and cheeseburgers, fried potatoes
Alcohol	8	24	Alcoholic drinks; fried meat, poultry, and fish; Mexican dishes
Non-Carbonated Sugar-Sweetened Drinks	58	27	Non-carbonated sugar-sweetened drinks, diet drinks, fresh fruit other than citrus, canned fruit, non-dairy desserts
Coffee	12	18	Coffee or tea, unsweetened high-fat milk, other high-fat dairy products, white bread
<b>Child Healthy Eaters (HEI <math>\geq</math> 70)</b>			
Sweet Milk	24	21	Sweetened high-fat milk, sugar-sweetened drinks, diet soda, beans, nuts, and seeds
Dairy Desserts	24	40	High-fat dairy desserts and beverages; fresh fruit other than citrus, melons, and berries; fried potatoes
Soda <sup>a</sup>	4	—	Non-diet sodas, mixed dishes with meat, mexican dishes, salty Snacks
High-Fat Milk	16	62	Unsweetened high-fat milk, refined grains (white bread and non-whole grain rice and pasta), canned or frozen fruit, coffee or tea
100% Fruit Juice	22	52	100% fruit juice, soy milk and soy products
Low-Fat Milk <sup>a</sup>	7	—	Unsweetened low-fat, reduced fat, and nonfat milk; sweet breakfast foods, poultry (not fried), soups
<b>Child Less-Healthy Eaters (HEI &lt; 49)</b>			
Soda and Pizza	23	25	Non-diet soda, pizza, salty snacks
Sweets	46	36	Sweetened milks, sweet breakfast foods, 100% fruit juice
High-Fat Dairy	17	41	High-fat unsweetened milk, high-fat dairy desserts and beverages, cereals, vegetables other than fried potatoes
Non-Carb. Sugar-Sweetened Drinks	14	30	Non-carbonated sugar-sweetened drinks, miscellaneous sugary foods, soups
Alcohol and Burgers <sup>a</sup>	0.4	—	Alcoholic drinks, poultry, hamburgers and cheeseburgers, fried potatoes

<sup>a</sup> Because of small sample sizes, the Soda and Low-Fat Milk patterns (n=17 and 15, respectively) for child healthy eaters, and the Alcohol and Burgers pattern (n=12) for child less-healthy eaters were not included in analyses that examined differences across dietary patterns in nutrient intake, MyPyramid food groups and subgroups, HEI-2005 scores, and sociodemographic characteristics. All 12 individuals included in the Alcohol and Burgers pattern were ages 16 to 18.

HEI = Score on Healthy Eating Index-2005

— = Sample size too small to produce reliable estimate

- Among adult less-healthy eaters, SNAP participants accounted for roughly a quarter of the Soda and Pizza, Alcohol, and Non-Carbonated Sugar-Sweetened Drinks patterns. The Coffee pattern had the lowest proportion of SNAP participants.
- Among adult less-healthy eaters, the Soda and Pizza pattern was characterized by particularly high consumption of fast foods and includes many younger adults who work full time and are part of large households.

### **Key Findings for Children**

- As with adults, child healthy eaters consumed fewer calories, on average, than child less-healthy eaters. Calorie consumption was not adjusted for age, however.
- As with adults, although dietary patterns for child healthy eaters were differentiated by some “unhealthy” foods, such foods were generally more frequent differentiators in the dietary patterns of child less-healthy eaters.
- Both healthy and less-healthy eaters had patterns with high intakes of sugar-sweetened beverages; milk (low-fat, high-fat, and sweetened); yogurt; dairy desserts such as ice cream; 100% fruit juice; and french fries.
- Large variation in the prevalence of obesity was observed across dietary patterns for child healthy eaters (where prevalence ranged from 6 percent to 48 percent). There was less variation across dietary patterns for child less-healthy eaters (17 percent to 19 percent). None of the differences in obesity prevalence were statistically significant.
- Among child healthy eaters, the High-Fat Milk pattern had the highest percentage of SNAP participants, while the Sweet Milk pattern had the lowest percentage. The High-Fat Milk pattern also had the highest percentage of children with low or very-low food security, while the Sweet Milk pattern had the highest percentage of children with full food security.
- Among child less-healthy eaters, SNAP participants accounted for a third or more of the Sweets, High-Fat Dairy, and Non-Carbonated Sugar-Sweetened Drinks patterns. The Soda and Pizza pattern had the lowest percentage of SNAP participants
- Among child healthy eaters, the Dairy Desserts and High-Fat Milk patterns were dominated by younger children ages 2 to 5 and 6 to 11.
- Among child less-healthy eaters, adolescents ages 12 to 18 predominated in the Soda and Pizza pattern and the Non-Carbonated Sugar-Sweetened drinks pattern.

### **Key Implications for Nutrition Education**

- A healthy diet, as defined by the HEI-2005, can take different forms and shapes depending on dietary preferences, which are in turn shaped by sociodemographic factors including age, sex, and culture. Some of the healthy diet patterns were more prevalent among Hispanics, while others were more prevalent among non-Hispanic whites; some were more prevalent among women (or girls), while others were more prevalent among men (or boys). This suggests that nutrition education should be tailored to specific population subgroups whenever possible, and should take into consideration the relevant food culture. For example, while certain foods such as vegetables and whole grains

should be encouraged across the board, preferences for particular vegetables and grains are likely to be culturally defined.

- Dietary patterns identified for healthy eaters could still use improvement. Healthy eaters had scores on the HEI-2005 that, while substantially higher than most of the population, were still roughly 25 percent below the maximum possible score. In general, recommendations for improvement are the same for healthy and less-healthy eaters.
- Key targets for nutrition education efforts include high intakes of sugar-sweetened beverages, high-fat dairy, and desserts. Nutrition educators should encourage decreased intake of these foods and use of healthier alternatives, such as water, skim or low-fat milk and 100% fruit juice (in moderation) for beverages and fruits or low-fat/low-calorie options for dessert.

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## I. INTRODUCTION

As scientific evidence has accumulated about the role diet plays in the development of chronic disease, the poor quality of the diets consumed by most Americans has become an increasingly important public health concern. Escalating rates of obesity have also brought a sharper focus to this issue. Concerns about diet quality are particularly salient to the Special Nutrition Assistance Program (SNAP) and other nutrition assistance programs administered by the U.S. Department of Agriculture's (USDA's) Food and Nutrition Service (FNS). The overarching goal of these programs is to provide vulnerable citizens with access to affordable and healthful foods. FNS is committed to increasing access to nutritious foods and to promoting healthy diet and physical activity behaviors (USDA/FNS 2010). For example, FNS recently implemented changes designed to improve the nutritional quality of the food packages provided to participants in the Special Supplemental Nutrition Assistance Program for Women, Infants and Children (WIC) and also commissioned Institute of Medicine (IOM) panels to provide recommendations for improving nutrition standards and menu-planning practices used in the school meals programs and in the Child and Adult Care Food Program (CACFP) (IOM 2005, 2009, and 2010).

SNAP is designed to provide access to foods for preparation at home through normal channels of trade. It places few restrictions on the types of food participants can purchase with program benefits.<sup>4</sup> Efforts to influence participants' food choices are essentially centered in the nutrition education component of the program, known as SNAP-Ed. SNAP-ED is designed to promote healthy food choices consistent with the *Dietary Guidelines for Americans*.<sup>5</sup> Under current regulations, SNAP-Ed is optional. FNS strongly encourages states to participate in the program and most do.

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<sup>4</sup> SNAP benefits cannot be used to purchase alcoholic beverages or, with the exception of eligible feeding/meal programs, to purchase hot foods and hot food products prepared for immediate consumption.

<sup>5</sup> The *Dietary Guidelines* are issued and updated every 5 years and provide advice on choosing nutritious diets for individuals two years and older.

State agencies submit annual plans for nutrition education, which outline SNAP-Ed activities and budget for the following year. Under the Healthy, Hunger-Free Act of 2010 (Public Law 111-296), states are eligible for 100 percent federal funding of reasonable and necessary costs involved in implementing SNAP-Ed. In fiscal year (FY) 2011, \$375 million was spent on SNAP-Ed activities implemented by 52 state agencies (USDA/FNS 2011a).

Some states and advocacy groups have recommended that SNAP implement policies that would promote healthier diets by rewarding healthful choices (for example, by providing increased benefits for the purchase of fruits and vegetables), or by limiting the types of foods and beverages that can be purchased with SNAP benefits (Guthrie et al. 2007). To date, few studies have examined whether either of these strategies would improve the quality of SNAP participants' diets or stem the tide of obesity, which is due at least in part to poor food choices.<sup>6</sup> However, FNS is currently sponsoring the Healthy Incentives Pilot (HIP), a random-assignment evaluation that is assessing the effectiveness of financial incentives in promoting the purchase and consumption of fruits and vegetables among SNAP participants (USDA/FNS 2011b).

Strategies for improving the diets of SNAP participants—whether developed by policymakers, program administrators, nutrition educators, or researchers—should (1) be based on valid and reliable information about the current dietary practices of SNAP participants, and (2) focus on dietary behaviors that have been shown to influence diet quality. This report uses data from the National Health and Nutrition Examination Survey (NHANES) to compare the food consumption patterns of SNAP participants and other low-income individuals who are consuming healthy diets and less-healthy diets. In addition, the analysis compares sociodemographic characteristics of healthy

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<sup>6</sup> See U.S. Government Accountability Office (2008) for a review of research on approaches to influencing participants' food choices.

eaters and less-healthy eaters. Scores on the Healthy Eating Index-2005 (HEI-2005) (Guenther et al. 2007) are used to differentiate “healthy eaters” and “less-healthy eaters.”

The analysis is divided into two parts. The first part is a descriptive analysis that addresses the following research questions:

- Within the SNAP and low-income populations, what household and personal characteristics are associated with high diet quality, as reflected in a high overall score on the HEI-2005?
- Are there specific dietary characteristics that are associated with high diet quality?

The second part of the analysis uses cluster analysis to identify comprehensive dietary patterns or “styles of eating” that are associated with healthy and less-healthy diets. Cluster analysis is a data reduction technique that identifies separate groups of individuals (clusters) with similar dietary intakes. The cluster analysis addresses the following three research questions:

- What are the predominant dietary patterns of low-income healthy eaters (children and adults), and how do they compare to the dietary patterns of less-healthy eaters?
- How do dietary intakes and overall diet quality differ across healthy and less-healthy dietary patterns?
- How do sociodemographic characteristics (including SNAP participation status) of low-income individuals differ across different healthy and less-healthy dietary patterns?

To our knowledge, the separate analysis of two groups of adults or children, defined based on the healthfulness of their diets as measured by the HEI-2005, is unique to this study. Findings from this analysis will enhance the knowledge base by illustrating the variability that can exist among dietary patterns, even those that were similarly regarded as either “healthy” or “less healthy.” This variability emerges because people select different combinations of foods and beverages based on their individual preferences. Illustrating this variation in diets of similar “healthfulness” (or “unhealthfulness”) may be helpful to policymakers and nutrition educators in designing nutrition education and promotion efforts that target specific dietary patterns and food choices.



## A. The National Health and Nutrition Examination Survey

NHANES is conducted by the National Center for Health Statistics (NCHS) and is designed to provide national estimates of the health and nutrition status of the civilian, noninstitutionalized population in the 50 states. The survey includes interviews, physical examinations, and laboratory tests. Beginning in 1999, NHANES became a continuous annual survey with data released in public data files every two years. All the analyses in this report are based on six years of survey data from NHANES 1999-2004.<sup>7</sup> Data come from the household interview, 24-hour dietary recall, and physical examination file portions of NHANES.<sup>8</sup> The 24-hour dietary recall collects quantitative data on foods and beverages consumed during the preceding 24 hours.<sup>9</sup> In-person interviews are conducted using a computer-assisted interview system that incorporates the Automated Multiple Pass Method (AMPM) developed by USDA's Agricultural Research Service (Raper et al. 2004). The AMPM method facilitates respondent recall of all foods and beverages consumed.<sup>10</sup> The NHANES public data release includes a food-level file that contains one record for each food item reported by each respondent.<sup>11</sup>

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<sup>7</sup> NHANES 2005-2006 is not used because the specialized MyPyramid Equivalents Database needed to estimate HEI-2005 scores has not been updated to include foods reported in NHANES 2005-2006.

<sup>8</sup> The household interview data file includes demographic, socioeconomic, and health-related variables, including income and SNAP participation. Data on height and weight are included in the physical examination file. The NHANES interview and physical examination data used in this study are described in Appendix A.

<sup>9</sup> NHANES 1999-2000 and 2001-2002 include one 24-hour recall for each sample member and a second recall for a subsample of respondents. In 2003-2004, two 24-hour recalls were collected for all respondents. To maintain consistency across waves, this analysis uses only one 24-hour recall per person, including the first recall collected for respondents in NHANES 2003-2004.

<sup>10</sup> The multiple passes include: (a) quick list of foods, without interviewer interruption; (b) reporting of the time, place, and eating occasion for each food; (c) specific probes about food details; and (d) a final review of reported foods in chronological order.

<sup>11</sup> Proxy interviews are conducted for sample persons less than 6 years of age. Interviews for children ages 6 to 8 are also conducted with a proxy, but with the child present and providing assistance. Children ages 9 to 11 provide their own data but are assisted by an adult household member. A proxy is also assigned to other sample persons who cannot report for themselves.

## B. The Health Eating Index-2005

The HEI-2005 (Guenther et al. 2007) provides a composite measure of diet quality, which sums 12 separate component scores that measure consumption of food and nutrients in relation to the 2005 *Dietary Guidelines for Americans* (U.S. Department of Health and Human Services and USDA 2005) and the MyPyramid food guidance system (USDA, Center for Nutrition Policy and Promotion [CNPP] 2005). As shown in Table I.1, nine components are food-based and assess intakes of MyPyramid food groups and subgroups: total fruit; whole fruit; total vegetables; dark green vegetables, orange vegetables, and legumes; total grains; whole grains; milk; meats and beans; and oils. The remaining three components assess intakes of saturated fat, sodium, and calories from solid fat, alcoholic beverages, and added sugar (SoFAAS). Scoring criteria assign higher scores for greater consumption of food-based components and lower scores for greater consumption of sodium, saturated fat, and SoFAAS. Maximum scores for each component range from 5 to 20, with a total possible 100 points for the HEI-2005. The standards used in assigning component scores are energy-adjusted on a density basis (per 1,000 calories). This approach reflects the overarching recommendation that individuals should strive to meet food group and nutrient needs while maintaining energy balance (rather than meeting food group and nutrient recommendations simply by consuming large quantities of food).

The per-1,000 calorie reference standards used in the HEI-2005 are based on the assumptions that underlie the recommended MyPyramid eating patterns, reflecting goals for intakes over time and the recommended mix of food groups. The HEI-2005 has an advantage over simple food-level estimates because it captures the contribution that each food makes to individual components of MyPyramid. For example, a beef and bean burrito contributes simultaneously to the positive measures of total vegetables, total grains, and meats and beans, as well as to the negative measures of sodium, saturated fat, and calories from SoFAAS. Much of the data needed to estimate HEI-2005

Table I.1. Healthy Eating Index-2005

Component	Healthy Eating Index-2005		
	Maximum Score	Standard for Maximum Score	Standard for Minimum Score of Zero
Total fruit	5	$\geq 0.8$ cup per 1,000 kcal	No fruit
Whole fruit (not juice)	5	$\geq 0.4$ cup per 1,000 kcal	No whole fruit
Total vegetables	5	$\geq 1.1$ cup per 1,000 kcal	No vegetables
Dark green and orange vegetables and legumes <sup>a</sup>	5	$\geq 0.4$ cup per 1,000 kcal	No dark green or deep orange vegetables or legumes
Total grains	5	$\geq 3.0$ oz per 1,000 kcal	No grains
Whole grains	5	$\geq 1.5$ oz per 1,000 kcal	No whole grains
Milk <sup>b</sup>	10	$\geq 1.3$ cup per 1,000 kcal	No milk/dairy
Meat and beans	10	$\geq 2.5$ oz per 1,000 kcal	No meat or beans
Oils <sup>c</sup>	10	$\geq 12$ gm per 1,000 kcal	No oil
Saturated fat	10 <sup>d</sup>	$\leq 7\%$ of total energy	$\geq 15\%$ of total energy
Sodium	10 <sup>d</sup>	$\leq 0.7$ gm per 1,000 kcal	$\geq 2.0$ gm per 1,000 kcal
Calories from solid fat, alcohol, and added sugar (SoFAAS)	20	$\leq 20\%$ of total energy <sup>e</sup>	$\geq 50\%$ of total energy
Maximum Score	100		

Source: *Healthy Eating Index-2005*, U.S. Department of Agriculture, Center for Nutrition Policy and Promotion, CNPP Fact Sheet No. 1, December 2006.

Note: With the exception of saturated fat and sodium, amounts between the minimum and maximum are scored proportionately.

<sup>a</sup>Legumes are counted as vegetables only after the standard for meat and beans is met.

<sup>b</sup>Includes all milk products, including fluid milks, yogurt, and cheese.

<sup>c</sup>Includes nonhydrogenated vegetable oils and oils in fish, nuts, and seeds.

<sup>d</sup>Saturated fat and sodium get a score of 8 for levels that reflect 2005 *Dietary Guidelines* recommendations: <10% of energy from saturated fat and 1.1 gm sodium per 1,000 kcal, respectively.

<sup>e</sup>The most generous allowance for discretionary calories in the MyPyramid food intake patterns (based on age, sex, and level of physical activity) is 20 percent of total energy.

scores and to assess sources of MyPyramid food group intake are not available in the NHANES data sets and were obtained by linking to the MyPyramid Equivalents Database (MPED). The MPED is described in Appendix A.

### C. NHANES Samples for Tabulation

The analysis in this report is limited to low-income individuals, defined as those from households with income below 200 percent of the federal poverty level. Because children tend to score higher on the HEI-2005 than adults (Cole and Fox 2008), tabulations and cluster analyses are done for two separate age groups: adults (ages 19 and older) and children (ages 2 to 18). Only NHANES sample members with complete and reliable dietary recalls are included in the analysis. Pregnant and lactating women, infants, and children under 2 years old are excluded. The dietary reference standards that underlie the HEI-2005 are different for these groups. Tabulations presented in Chapters II and III are done separately for SNAP participants and nonparticipants. Small sample sizes precluded separate cluster analyses for SNAP participants and nonparticipants. However, tabulations that compare sociodemographic characteristics of individuals in each dietary pattern cluster include information about proportions of SNAP participants, income-eligible nonparticipants, and other low-income nonparticipants.

#### 1. Identifying Healthy and Less-Healthy Eaters

We define healthy eaters as individuals with scores of 70 or greater on the HEI-2005. This cutoff corresponds to the 90th percentile in HEI-2005 scores for the general population. Less-healthy eaters are defined as those with HEI-2005 scores below 49 (the population median). These cutoff points were chosen to ensure a sharp distinction/contrast between healthy and less-healthy eaters while maximizing cell sizes.

## 2. Identifying SNAP Participants and Nonparticipants

SNAP participants are self-identified by their response to the survey question: “In the last 12 months, were you (or any members of your household) authorized to receive Food Stamps?”<sup>12</sup> Individuals who did not report food stamp receipt in the last 12 months are considered nonparticipants.<sup>13</sup> Nonparticipants are further subdivided into those who were income-eligible for SNAP (household income  $\leq$  130 percent of the federal poverty level) and those whose income exceeded the eligibility standard (household income  $>$  130 percent of the federal poverty level and  $\leq$  200 percent). Sample sizes for the groups of SNAP participants and nonparticipants are shown in Table I.2.<sup>14</sup>

Table I.2. Sample Sizes by HEI-2005 Cutoffs, Participation/Income Group, and Age

	All Low- Income Individuals	SNAP Participants	Income-Eligible Nonparticipants	Other Low- Income Nonparticipants
Healthy Eaters (HEI-2005 $\geq$ 70)				
Children	246	73	109	64
Adults	506	76	243	187
Less-Healthy Eaters (HEI-2005 $<$ 49)				
Children	3,344	1,178	1,322	844
Adults	2,792	661	1,260	871

Source: NHANES 1999-2004

## D. Analytic Approach for the Descriptive Analysis

The descriptive analysis compares the prevalence of selected sociodemographic and dietary characteristics among healthy eaters and less-healthy eaters. Comparisons are done separately for adults and children. In each group, comparisons are done for low-income individuals overall and for the three subgroups of SNAP participants and nonparticipants shown in Table I.2. The statistical

<sup>12</sup> NHANES asked about current food stamp participation at the time of the survey, but computer programming problems during data collection resulted in substantial missing data for that item. See Appendix A.

<sup>13</sup> Because participation is defined based on the past 12 months, individuals who had a different SNAP participation status at the time the 24-hour recall was collected will be misclassified in this analysis.

<sup>14</sup> Sampling weights for this subsample of the NHANES population are discussed in Appendix A.

significance of differences between healthy eaters and less-healthy eaters was tested using the Benjamini-Hochberg approach (Benjamini and Hochberg 1995) to account for the large number of tests conducted simultaneously.<sup>15</sup> In general, findings discussed in the text are limited to those that are statistically significant, or those that are part of an obvious trend or pattern in the data.

Text discussions may point out differences in results for SNAP participants and nonparticipants or between children and adults, when the differences are noteworthy. The statistical significance of these secondary comparisons was not tested, however, because of the expansive number of statistical tests performed in the main analysis and because these comparisons are not the focus of the report. Additional information about the analytic approach, including use of NHANES sampling weights, calculation of standard errors, and testing for statistical significance, is provided in Appendix A.

## E. Analytic Approach for the Cluster Analysis

Cluster analysis was used to identify the predominant dietary patterns (or “styles of eating”) of healthy and less-healthy eaters. The overall quality of an individual’s diet depends on the combination of foods eaten collectively over time (Knol et al. 2005). Analyses that focus on overall dietary patterns rather than consumption of individual foods or food groups take this into account.

Dietary patterns were identified for four groups of individuals: adult healthy eaters, adult less-healthy eaters, child healthy eaters, and child less-healthy eaters. Technical details about the approach are presented in Chapter IV, along with the results. In presenting results, we describe key differences between the dietary pattern groups identified for each of the four analytic groups in terms of food group intakes (the input variables for the cluster analysis). We use these key differences to name the patterns. We then explore differences between dietary pattern groups in other measures of dietary intake (energy and nutrient intakes, intakes of MyPyramid food groups

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<sup>15</sup> A detailed description of the Benjamini-Hochberg method appears in Appendix A.

and subgroups, and HEI-2005 scores and component scores). Finally, we look at differences in the sociodemographic characteristics of the individuals included in each dietary pattern group.

The statistical significance of differences in means or proportions across the dietary pattern groups identified within each of the four analytic groups was tested using the Benjamini-Hochberg approach to account for multiple comparisons (that is, the large number of tests conducted simultaneously). Differences between clusters that are statistically significant at the five percent level ( $p < .05$ ) are noted in the tables. We do not limit the discussion of differences between clusters to statistically significant differences, however, because statistical significance is not the only important criterion for examining differences between clusters.<sup>16</sup> The discussion of differences between clusters focuses on differences within the same analytic group (i.e., child healthy eaters or adult less-healthy eaters). In addition, summaries included at the end of the adult- and child-specific sections point out more general differences between healthy and less-healthy eaters. The statistical significance of these secondary comparisons was not tested because of the extensive number of statistical tests performed in the main analysis.

## F. Organization of the Report

Chapters II and III summarize findings from the descriptive analysis of the characteristics of healthy eaters and less-healthy eaters. Chapter II summarizes findings related to sociodemographic characteristics, and Chapter III summarizes findings related to dietary characteristics. In each chapter, graphics are used to illustrate observed differences between healthy eaters and less-healthy eaters. Respective tabulations of means and standard errors are included in Appendices B through E. Chapter IV presents results of the cluster analysis and includes tables comparing means across the identified dietary patterns. Tables included in Appendices F through H provide information on

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<sup>16</sup> Some epidemiologists do not assess statistical significance at all when comparing dietary pattern groups.

findings not discussed in the text (including standard errors). Chapter V summarizes key findings from all analyses.



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## II. SOCIODEMOGRAPHIC CHARACTERISTICS OF HEALTHY AND LESS-HEALTHY EATERS

In this chapter, we compare the sociodemographic characteristics of healthy eaters and less-healthy eaters among all low-income individuals as well as separately for SNAP participants, income-eligible nonparticipants, and other low-income nonparticipants. This comparison provides information on sociodemographic and health-related characteristics associated with a healthy diet, as measured by the HEI-2005. Table II.1 shows the income distribution of low-income healthy eaters and less-healthy eaters, adults and children shown separately. There are no significant differences in the income distribution for healthy and less-healthy eaters in either age group.

In addition to income, we examined three types of characteristics: (1) sociodemographic characteristics at the individual level, such as sex, age, and country of birth; (2) sociodemographic characteristics at the household level, such as household size and household food security level;<sup>17</sup> and (3) health-related characteristics, such as obesity status, blood pressure level, and level of physical activity. We compared the prevalence of each characteristic among healthy eaters and less-healthy eaters for all low-income individuals and for the three subgroups of SNAP participants and nonparticipants. Comparisons were done separately for adults (ages 19 and older) and children (ages 2 to 18).

The next two sections discuss bivariate comparisons between healthy and less-healthy eaters in the sociodemographic characteristics described above, first for adults and then for children. Findings from this analysis provide a comprehensive picture of observed differences in the demographic, economic, and health-related characteristics of healthy eaters and less-healthy eaters. Some of the findings in the bivariate analyses are counterintuitive, however, and should be interpreted with

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<sup>17</sup> Food security means having access at all times to enough food for an active, healthy life for all household members (see Nord et al. 2010).

Table II.1. Income Distribution of Healthy Eaters and Less-healthy Eaters

	Adults		Children	
	Healthy Eaters (HEI $\geq$ 70) n=506	Less-Healthy Eaters (HEI<49) n=2,792	Healthy Eaters (HEI $\geq$ 70) n=246	Less-Healthy Eaters (HEI<49) n=3,344
	Percent of Individuals In Sample Group			
No Income	2.1	1.8	3.7	2.6%
1%-50% of FPL	7.8	11.4	12.2	16.5
51%-100% of FPL	30.3	28.3	38.8	30.2
101%-150% of FPL	34.8	32.0	22.5	29.4
151%-200% of FPL	25.0	26.5	22.8	21.4

Source: NHANES 1999-2004

HEI = Score on Healthy Eating Index-2005

caution. In the third and final section of this chapter, we present results from multivariate analyses that explore these counterintuitive findings in a more in-depth way, controlling for potential confounding variables.

## A. Adults

In the sections below, we discuss the person-level, household-level, and health-related characteristics for which we observed statistically significant differences in prevalence rates between healthy eaters and less-healthy eaters for low-income adults overall or for one or more of the subgroups of SNAP participants and nonparticipants.<sup>18</sup> Results for the full list of characteristics are presented in Tables B.1, B.2, and B.3.<sup>19</sup>

<sup>18</sup> Due to the large number of comparisons tested, the discussion in the text focuses on differences between healthy and less-healthy eaters that are statistically significant and points out instances of no significant differences without much additional comment. For many variables, differences between healthy eaters and less-healthy eaters among SNAP participants are not statistically significant even though the magnitude of the difference is large. In some of these cases, the lack of statistical significance among SNAP participants is presumably due to smaller sample sizes (and, therefore, less statistical power to detect differences).

<sup>19</sup> In Appendix B tables and figures II.1 to II.9, “HEI” is used instead of “HEI-2005” because of space limitation.

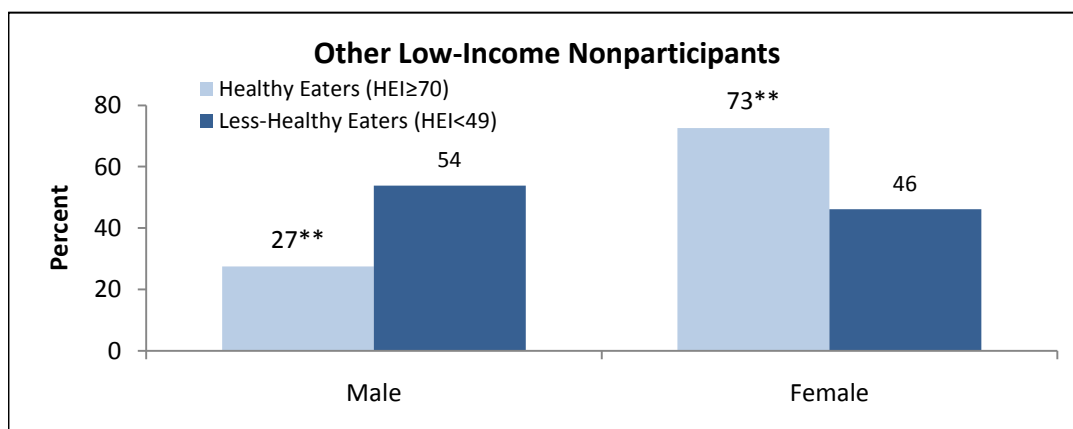
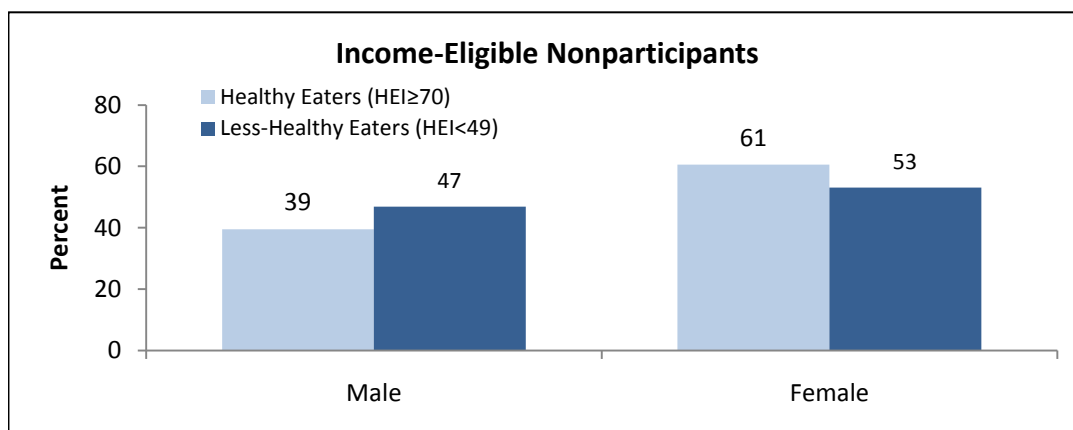
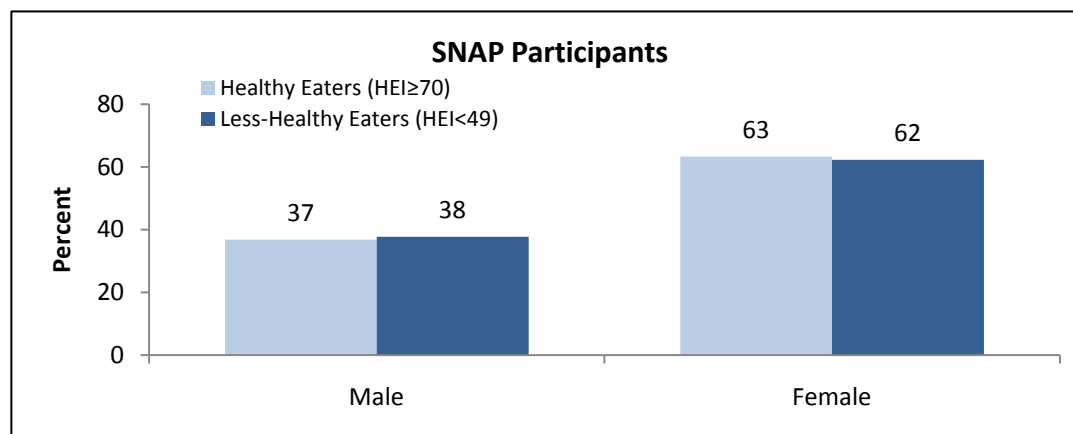
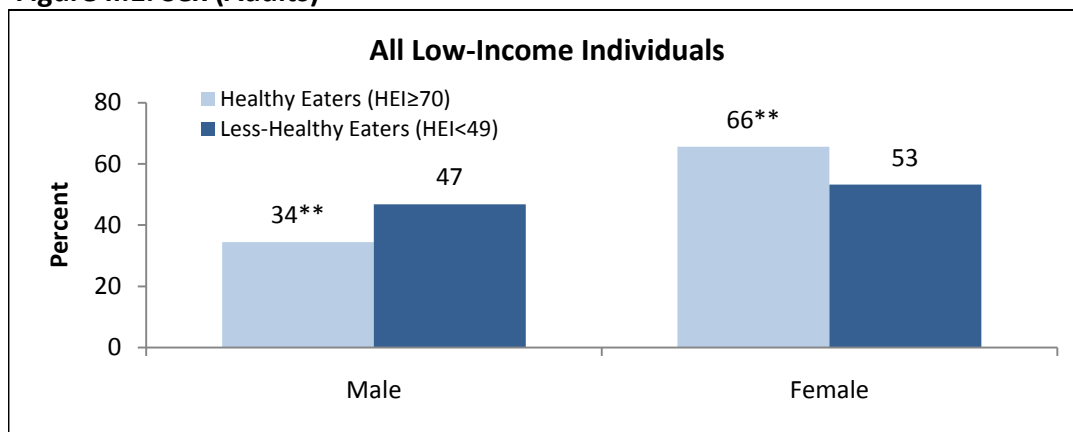
## 1. Person-Level Characteristics

- **Sex:** Among all low-income adults, healthy eaters were more likely than less-healthy eaters to be female (66 percent versus 53 percent) (Figure II.1). This difference was also observed among income-ineligible nonparticipants (73 percent versus 46 percent). However, among SNAP participants and income-eligible nonparticipants, there were no significant sex differences between healthy eaters and less-healthy eaters.
- **Age:** Overall, adult healthy eaters were less likely than adult less-healthy eaters to be 19 to 30 years old (18 percent versus 35 percent) or 31 to 40 years old (13 percent versus 22 percent) and more likely to be older than 60 years old (42 percent versus 17 percent). Among income-eligible nonparticipants, healthy eaters were 20 percentage points less likely than less-healthy eaters to be in the youngest age group. Among both groups of nonparticipants, healthy eaters were substantially more likely to be older than 60, compared to less-healthy eaters (Figure II.2).
- **Race/Ethnicity:** Among all low-income adults, healthy eaters were less likely to be black, compared to less-healthy eaters (10 percent versus 18 percent). This difference was also observed among SNAP participants (10 percent versus 27 percent), as well as among income-ineligible nonparticipants (9 percent versus 15 percent) (Figure II.3).
- **Country of Birth:** The proportion of foreign-born individuals was larger for adult healthy eaters, compared to adult less-healthy eaters (33 percent versus 13 percent). This difference, observed across all groups, was the largest among SNAP participants (38 percent versus 9 percent) and the smallest among income-ineligible nonparticipants (26 percent versus 14 percent) (Figure II.4).
- **Work Status:** Overall, adult healthy eaters were less likely than adult less-healthy eaters to be employed (32 percent versus 48 percent) and less likely to work 20 or more hours per week (27 percent versus 45 percent). This pattern was also observed among income-eligible and other nonparticipants. However, among SNAP participants, there were no differences between healthy eaters and less-healthy eaters in employment or the number of hours worked (Figure II.4).
- There were no statistically significant differences between adult healthy eaters and less-healthy eaters, overall or in any of the subgroups, for education level or marital status (Table B.1).

## 2. Household-Level Characteristics

- **Household Size:** Among all low-income adults, healthy eaters were more likely than less-healthy eaters to live alone (26 percent versus 16 percent). This difference was even more pronounced for income-ineligible nonparticipants (28 percent versus 14 percent) (Figure II.5).
- **Household Food Security Level:** Overall, adult healthy eaters were less likely than adult less-healthy eaters to have very low food security (6 percent versus 10 percent). Among income-eligible nonparticipants, healthy eaters were more likely than less-healthy eaters to be fully food secure (76 percent versus 63 percent) and less likely to have very low food security (3 percent versus 10 percent). Results were comparable for adult food security (Figure II.6).

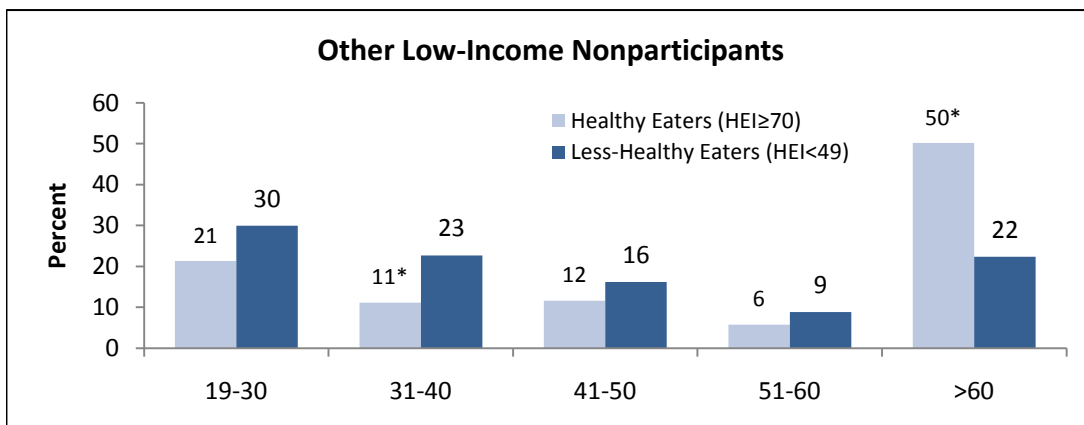
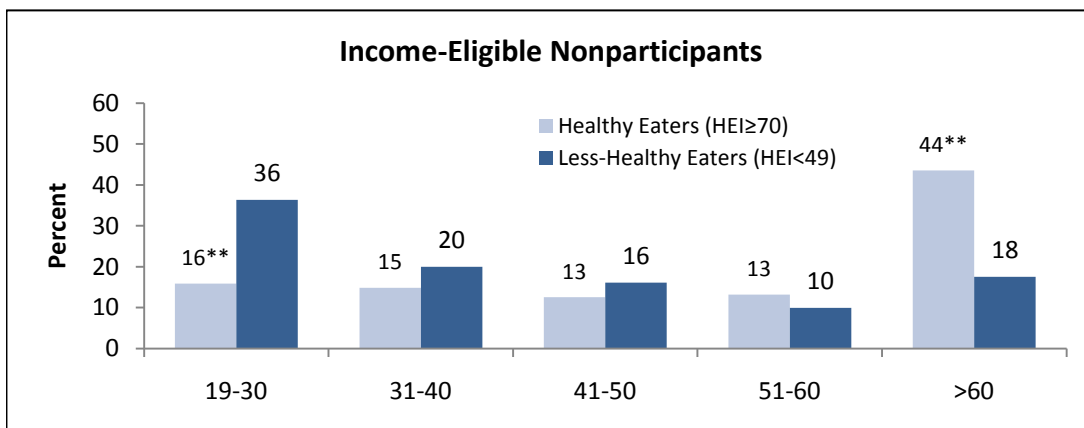
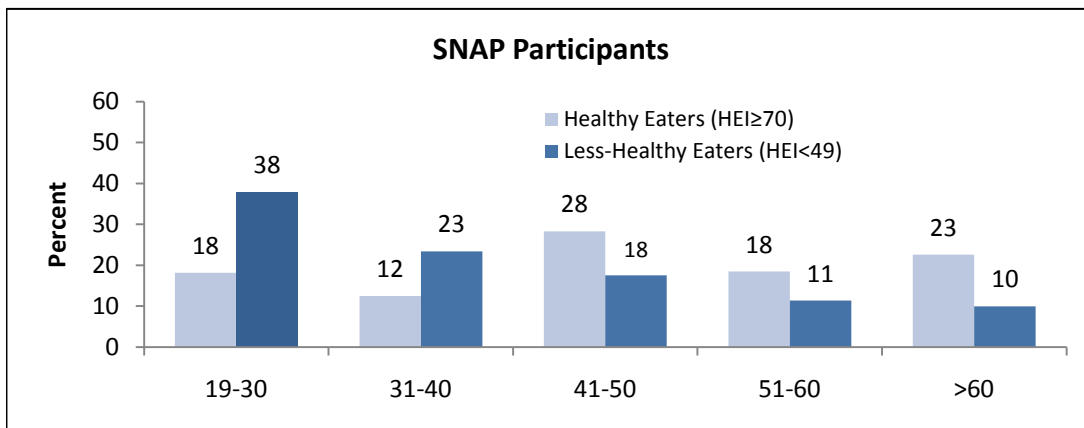
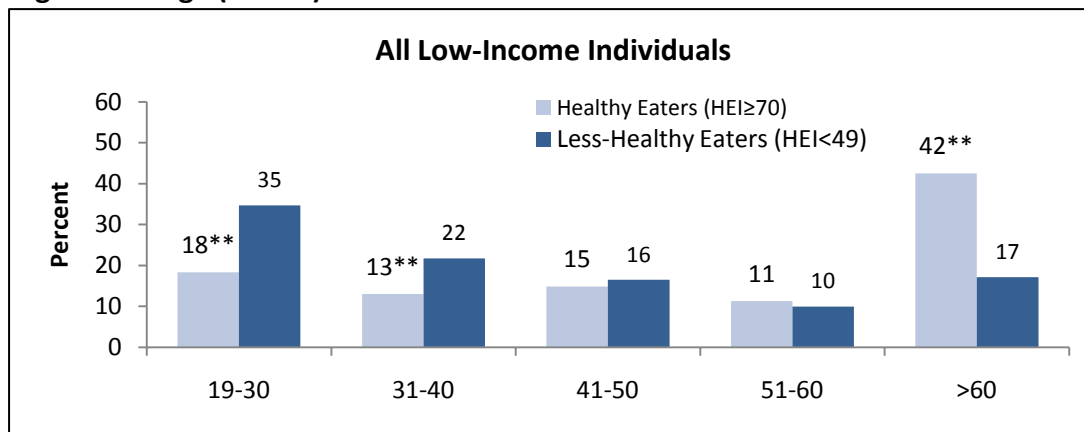
**Figure II.1. Sex (Adults)**



\* Significantly different from less-healthy eaters,  $p < .05$ , two-tailed test with BH adjustment

\*\* Significantly different from less-healthy eaters,  $p < .01$ , two-tailed test with BH adjustment

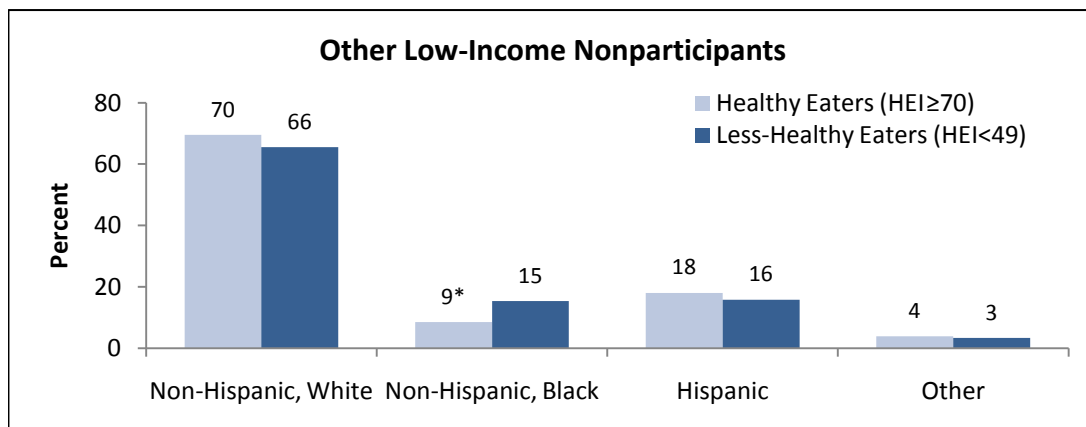
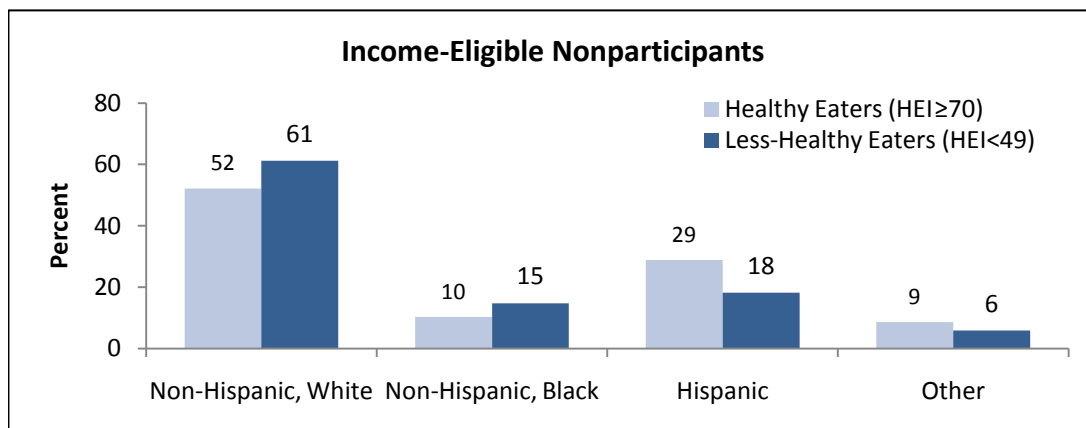
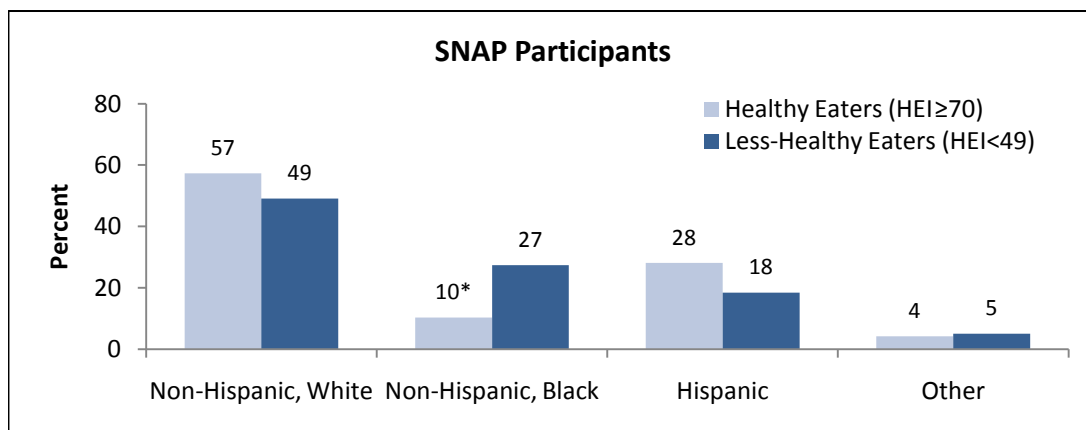
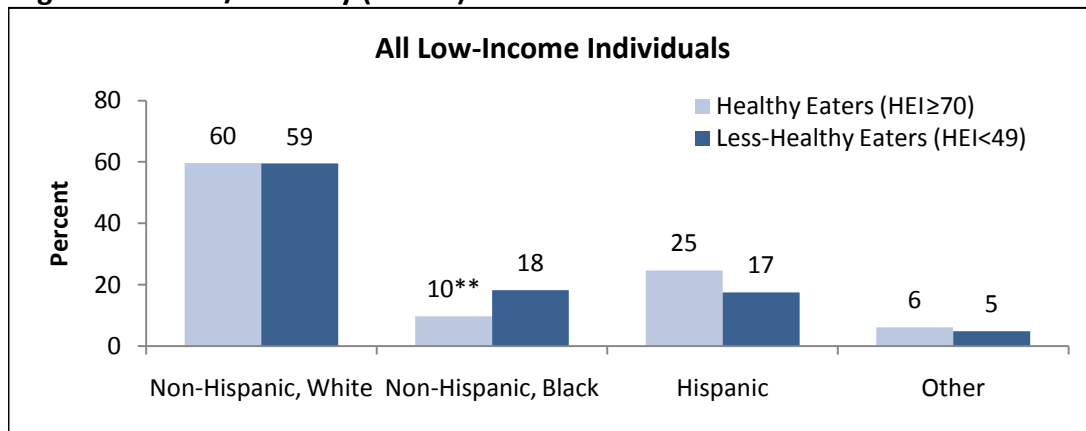
**Figure II.2. Age (Adults)**



\* Significantly different from less-healthy eaters,  $p < .05$ , two-tailed test with BH adjustment

\*\* Significantly different from less-healthy eaters,  $p < .01$ , two-tailed test with BH adjustment

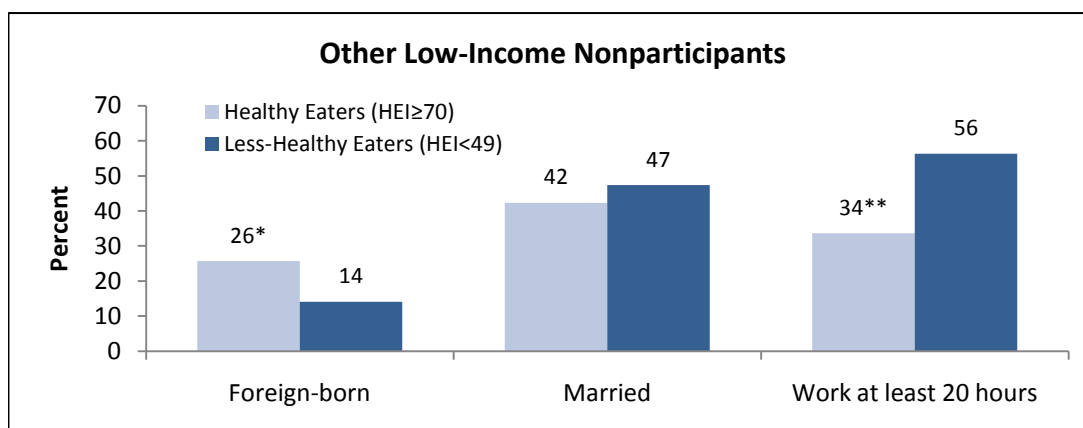
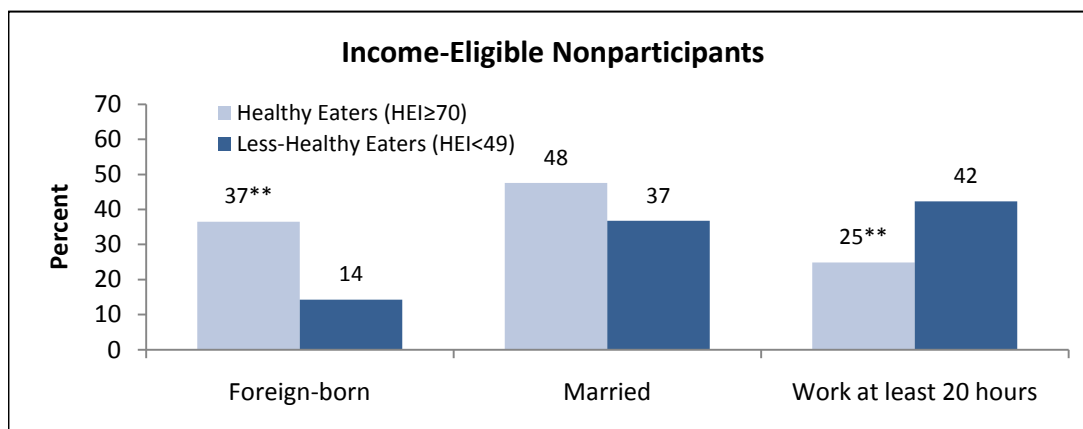
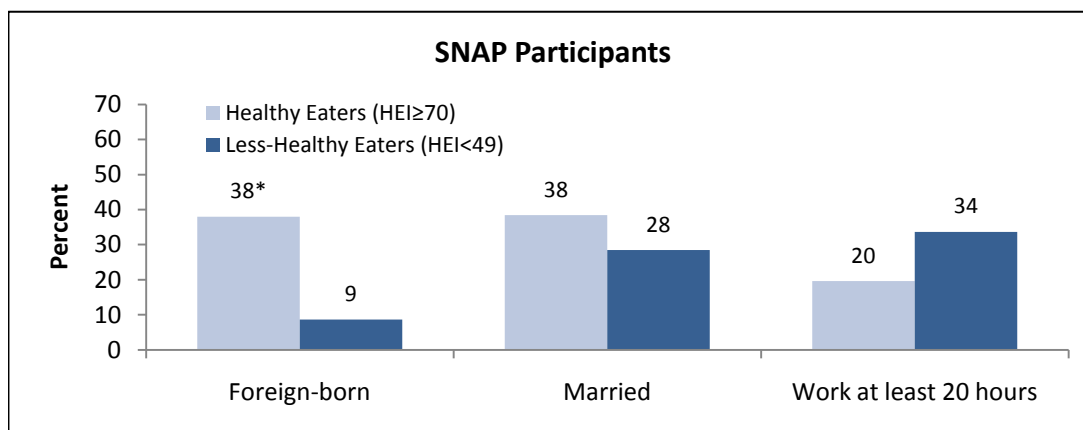
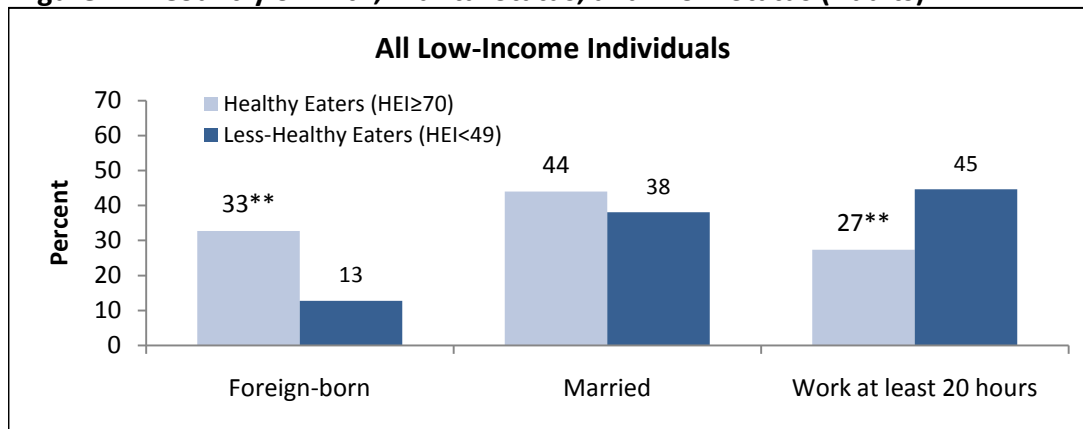
**Figure II.3. Race/Ethnicity (Adults)**



\* Significantly different from less-healthy eaters,  $p < .05$ , two-tailed test with BH adjustment

\*\* Significantly different from less-healthy eaters,  $p < .01$ , two-tailed test with BH adjustment

**Figure II.4. Country of Birth, Marital Status, and Work Status (Adults)**

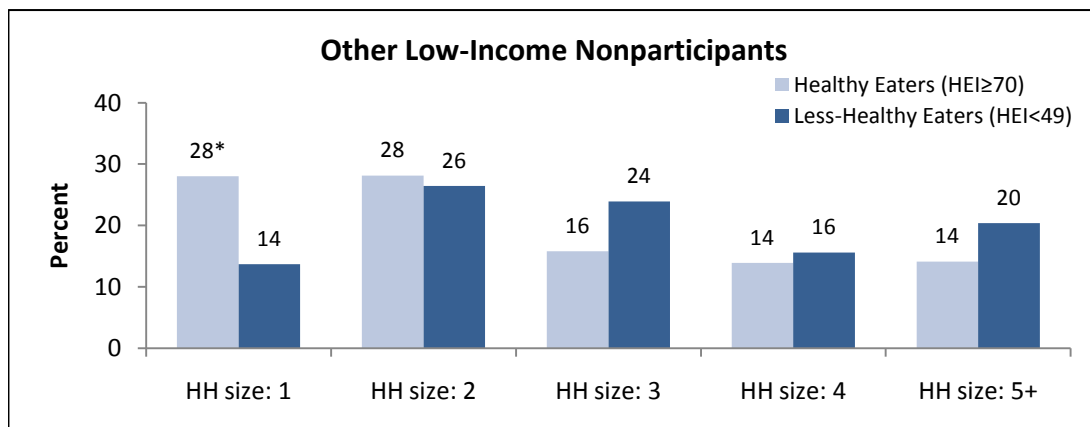
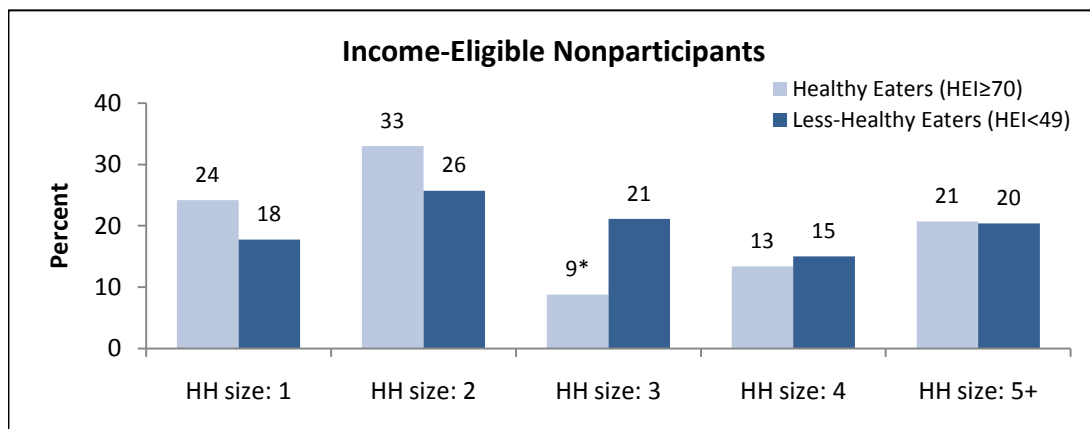
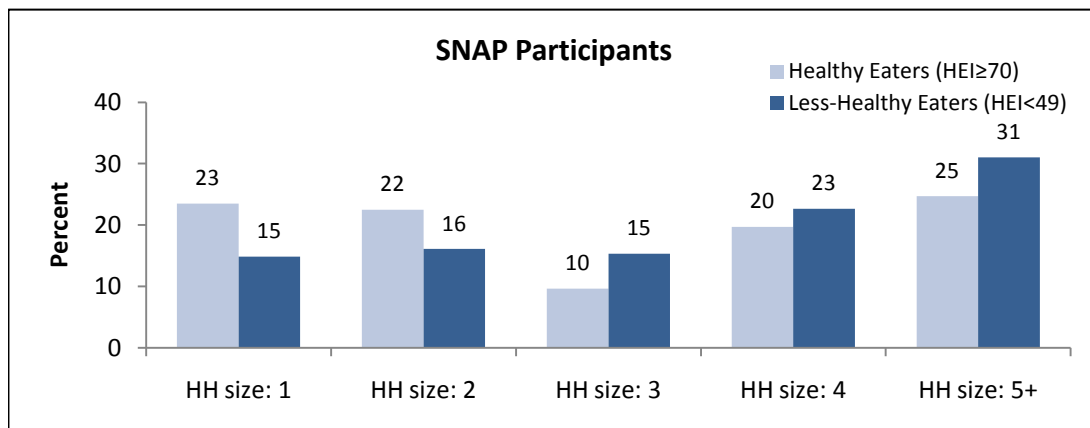
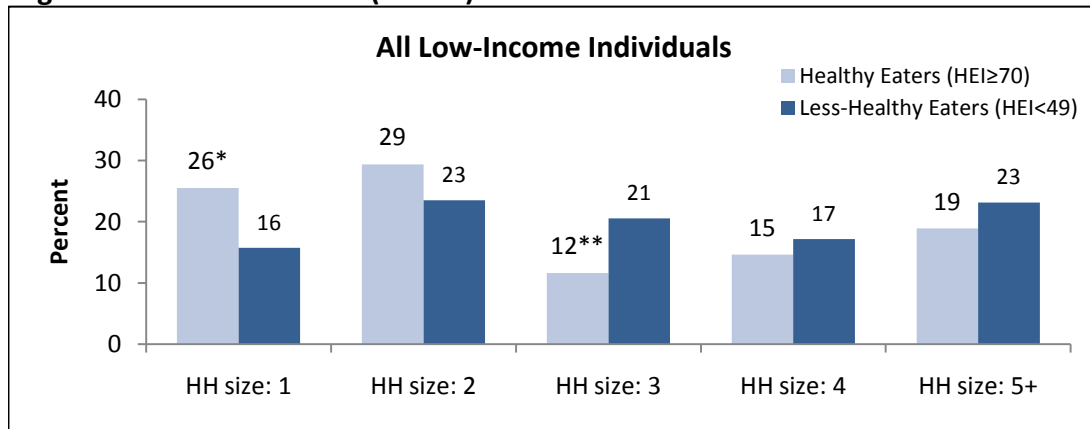


\* Significantly different from less-healthy eaters,  $p < .05$ , two-tailed test with BH adjustment

\*\* Significantly different from less-healthy eaters,  $p < .01$ , two-tailed test with BH adjustment



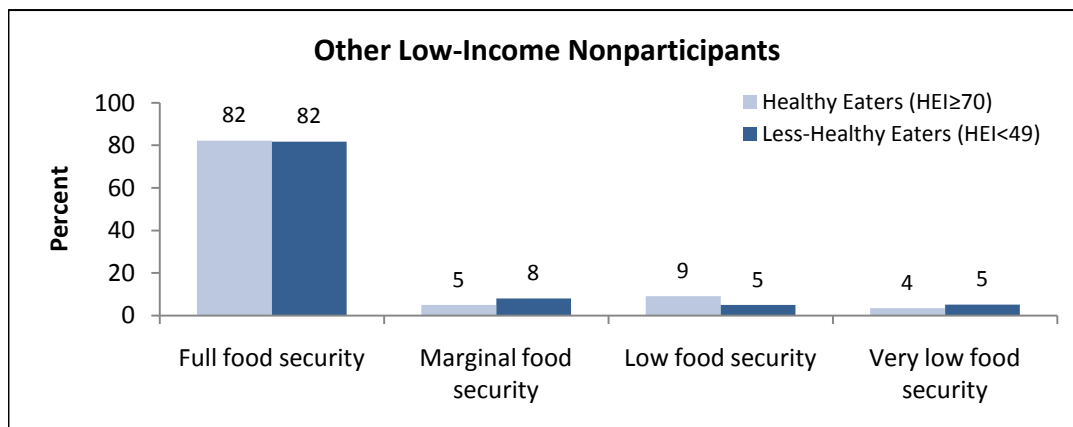
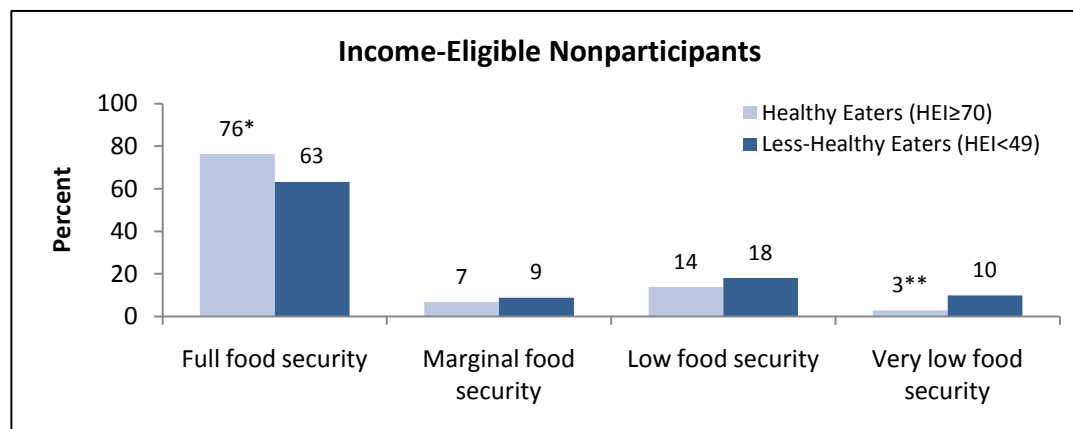
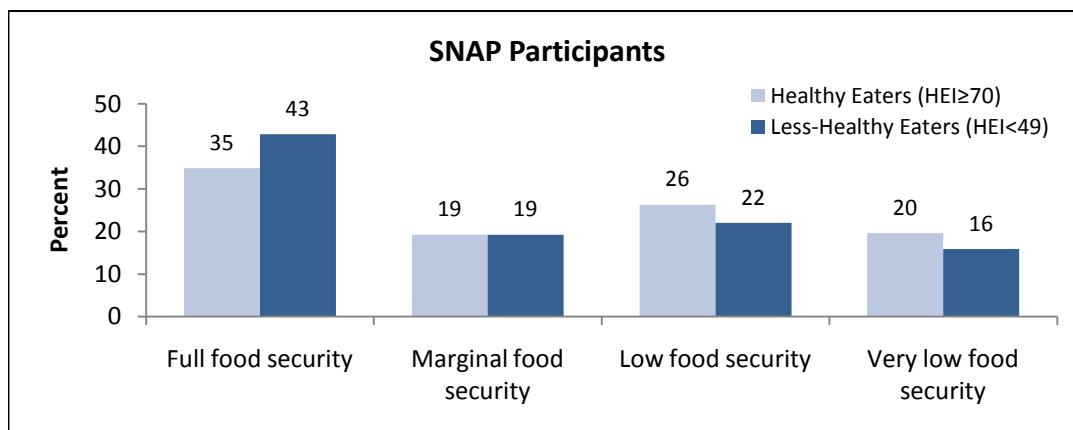
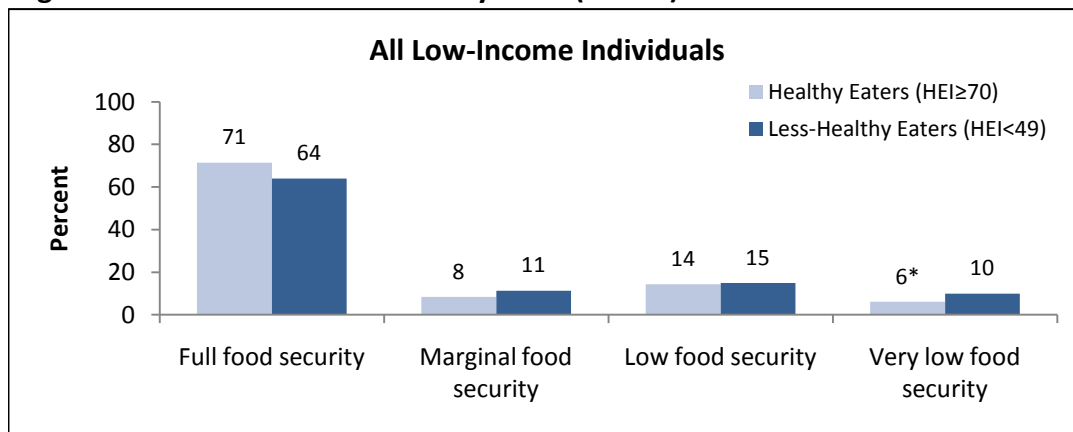
**Figure II.5. Household Size (Adults)**



\* Significantly different from less-healthy eaters,  $p < .05$ , two-tailed test with BH adjustment

\*\* Significantly different from less-healthy eaters,  $p < .01$ , two-tailed test with BH adjustment

**Figure II.6. Household Food Security Level (Adults)**



\* Significantly different from less-healthy eaters,  $p < .05$ , two-tailed test with BH adjustment

\*\* Significantly different from less-healthy eaters,  $p < .01$ , two-tailed test with BH adjustment

- **Smoker in Household:** Adult healthy eaters were substantially less likely than adult less-healthy eaters to have a smoker in the household (8 percent versus 40 percent). This pattern was observed in all of the subgroups. Differences between healthy eaters and less-healthy eaters were greatest among SNAP participants (17 percent versus 53 percent) and income-eligible nonparticipants (4 percent versus 39 percent) (Figure II.7).
- There were no statistically significant differences between adult healthy eaters and less-healthy eaters, overall or in any of the subgroups, for household WIC participation or home ownership (Table B.2).

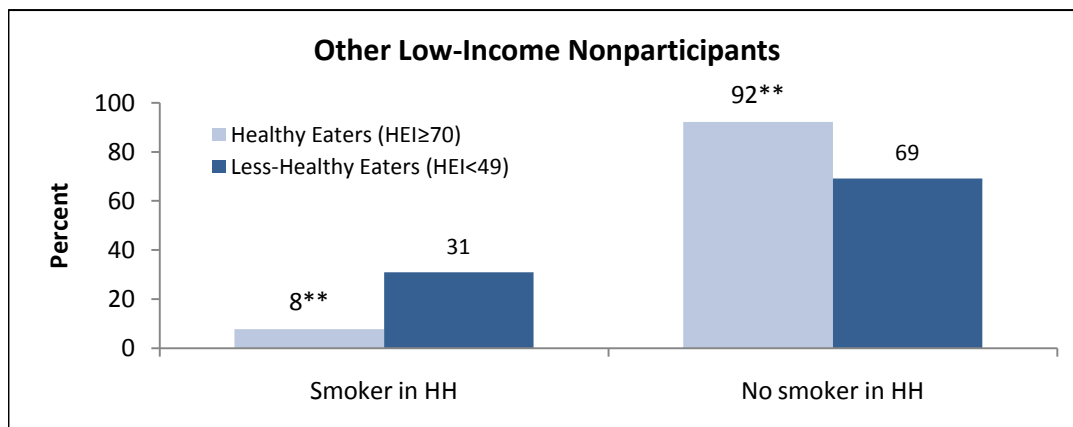
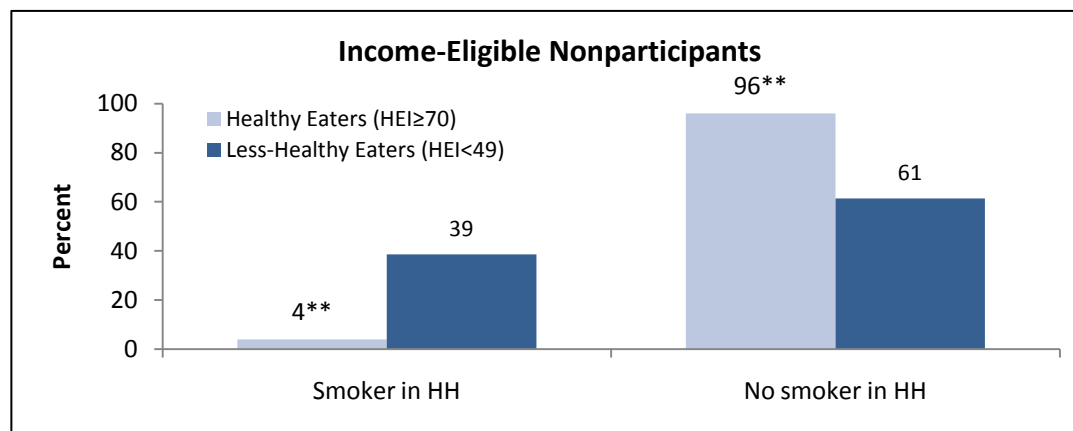
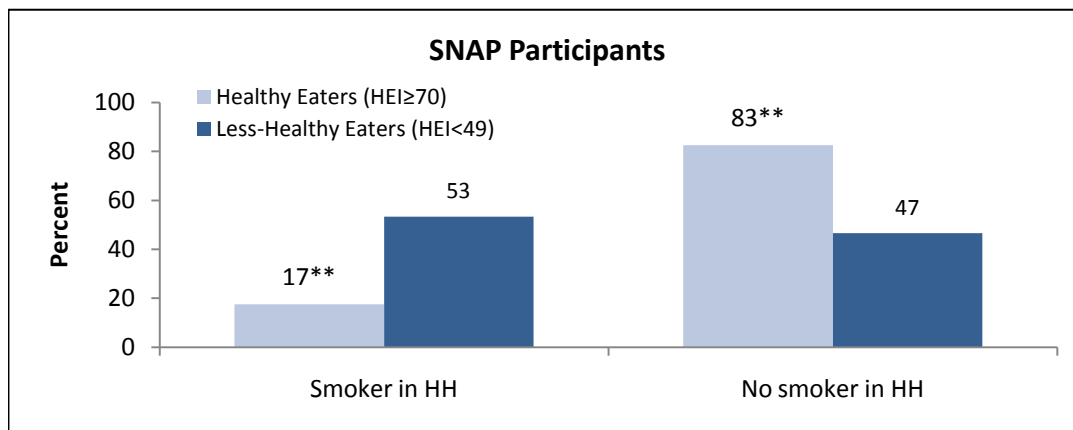
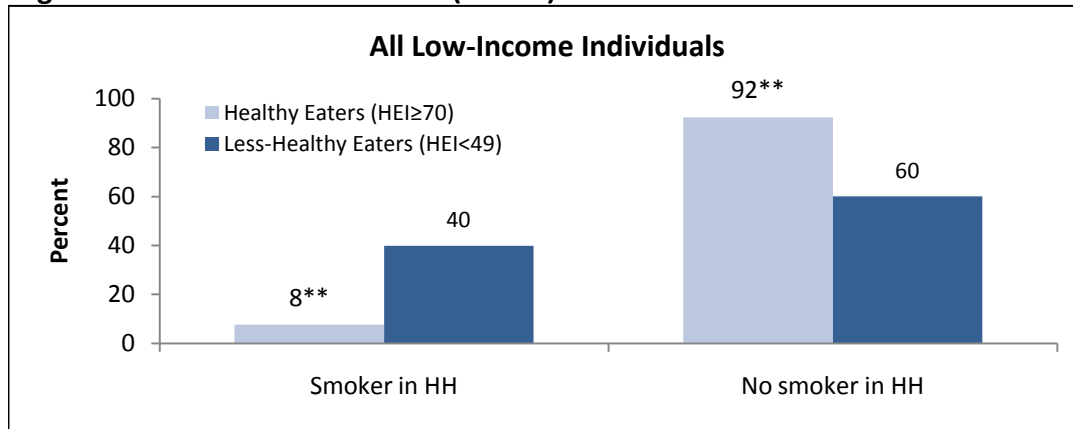
### 3. Health-Related Characteristics

- **Health Status:** Among all low-income adults, healthy eaters were more likely than less-healthy eaters to have high blood pressure (39 percent versus 27 percent), have high cholesterol (36 percent versus 20 percent), and have diabetes (18 percent versus 6 percent). They were also more likely than less-healthy eaters to have taken prescription medication in the past month (65 percent versus 50 percent) (Figure II.8). Healthy eaters were just as likely as less-healthy eaters to be obese. As we discuss later, these odd results can be largely explained by the fact that healthy eaters are much more likely to be age 60 or older than less-healthy eaters.
- **Healthy Behaviors:** Overall, adult healthy eaters were more likely than adult less-healthy eaters to have health insurance, about equally likely to have engaged in vigorous physical activity in the past 30 days, considerably less likely to smoke, and less likely to have spent at least two hours per day in front of the TV or computer. These patterns were generally repeated in each of the SNAP participation groups. However, among SNAP participants, healthy eaters were 15 percentage points less likely than less-healthy eaters to have engaged in vigorous physical activity (Figure II.9).

### 4. Summary

Table II.2 summarizes key differences in sociodemographic characteristics of adult healthy and less-healthy eaters in the low-income population. In addition to the differences noted in the table, we found that among low-income adults, healthy eaters were more likely than less-healthy eaters to have taken prescription medication recently and to have health insurance. We did not find a difference between adult healthy and less-healthy eaters in the prevalence of obesity.

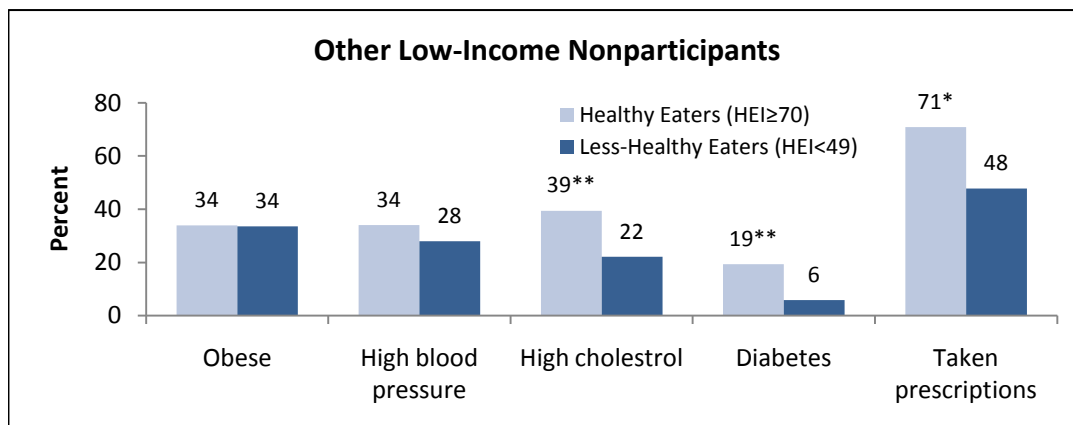
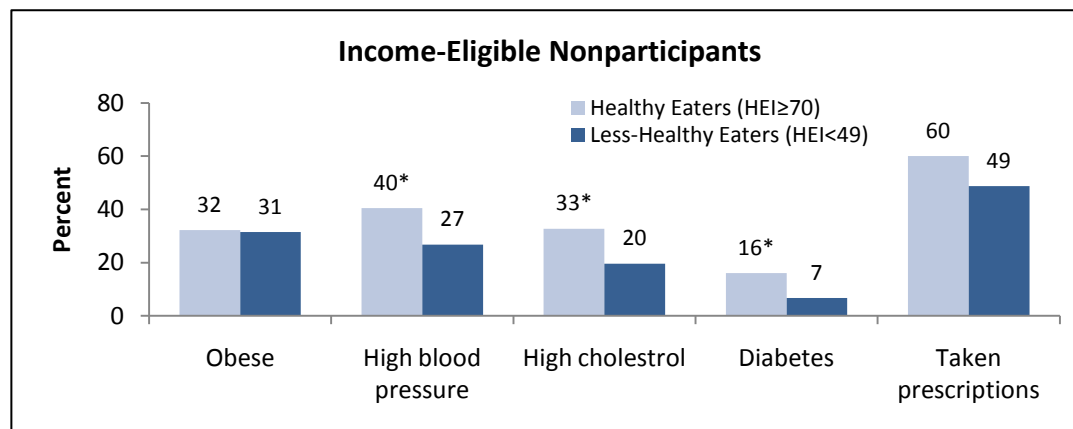
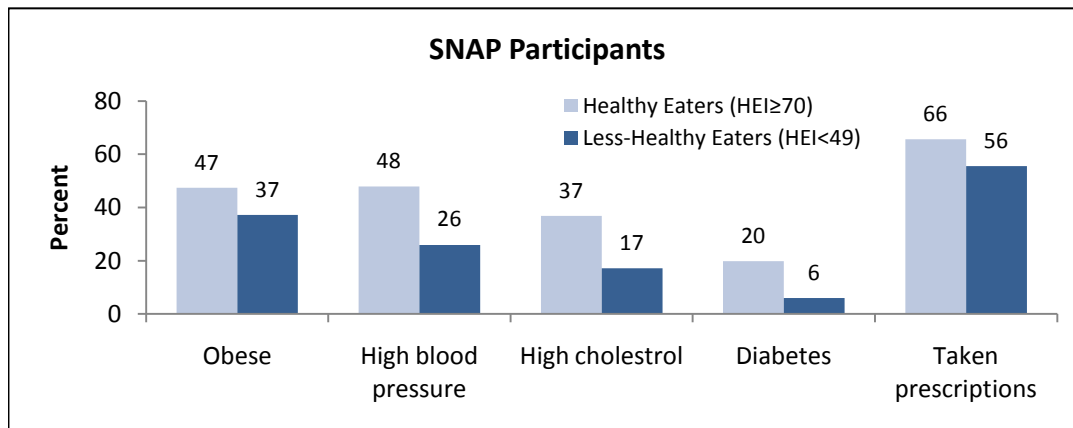
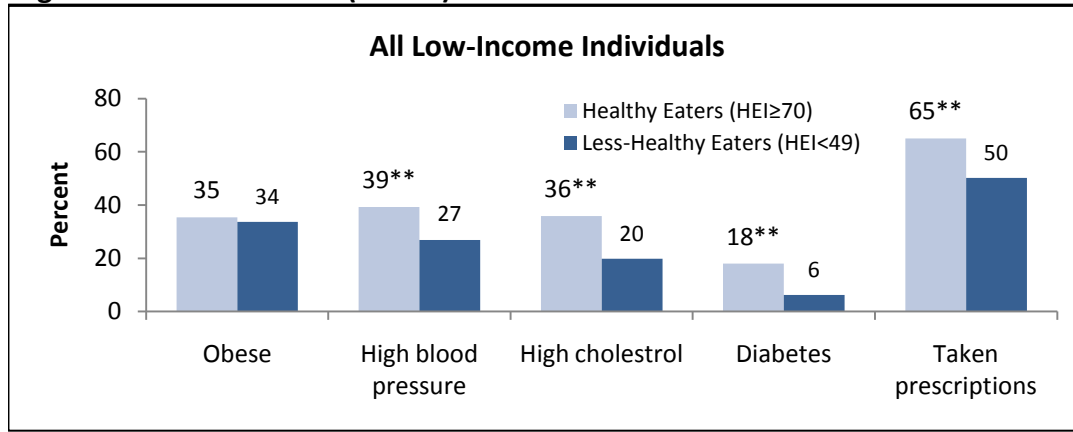
**Figure II.7. Smoker in Household (Adults)**



\* Significantly different from less-healthy eaters,  $p < .05$ , two-tailed test with BH adjustment

\*\* Significantly different from less-healthy eaters,  $p < .01$ , two-tailed test with BH adjustment

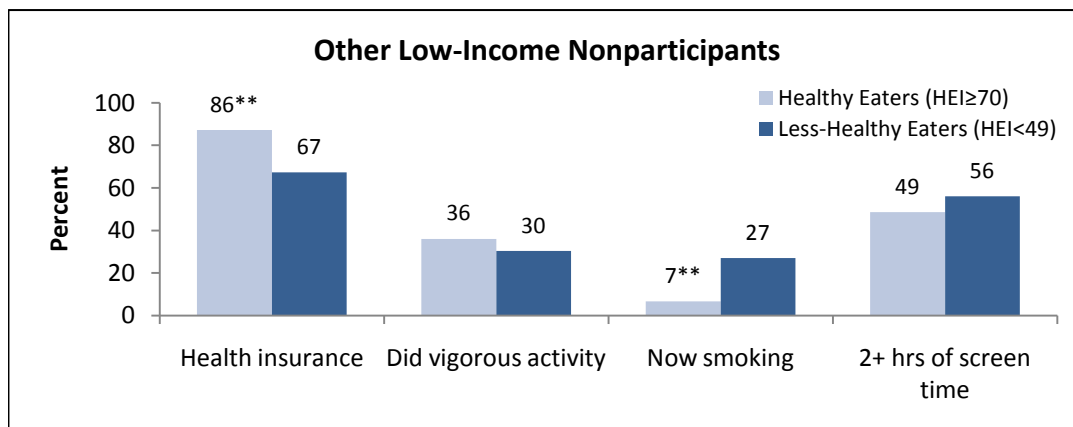
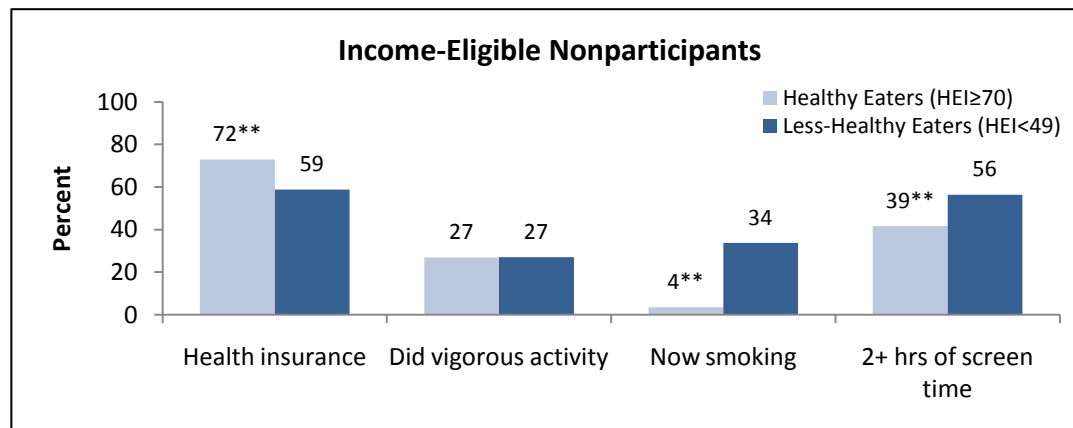
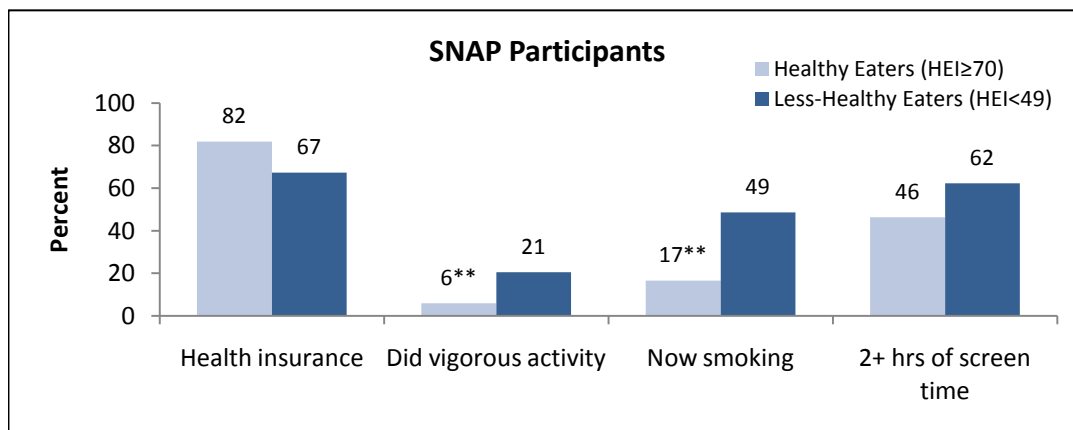
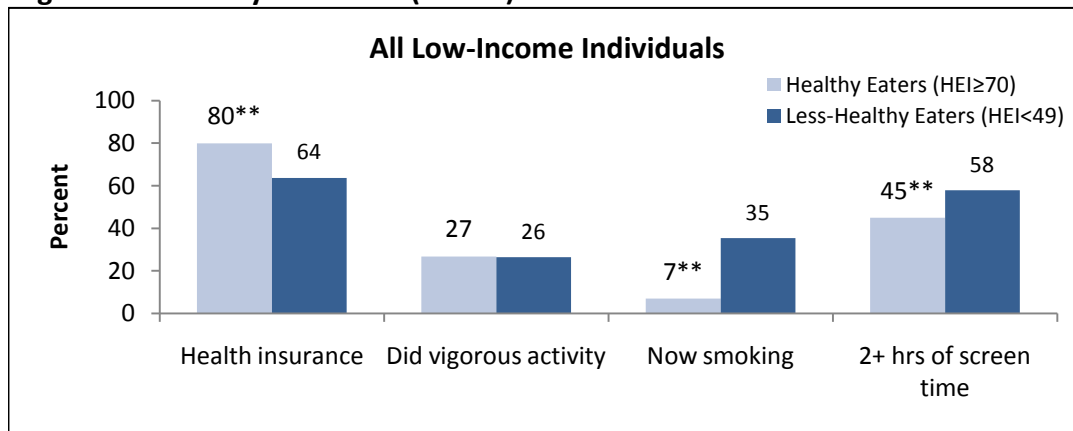
**Figure II.8. Health Status (Adults)**



\* Significantly different from less-healthy eaters,  $p < .05$ , two-tailed test with BH adjustment

\*\* Significantly different from less-healthy eaters,  $p < .01$ , two-tailed test with BH adjustment

**Figure II.9. Healthy Behaviors (Adults)**



\* Significantly different from less-healthy eaters,  $p < .05$ , two-tailed test with BH adjustment

\*\* Significantly different from less-healthy eaters,  $p < .01$ , two-tailed test with BH adjustment

Some differences between adult healthy and less-healthy eaters shown in Table II.2 are consistent with those observed in other studies and data sets. For example, it is well documented that women generally follow healthier eating patterns than men (Newby and Tucker 2004), and recent studies have found that greater acculturation in the U.S. is associated with less healthful diets as individuals acclimate to more Western diets that are relatively high in saturated fat, sugar, and sugar-sweetened beverages and low in fruits, vegetables and fiber (Ayala et al. 2008, Montez and Eschbach 2008). Findings regarding the association between age and healthy eating have been less conclusive, however (Newby and Tucker 2004).

Table II.2. Summary of Key Differences in Sociodemographic Characteristics of Adult Healthy and Less-Healthy Eaters.

Healthy adult eaters (HEI $\geq$ 70) were more likely to:	Less-healthy adult eaters (HEI<49) were more likely to:
<ul style="list-style-type: none"> <li>• Be female</li> <li>• Be older than 60</li> <li>• Be foreign-born</li> <li>• Not work</li> <li>• Live in a one-person household</li> <li>• Have high blood pressure and cholesterol</li> <li>• Have diabetes</li> </ul>	<ul style="list-style-type: none"> <li>• Be male</li> <li>• Be age 19 to 40</li> <li>• Be black</li> <li>• Work at least 20 hours per week</li> <li>• Have very low household food security</li> <li>• Smoke</li> <li>• Have more than 2 hrs. of screen time a day</li> </ul>

HEI = Score on Healthy Eating Index-2005

Most of the differences between adult healthy and less-healthy eaters shown in Table II.2 are consistent for SNAP participants, income-eligible nonparticipants, and other low-income nonparticipants. However, we also found some interesting differences between SNAP participants and nonparticipants. For example, being female was most strongly associated with being a healthy eater among “other low-income nonparticipants”—nonparticipants who were not income-eligible for SNAP (although still low-income, by our definition). In addition, full household food security

was positively associated with being a healthy eater only among income-eligible nonparticipants.<sup>20</sup> A somewhat counter-intuitive result is that among income-eligible nonparticipants, recent engagement in daily physical activity was negatively associated with being a healthy eater.

There are multiple possible explanations for lack of consistency in the pattern of findings for SNAP participants and the two groups of nonparticipants. For example, higher household income among other low-income nonparticipants, as compared to SNAP participants and income-eligible nonparticipants, may mean that women in these households have relatively more control over the foods they consume. Alternatively, women in these higher income households may have higher levels of nutrition knowledge than women in SNAP participant or low-income nonparticipant households, or they may simply have different preferences regarding what they eat. Reasons for the differences between the SNAP participant/nonparticipant groups in the association between full household food security and being a healthy eater and between engagement in physical activity and being a healthy eater are less straightforward, and likely result from a complex inter-correlation between the different characteristics examined in this descriptive analysis.

Such inter-correlation may also be confounding associations (or lack of an association) between sociodemographic characteristics and being a healthy eater that are consistent across the three groups of SNAP participants and nonparticipants. For example, no association is observed between being obese and being a healthy eater. Similarly, while a priori one might expect a negative association between having high blood or being diabetic and being a healthy eater, positive associations are observed for both health conditions. This pattern could reflect the fact that adult healthy eaters are older, on average, than adult less-healthy eaters (and therefore more likely to have

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<sup>20</sup> Full household food security is not included in table II.2 because this table shows results for the total sample (not SNAP participant and nonparticipant subgroups).



a chronic disease). It could also be that adults being treated for health problems are more likely to be paying attention to their diet.

With bivariate analyses, it is not possible to determine the reasons for the observed associations and non-associations. At the end of this chapter, we present results from multivariate analyses that control for age and other potentially confounding variables, in an attempt to better understand some of the complex relationships between sociodemographic and health characteristics and the likelihood of being a healthy eater. These analyses were conducted for a subset of the characteristics examined in the descriptive analyses, with a focus on those where results of the descriptive analyses were counterintuitive.

## B. Children

In the sections below, we discuss the person-level, household-level, and health-related characteristics for which we observed statistically significant differences in prevalence rates between child healthy eaters and child less-healthy eaters, overall or for one or more of the subgroups of SNAP participants and nonparticipants.<sup>21</sup> Results for the full list of characteristics are presented in Tables B.4, B.5, and B.6.<sup>22</sup>

### 1. Person-Level Characteristics

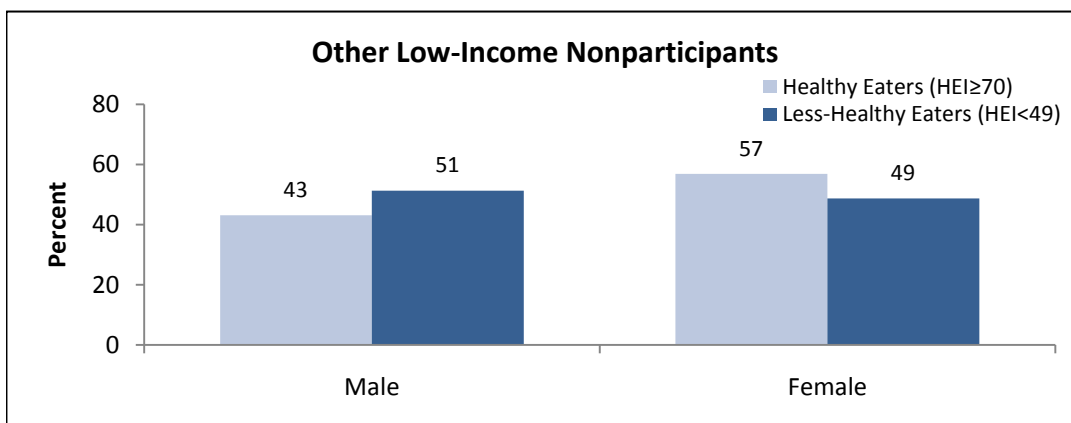
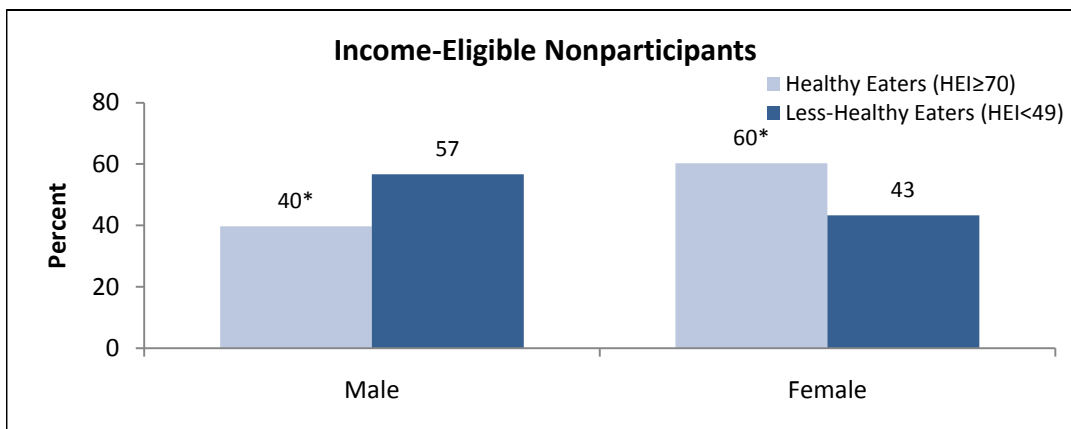
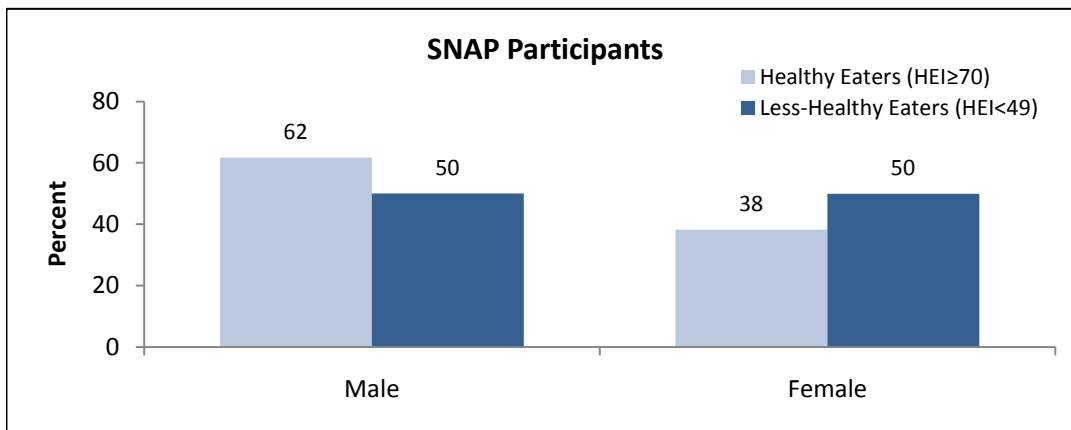
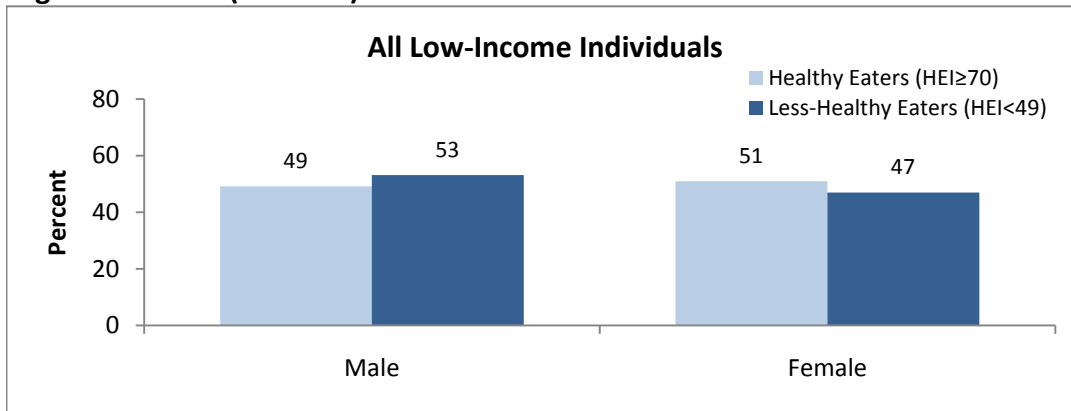
- **Sex:** Among children in low-income households, there were no statistically significant differences between healthy eaters and less-healthy eaters in the proportions of males and females. However, among income-eligible nonparticipants, healthy eaters were more likely than less-healthy eaters to be female (60 percent versus 43 percent) (Figure II.10).

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<sup>21</sup> Due to the large number of comparisons tested, the discussion in the text focuses on differences between healthy and less-healthy eaters that are statistically significant and points out instances of no significant differences without much additional comment. For many variables, differences between healthy eaters and less-healthy eaters among SNAP participants are not statistically significant even though the magnitude of the difference is large. In some of these cases, the lack of statistical significance among SNAP participants is presumably due to smaller sample sizes (and, therefore, less statistical power to detect differences).

<sup>22</sup> In Appendix B tables and figures II.10 to II.16, “HEI” is used instead of “HEI-2005” because of space limitation.

**Figure II.10. Sex (Children)**



\* Significantly different from less-healthy eaters,  $p < .05$ , two-tailed test with BH adjustment

\*\* Significantly different from less-healthy eaters,  $p < .01$ , two-tailed test with BH adjustment

- **Age:** Overall, child healthy eaters had a younger age distribution than child less-healthy eaters. Healthy eaters were more likely than less-healthy eaters to be ages 2 to 5 (40 percent versus 22 percent) and less likely to be ages 12 to 18 (25 percent versus 43 percent). This pattern was mostly repeated among SNAP participants and income-eligible nonparticipants. However, among income-ineligible nonparticipants, there were no statistically significant differences between healthy eaters and less-healthy eaters (Figure II.11).
- **Race/Ethnicity:** Child healthy eaters were much less likely than child less-healthy eaters to be black (10 percent versus 22 percent). This difference was also observed for SNAP participants (10 percent versus 34 percent) and income-eligible nonparticipants (7 percent versus 17 percent). Among income-eligible nonparticipants, healthy eaters were also less likely than less-healthy eaters to be non-Hispanic and white (30 percent versus 53 percent) and more likely to be Hispanic (51 percent versus 23 percent) (Figure II.12).

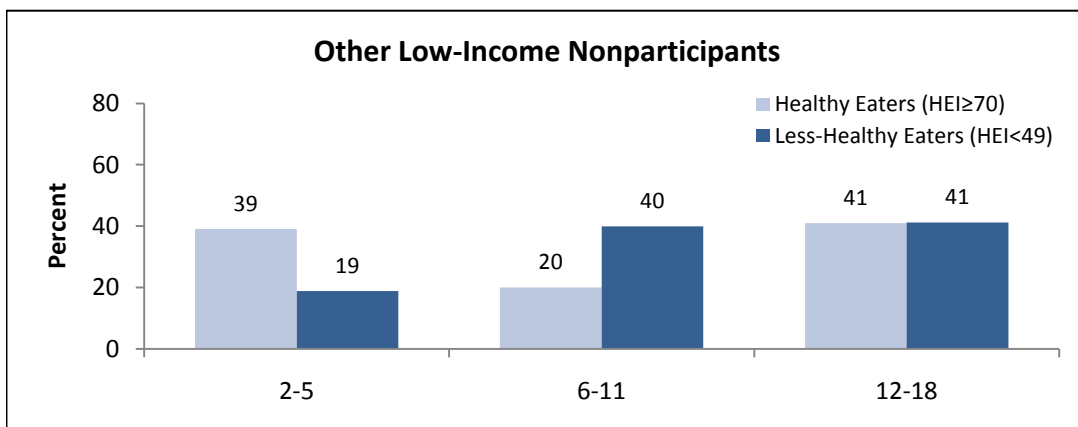
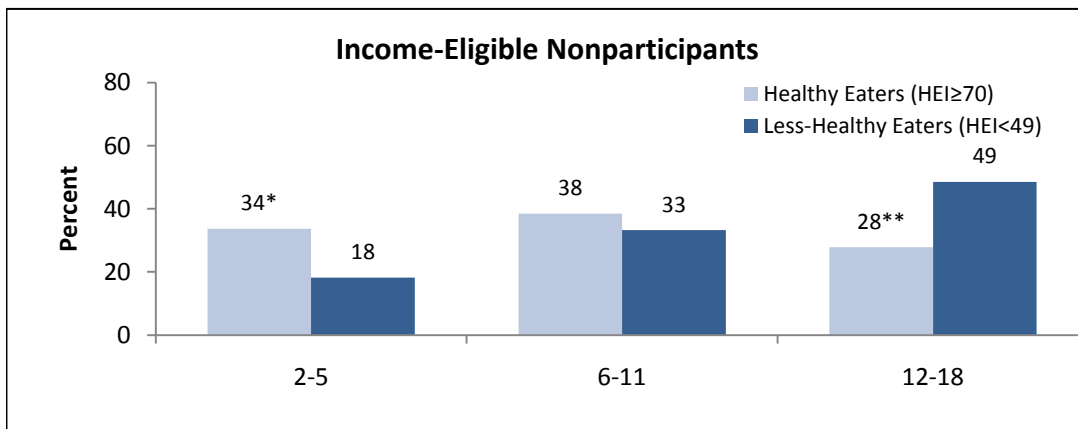
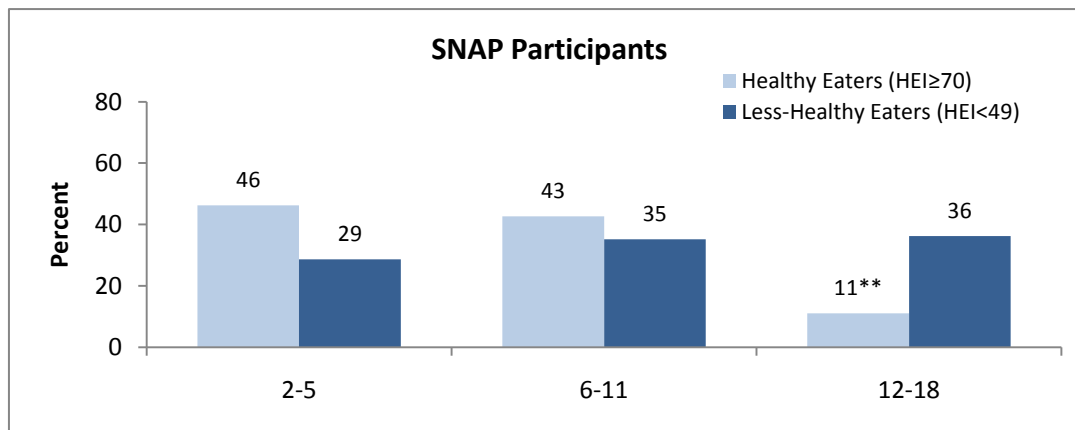
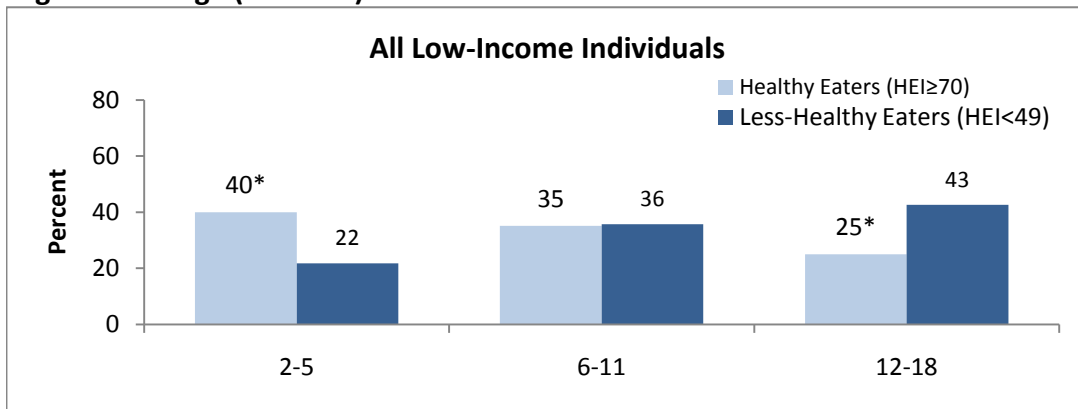
## 2. Household-Level Characteristics

- **Household Size:** Overall, there were no statistically significant differences between healthy eaters and less-healthy eaters in the proportion living in a household of a certain size. However, among income-eligible nonparticipants, healthy eaters were less likely than less-healthy eaters to live in a household of four or fewer individuals and more likely to live in a household of five or more individuals (78 percent versus 48 percent) (Figure II.13).
- **Household Reference Person's Country of Birth:**<sup>23</sup> Child healthy eaters were more likely than child less-healthy eaters to have a foreign-born household reference person. Overall, 40 percent of healthy eaters had a foreign-born reference person, compared to only 17 percent of less-healthy eaters. This difference was largely due to a difference among income-eligible nonparticipants. Among SNAP participants, there was no significant difference between healthy eaters and less-healthy eaters in the proportion with a foreign-born household reference person (Figure II.14).
- **Household Reference Person's Marital Status:** Child healthy eaters were more likely than child less-healthy eaters to live with a married household reference person. Overall, 73 percent of healthy eaters had a married reference person, compared to 45 percent of less-healthy eaters. This pattern was repeated among SNAP participants, income-eligible nonparticipants, and other low-income nonparticipants (Figure II.14).
- **Household WIC participation:** Forty percent of child healthy eaters were living in households participating in the WIC program, compared to 24 percent of child less-healthy eaters. However, the difference between healthy eaters and less-healthy eaters was statistically significant only among income-eligible nonparticipants. In this group, healthy eaters were substantially more likely than less-healthy eaters to live in households participating in WIC (51 percent versus 20 percent) (Figure II.14).

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<sup>23</sup> The household reference person is defined as the first household member 18 years of age or older listed on the NHANES screener household member roster who owns or rents the residence where members of the household reside.

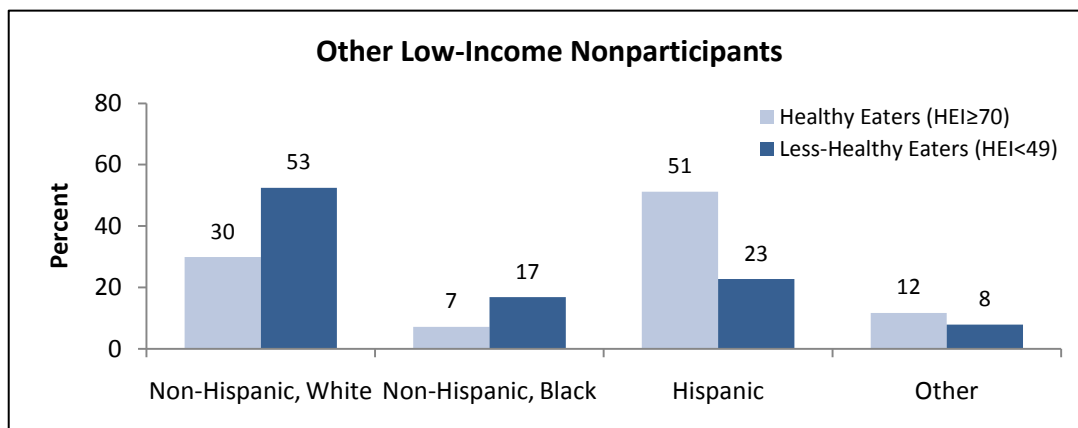
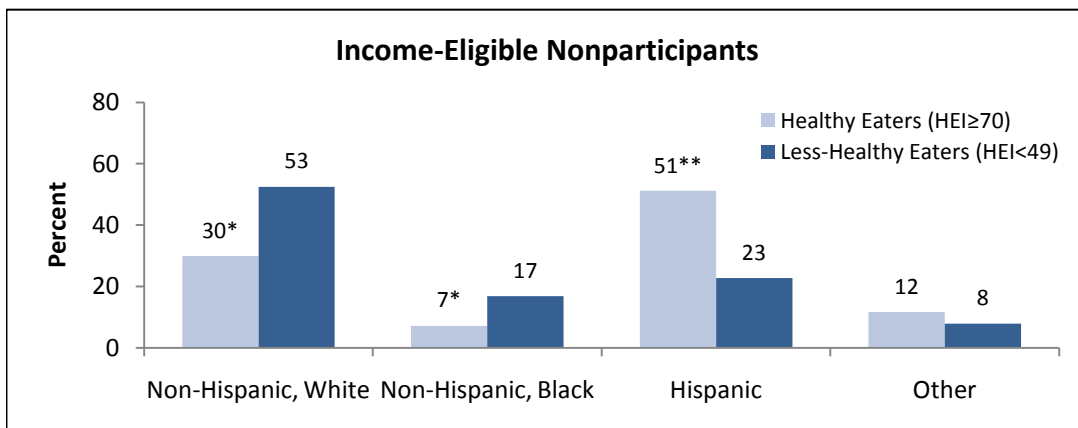
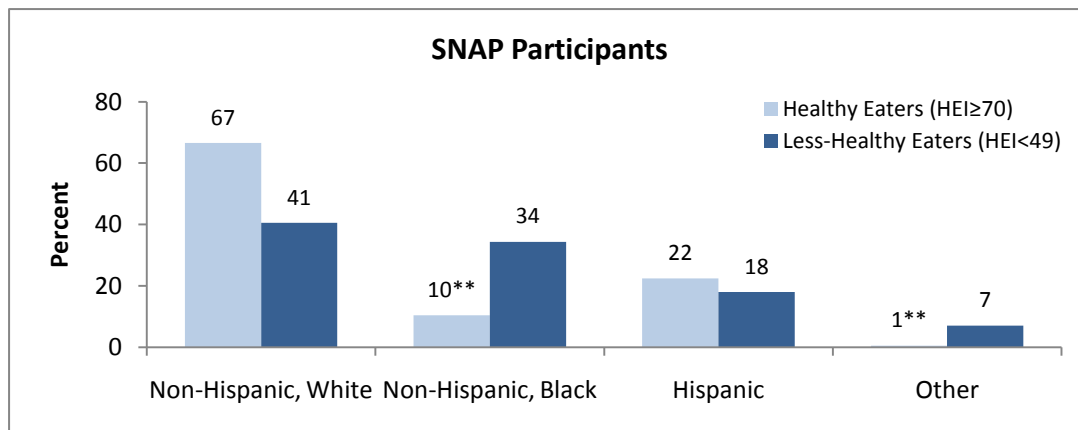
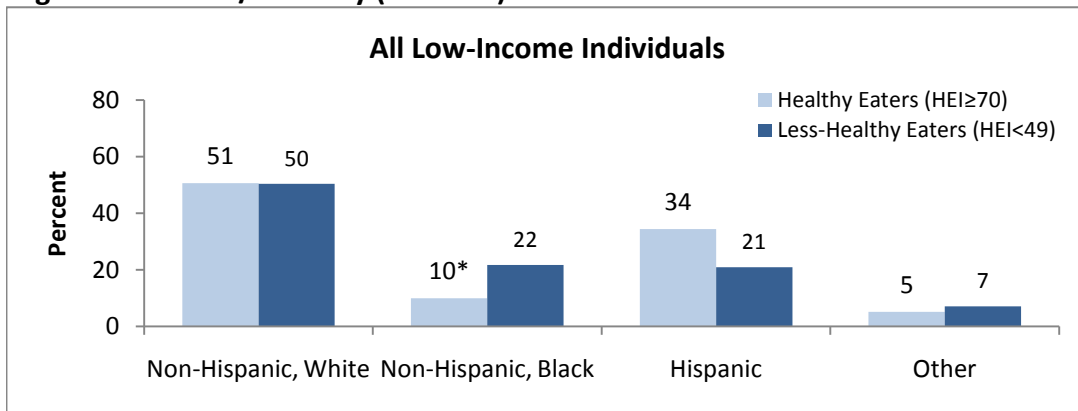
**Figure II.11. Age (Children)**



\* Significantly different from less-healthy eaters,  $p < .05$ , two-tailed test with BH adjustment

\*\* Significantly different from less-healthy eaters,  $p < .01$ , two-tailed test with BH adjustment

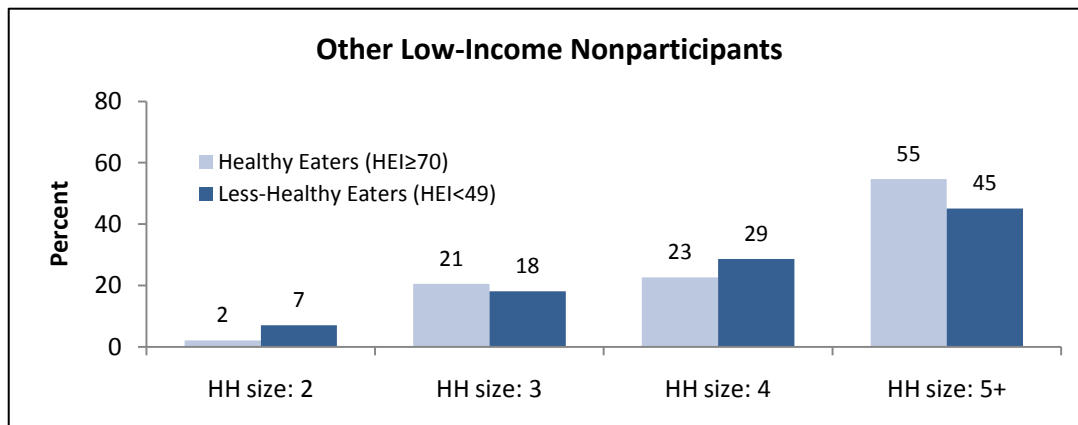
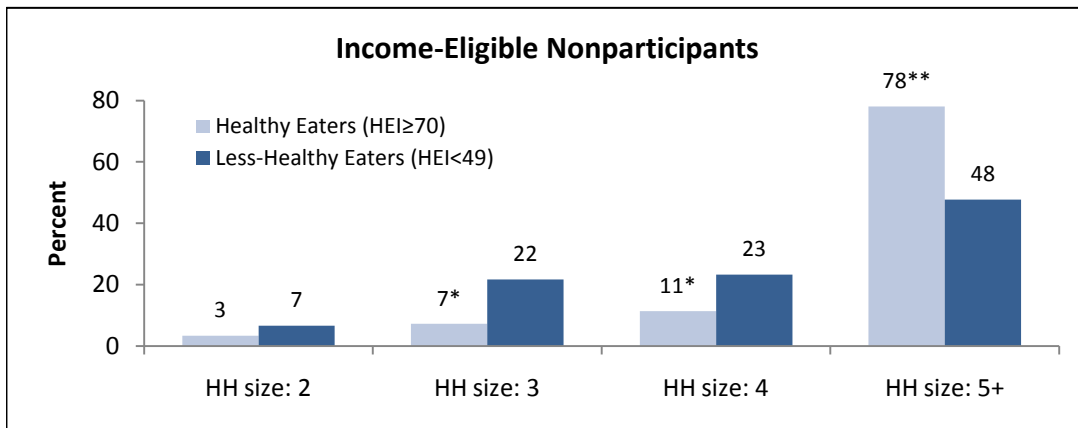
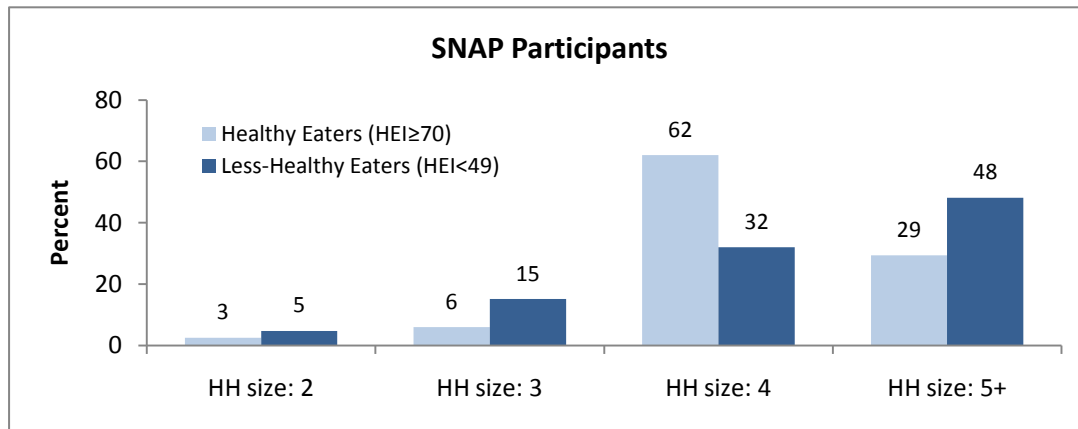
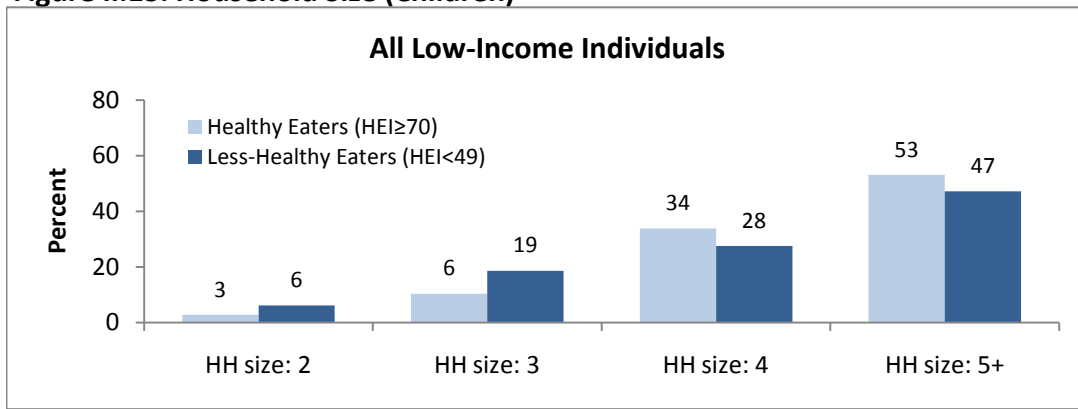
**Figure II.12. Race/Ethnicity (Children)**



\* Significantly different from less-healthy eaters,  $p < .05$ , two-tailed test with BH adjustment

\*\* Significantly different from less-healthy eaters,  $p < .01$ , two-tailed test with BH adjustment

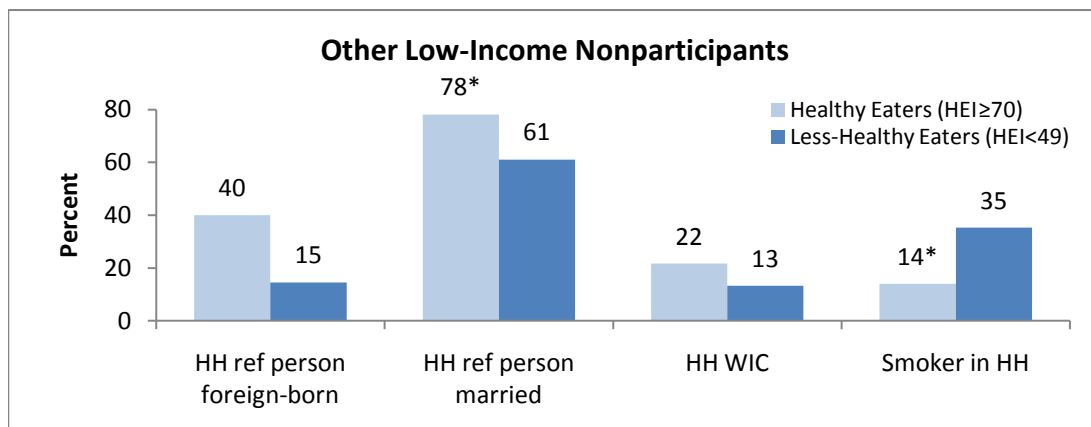
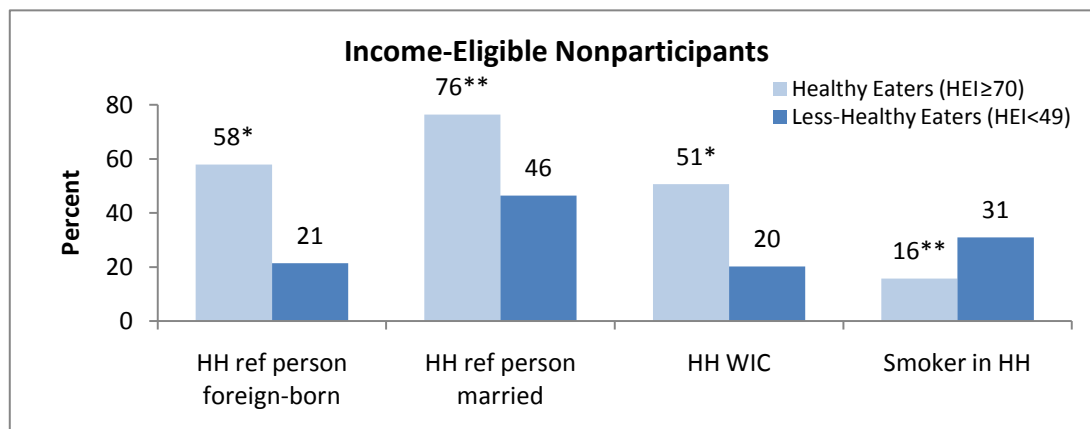
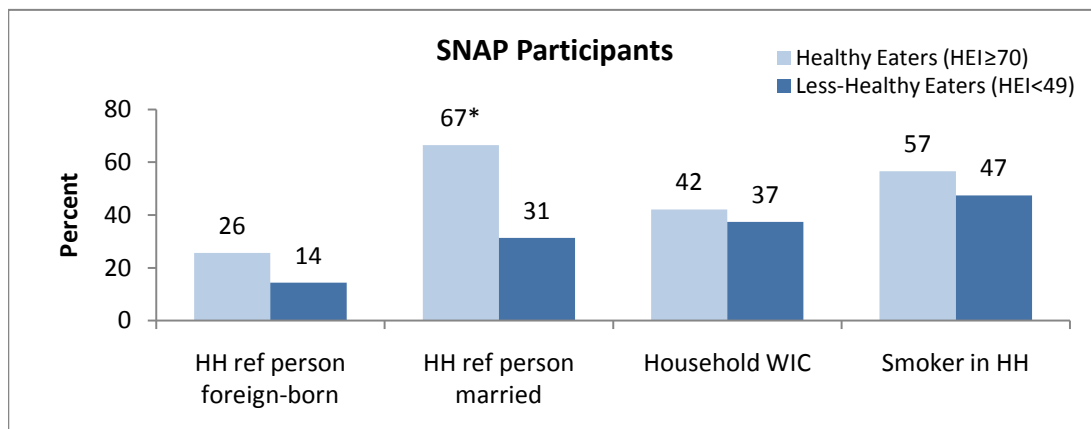
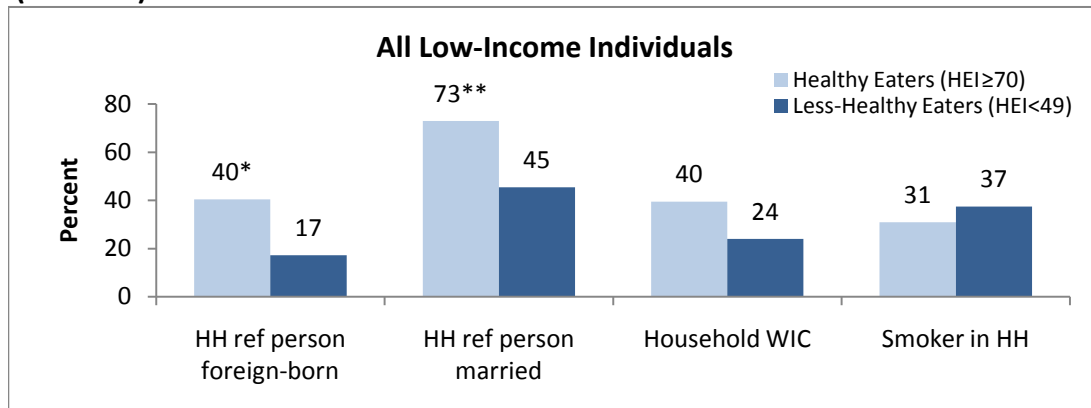
**Figure II.13. Household Size (Children)**



\* Significantly different from less-healthy eaters,  $p < .05$ , two-tailed test with BH adjustment

\*\* Significantly different from less-healthy eaters,  $p < .01$ , two-tailed test with BH adjustment

**Figure II.14. Adult Country of Birth, WIC Participation, and Smoker in Household (Children)**



\* Significantly different from less-healthy eaters,  $p < .05$ , two-tailed test with BH adjustment

\*\* Significantly different from less-healthy eaters,  $p < .01$ , two-tailed test with BH adjustment

- **Smoker in Household:** Overall, there were no statistically significant differences between child healthy eaters and less-healthy eaters in the proportion that had a smoker in the household. Among nonparticipants, however, healthy eaters were less likely than less-healthy eaters to have a smoker in the household. Sixteen percent of healthy eaters in income-eligible nonparticipating households had a smoker in the household, compared to 31 percent of less-healthy eaters. The respective numbers for other low-income nonparticipants were 14 percent and 35 percent (Figure II.14).
- **Child Food Security:** Among all children in low-income households, healthy eaters were less likely than less-healthy eaters to have very low food security. Among SNAP participants, healthy eaters were also less likely than less-healthy eaters to be marginally food secure (5 percent versus 17 percent) (Figure II.15).

### 3. Health-Related Characteristics

- **Obesity Status:** Among children in low-income households, healthy eaters and less-healthy eaters were about equally likely to be obese. However, among income-eligible nonparticipants, healthy eaters were more likely to be obese than less-healthy eaters (28 percent versus 17 percent) (Figure II.16).
- **Taking Prescription Medications:** Overall, differences between child healthy eaters and less-healthy eaters in the proportion that had taken prescription medication within the past month were not statistically significant. However, among SNAP participants, healthy eaters were less likely than less-healthy eaters to have taken prescription medication (6 percent versus 22 percent) (Figure II.16).
- **Screen Time:** Overall, and in each of the subgroups of SNAP participants and nonparticipants, there were no statistically significant differences between child healthy eaters and less-healthy eaters in the proportion spending at least two hours per day in front of the TV or computer (Table B.6).

### 4. Summary

Table II.3 summarizes key differences in the sociodemographic characteristics of healthy and less-healthy eaters among low-income children ages 2 to 18.

Table II.3. Summary of Key Differences in Sociodemographic Characteristics Between Child Healthy and Less-Healthy Eaters.

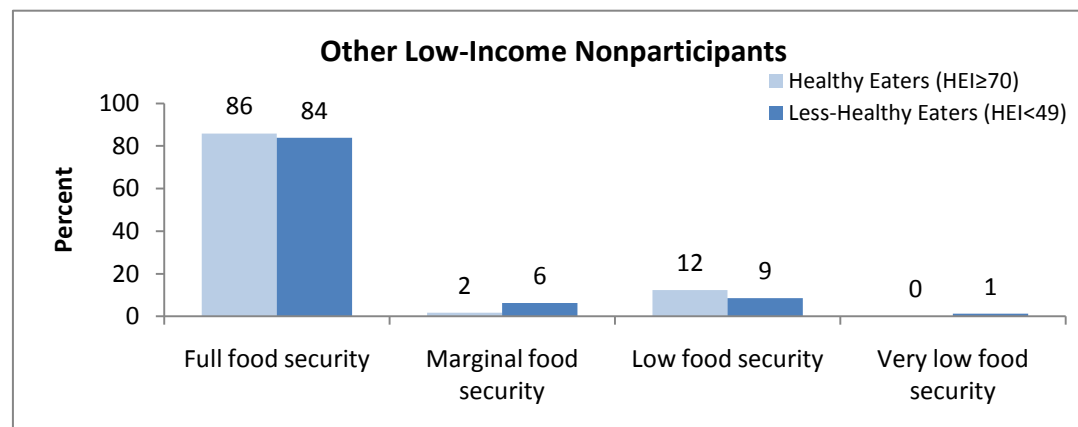
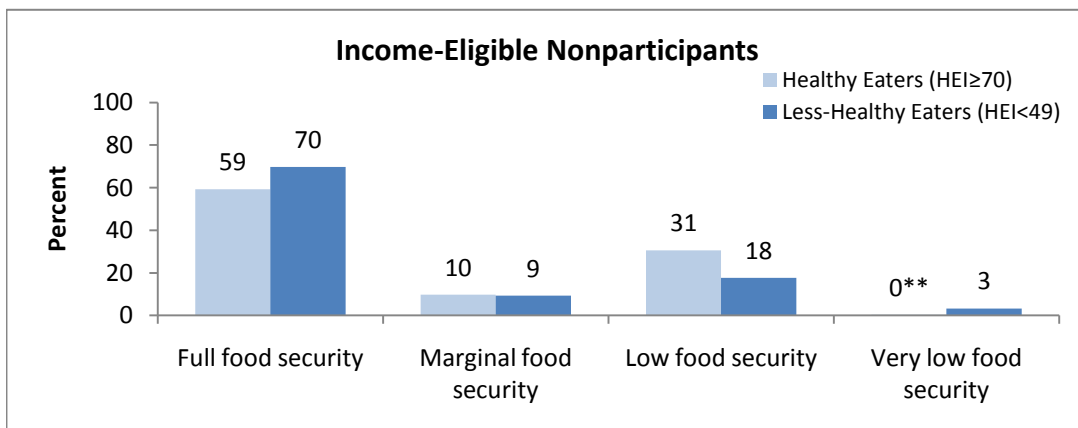
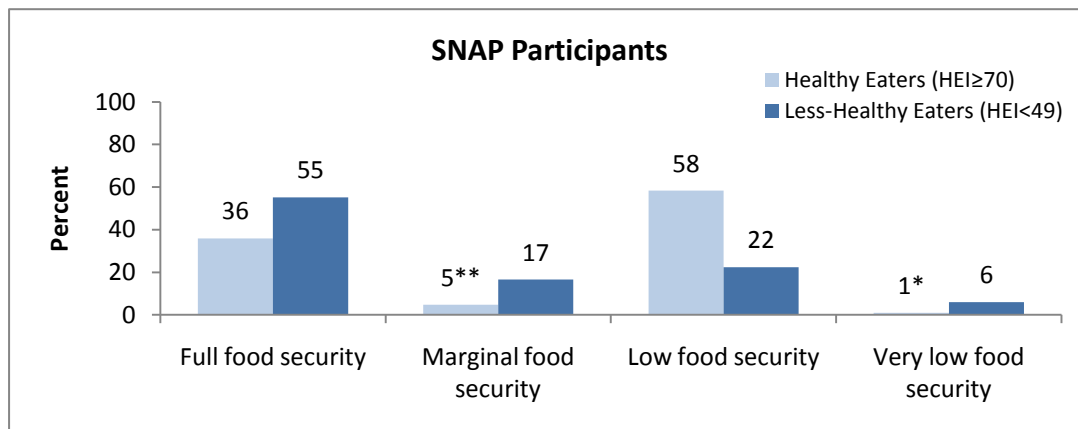
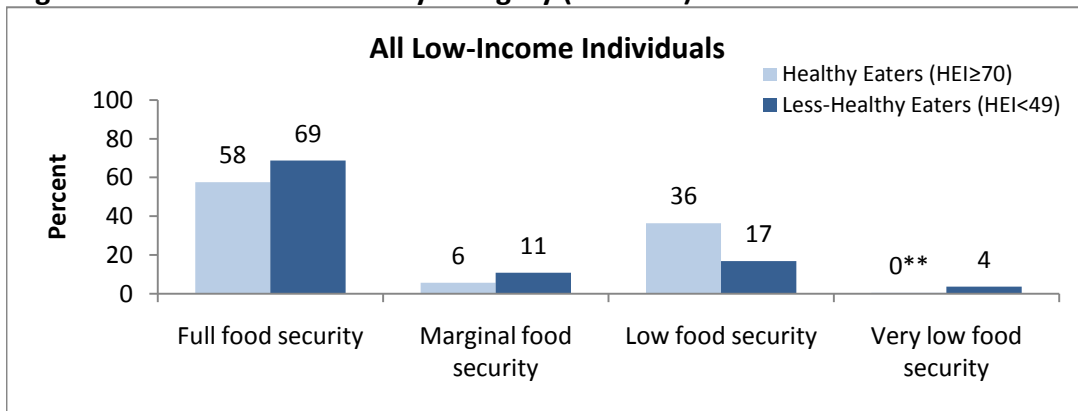
Healthy eaters (HEI $\geq$ 70) were more likely to:	Less-healthy eaters (HEI $<$ 49) were more likely to:
<ul style="list-style-type: none"> <li>• Be age 2 to 5</li> <li>• Have a foreign-born HH reference person<sup>a</sup></li> <li>• Have a married HH reference person<sup>a</sup></li> </ul>	<ul style="list-style-type: none"> <li>• Be age 12 to 18</li> <li>• Be black</li> <li>• Have very low child food security</li> </ul>

<sup>a</sup> The household (HH) reference person is defined as the first household member 18 years of age or older listed on the NHANES screener household member roster who owns or rents the residence where members of the household reside.

HEI = Score on Healthy Eating Index-2005



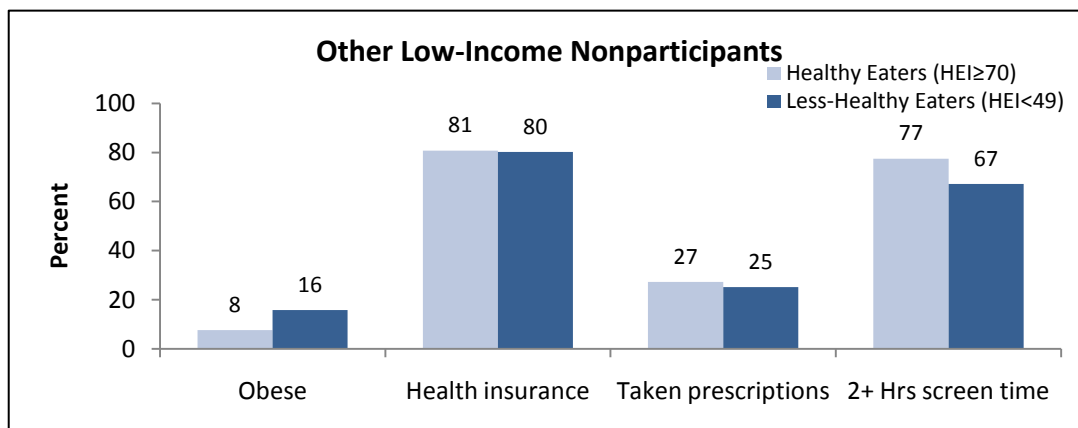
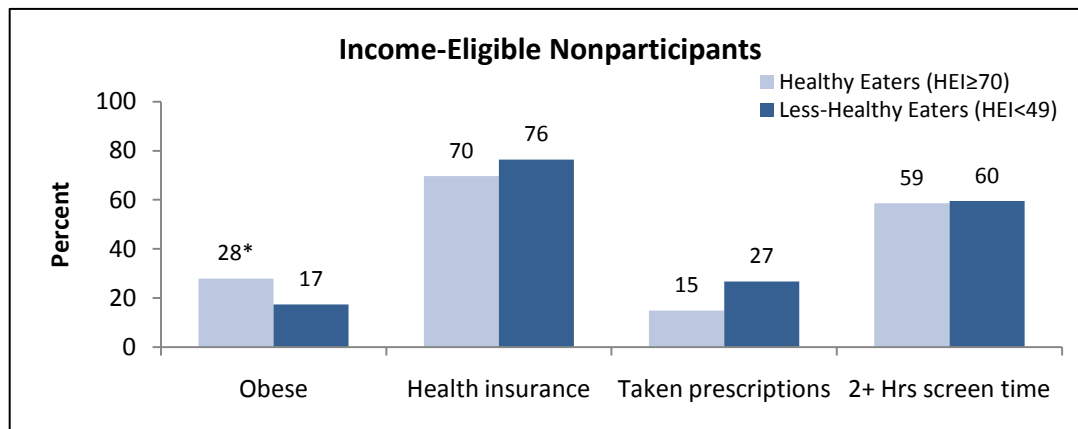
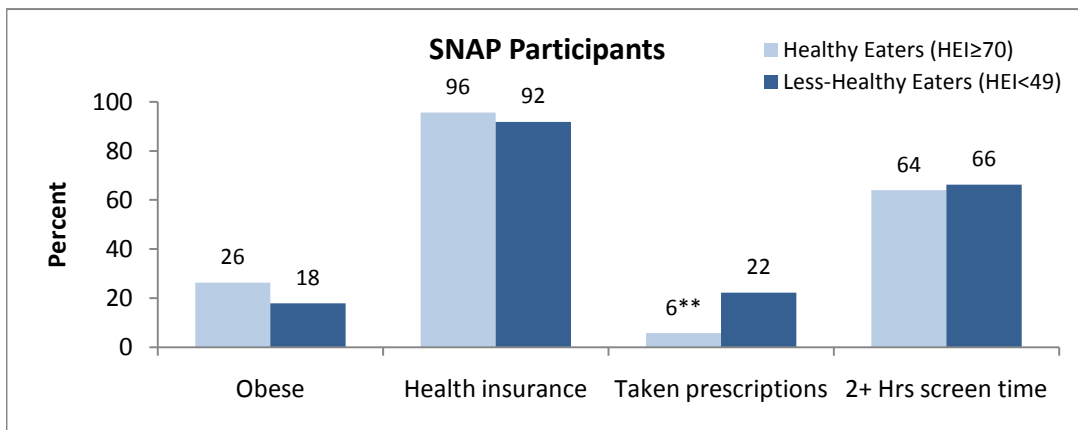
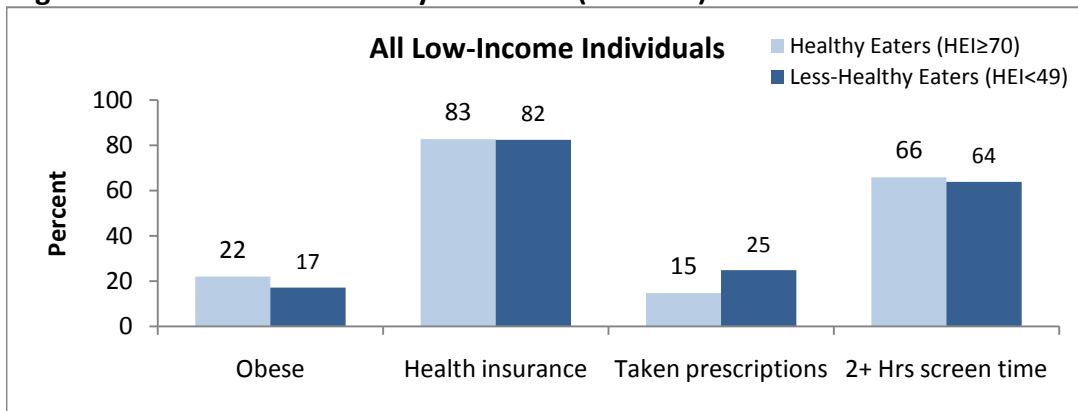
**Figure II.15. Child Food Security Category (Children)**



\* Significantly different from less-healthy eaters,  $p < .05$ , two-tailed test with BH adjustment

\*\* Significantly different from less-healthy eaters,  $p < .01$ , two-tailed test with BH adjustment

**Figure II.16. Health and Healthy Behaviors (Children)**



\* Significantly different from less-healthy eaters,  $p < .05$ , two-tailed test with BH adjustment

\*\* Significantly different from less-healthy eaters,  $p < .01$ , two-tailed test with BH adjustment

As with adults, we also found some interesting differences between SNAP participants and nonparticipants. For example, being age 12 to 18 was strongly associated with being a less-healthy eater among SNAP participants and income-eligible nonparticipants, but not among other low-income nonparticipants; the same was true for being black. There are multiple possible explanations for these differences. For example, parents in higher (but still low) income nonparticipating households may have better knowledge of (or preference for) healthful nutrition, compared to parents in SNAP and income-eligible non-participating households, and therefore provide teenagers in these households with more healthful food choices.

Differences between the groups in the association between certain sociodemographic characteristics and healthy eating likely result from complex inter-correlations between the different characteristics examined in this descriptive analysis. In some cases, such inter-correlation may also confound the association so that it appears counterintuitive. For example, among children in the low-income population overall, no association is observed between being obese and healthy eating, when one would expect a negative association; in fact, among income-eligible nonparticipants, obesity is positively associated with healthy eating. In theory, at least, it may be that obese children are more likely than other children to eat healthfully because they are trying to control their weight, and that this is the phenomena observed instead of the potentially causal link between less-healthy eating and obesity.

In the next section, we present results from a multivariate analysis that controls for sex, age, and other potentially confounding variables, in attempt to better understand the relationship between obesity and healthy eating among children.

### **Comparison Between Children and Adults**

We found more sociodemographic characteristics that distinguished adult healthy and less-healthy eaters than we did for child healthy and less-healthy eaters. This is expected, because (1) our sample of adult healthy eaters was twice as large as our sample of child healthy eaters ( $n=506$  versus

n=246), and (2) many more sociodemographic variables were available for adults than for children.

Several results were consistent for adults and children, including the following:

- Being foreign-born was associated with being a healthy eater among adults, while having a foreign-born household reference person was associated with being a healthy eater among children.
- Being black was associated with being a less-healthy eater among both adults and children. This could reflect differences in food preferences, nutrition knowledge, and access to healthful foods among blacks, relative to other racial/ethnic groups.
- Having very low household food security was associated with being a less-healthy eater among adults, while having very low child food security was associated with being a less-healthy eater among children. Overall, having very low household food security was not associated with being a less-healthy eater among children. It is possible that adults in households with very low food security give priority to their children's diets.

A notable difference between results for adults and children is that spending two or more hours per day in front of the TV or computer was associated with being a less-healthy eater among adults, but not among children. There are many possible reasons for this difference. For example, it may indicate that adults are more likely than children to excessively snack while watching TV.

### C. Multivariate Regressions

In the descriptive analyses of adult healthy eaters and less-healthy eaters (Section A), we found that healthy eaters were: (1) overall, about equally likely as less-healthy eaters to engage in vigorous physical activity and, among SNAP participants, less likely than less-healthy eaters to engage in vigorous physical activity; (2) more likely than less-healthy eaters to have high blood pressure, high cholesterol, diabetes, and to use prescription drugs; and (3) as likely as less-healthy eaters to be obese. In addition, in the descriptive analysis of child healthy eaters and less-healthy eaters we found that, among income-eligible children in non-SNAP households, healthy eaters were more likely than less-healthy eaters to be obese.

These findings are somewhat counterintuitive, since we would expect healthy eaters to lead healthier lifestyles than less-healthy eaters. However, we also found that adult healthy eaters are substantially more likely than adult less-healthy eaters to be age 60 or above, suggesting that age may

be a confounder in the relationship between healthy eating and the previously mentioned health-related characteristics. Other personal characteristics, such as sex and race/ethnicity, may also confound this relationship for both adults and children.

To explore these relationships in a more in-depth way, we used multivariate techniques to control for potential confounding variables. Specifically, we estimated a series of logistic regressions in which the main explanatory variable of interest is one of the health-related characteristics mentioned above, controlling for important personal and household-level characteristics, such as sex, age, and race/ethnicity. We also included an indicator variable for SNAP participation and interacted the explanatory variable of interest with this indicator variable to see whether the estimated relationships vary between participants and nonparticipants.

The estimated regression model was as follows:

$$Prob(Y_i = 1) = \text{logit} \left[ \beta_0 + \beta_1 X_i + \sum_{k=2}^k \beta_k Z_{ik} + \varepsilon_i \right]$$

Here,  $Y_i$  equals 1 if person  $i$  has an HEI-2005 score equal to or above the “healthy eating” cutoff point,  $X_i$  is the health-related characteristic of interest (for example: “has high blood pressure”),  $Z_{ik}$  is the value of characteristic  $k$  for individual  $i$  (including participation group indicators and interactions), and  $\varepsilon_i$  is the residual. We estimated separate regressions for adults and children, including in each regression all individuals with household incomes at or below 200 percent of the federal poverty level. For adults, we estimated regressions for six health-related characteristics: obesity, engaged in vigorous physical activity, high blood pressure, high cholesterol, diabetes, took prescription medications. For children, we estimated a regression for the obesity variable.

The estimated coefficient  $\beta_1$  provides an estimate of the magnitude of the association between the health-related characteristic of interest and the probability of being a healthy eater, adjusted for

the other explanatory variables included in the regression. If, for example, the relationship between having high blood pressure and healthy eating is largely explained by the relationship between age and healthy eating, we would expect the estimated association between having high blood pressure and healthy eating to be weaker once age is accounted for, compared to when it is not. Below, we separately discuss results for adults and for children.

## 1. Adults

Regression results for adults are presented in Table II.4. Each column in the table corresponds to a separate regression analysis. In each column, the dependent variable is the same (an indicator for healthy eating status), while the explanatory variable of interest is an indicator for either: (1) obesity, (2) engaged in vigorous physical activity in past 30 days, (3) high blood pressure, (4) high cholesterol, (5) diabetes, or (6) took prescription drugs in past 30 days. All other explanatory variables—including SNAP participation status, sex, age, race/ethnicity, education, marital status, and an indicator for being foreign-born—are the same across columns.

In all six regressions, the following characteristics were positively associated with being a healthy eater and statistically significant at the 5 percent level: being female, being older than 60, having a high school education or higher degree (compared to less than a high school education), and being foreign-born. There were no significant differences between SNAP participants and nonparticipants in the relationship between the explanatory variables of interest and the likelihood of being a healthy eater, except for the variable indicating engagement in vigorous physical activity.

There was no significant relationship between being a healthy eater and obesity status. One potential explanation for this is that obese individuals may have underreported their dietary intakes, a phenomenon that has been observed in previous research (Briefel et al. 1997, Klesges et al. 1995); another is that cross-sectional studies such as this one are inherently limited by the potential for reverse causality (see related discussion in the summary section below).

Table II.4. Logistic Regression Results on the Relationship between Healthy Eating Status (Y), Explanatory Variables of Interest (X), and Other Sociodemographic Characteristics (Adults)<sup>a</sup>

Y = HEI- 2005≥70 (dependent variable)						
Variable	(1) X=Obese Odds Ratio (95% CI)	(2) X=Engaged in Vigorous Physical Activity in Past 30 Days Odds Ratio (95% CI)	(3) X=High Blood Pressure Odds Ratio (95% CI)	(4) X=High Cholesterol Odds Ratio (95% CI)	(5) X= Diabetes Odds Ratio (95% CI)	(6) X=Took Prescription Drugs in Past 30 Days Odds Ratio (95% CI)
X	1.25 (0.90-1.74)	1.88 (1.23-2.87)	1.16 (0.85-1.57)	1.28 (0.93-1.77)	1.75 (1.20-2.55)	1.37 (0.83-2.26)
SNAP Participant	0.77 (0.46-1.29)	1.25 (0.81-1.94)	0.80 (0.40-1.62)	0.95 (0.53-1.70)	0.95 (0.60-1.50)	1.12 (0.46-2.73)
X*SNAP Participant	1.33 (0.57-3.08)	0.21 (0.08-0.52)	1.43 (0.57-3.58)	1.06 (0.46-2.46)	0.97 (0.35-2.73)	0.74 (0.28-1.98)
Female	1.46 (1.11-1.91)	1.66 (1.26-2.17)	1.57 (1.19-2.06)	1.57 (1.14-2.16)	1.58 (1.20-2.08)	1.53 (1.16-2.01)
Age <sup>b</sup>						
31-40	1.16 (0.65-2.05)	1.14 (0.68-1.92)	1.04 (0.62-1.75)	1.13 (0.67-1.93)	1.01 (0.61-1.68)	1.01 (0.62-1.64)
41-50	1.81 (1.08-3.02)	1.87 (1.09-3.19)	1.60 (0.95-2.69)	1.73 (0.89-3.39)	1.58 (0.96-2.61)	1.52 (0.91-2.56)
51-60	1.78 (0.93-3.42)	1.81 (0.84-3.90)	1.46 (0.69-3.08)	1.59 (0.74-3.42)	1.39 (0.68-2.83)	1.42 (0.72-2.77)
>60	3.82 (2.33-6.26)	4.28 (2.60-7.05)	3.19 (1.94-5.26)	3.49 (1.96-6.22)	3.11 (1.95-4.95)	3.01 (1.89-4.81)
Education <sup>c</sup>						
HS/GED	1.78 (1.29-2.46)	1.70 (1.22-2.37)	1.73 (1.24-2.41)	1.64 (1.19-2.27)	1.77 (1.26-2.47)	1.71 (1.23-2.38)
More than HS	2.39 (1.67-3.42)	2.07 (1.43-3.01)	2.21 (1.49-3.28)	2.27 (1.56-3.30)	2.29 (1.55-3.39)	2.21 (1.51-3.21)
Married	1.08 (0.77-1.53)	1.13 (0.82-1.56)	1.09 (0.79-1.51)	1.11 (0.80-1.53)	1.10 (0.79-1.52)	1.11 (0.80-1.53)
Foreign-Born	2.89 (2.00-4.19)	3.01 (2.12-4.26)	3.10 (2.15-4.47)	3.06 (2.05-4.55)	2.98 (2.08-4.28)	3.13 (2.22-4.42)

Source: NHANES 1999-2004, N=6,055

<sup>a</sup> If the value 1 is not within the 95% CI, then the Odds Ratio is statistically significant at the 5% level (P<0.05).<sup>b</sup> Reference group is 19 to 40 years old.<sup>c</sup> Reference group is non-Hispanic white.<sup>d</sup> Reference group is less than a high school education.

The estimated coefficient for vigorous physical activity is significant, and positive, with an odds ratio (OR) of 1.88. In addition, the OR for the interaction between vigorous physical activity and the indicator for SNAP participation is significantly smaller than 1 (OR=0.21). This indicates that, after controlling for possible confounders, vigorous physical activity is positively associated with healthy eating among nonparticipants, but not among participants.

The estimated coefficients for high blood pressure, high cholesterol, and prescription drugs are not significant, suggesting that the initial positive association between these variables and healthy eating is due to confounders, such as age. However, the estimated coefficient for diabetes is significant and positive, with an OR of 1.75. This suggests that diabetic adults in the low-income population are more likely than nondiabetic adults to be healthy eaters, holding other factors constant. This is not necessarily surprising, given that a healthy diet is a major strategy for day-to-day management of diabetes.<sup>24</sup>

## 2. Children

Regression results for children are presented in Table II.5. The dependent variable is an indicator for healthy eating status, and the explanatory variable of interest is an indicator for obesity. Other explanatory variables include: SNAP participation status, sex, age, race/ethnicity, education and marital status of the household reference person, and whether the household reference person is foreign-born.

The estimated coefficient for ages 12 to 18 is significant and negative, and the estimated coefficient for having a married household reference person is significant and positive. This suggests that children in low-income households are more likely to be healthy eaters if they are younger than

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<sup>24</sup> For the same reason, a similar relationship with healthy eating might be expected for those with high blood pressure and high cholesterol. See related discussion in the summary section below.



Table II.5. Logistic Regression Results on the Relationship between Healthy Eating Status (Y), Obesity (X), and Other Sociodemographic Characteristics (Children)<sup>a</sup>

Variable	Y = HEI-2005 $\geq$ 70 (dependent variable)
	Odds Ratio (95% CI)
Obese	1.05 (0.57-1.92)
SNAP Participant	1.51 (0.70-3.28)
Obese*SNAP Participant	2.14 (0.89-5.17)
Female	1.25 (0.61-2.55)
Age <sup>b</sup>	
6-11	0.57 (0.23-1.40)
12-18	0.42 (0.26-0.68)
Race/Ethnicity <sup>c</sup>	
Black	0.59 (0.25-1.38)
Hispanic	0.90 (0.51-1.58)
Other	0.70 (0.20-2.41)
Education of HH Ref Person <sup>d,e</sup>	
HS/GED	1.90 (0.90-4.04)
More than HS	1.49 (0.85-2.61)
HH Ref Person Married <sup>e</sup>	2.52 (1.23-5.19)
HH Ref Person Foreign-Born <sup>e</sup>	2.02 (0.99-4.16)

Source: NHANES 1999-2004, N=6,311

<sup>a</sup> If the value 1 is not within the 95% CI, then the Odds ratio is statistically significant at the 5% level (P<0.05).<sup>b</sup> Reference group is 2 to 5 years old.<sup>c</sup> Reference group is non-Hispanic white.<sup>d</sup> Reference group is less than a high school education.<sup>e</sup> The household reference (HH Ref) person is defined as the first household member 18 years of age or older listed on the NHANES screener household member roster who owns or rents the residence where members of the household reside.

12 and live in a household with a married adult. However, as with adults, the estimated coefficient for obesity status is not significant.

### 3. Summary

Table II.6 summarizes findings from the multivariate analysis. As shown, for both adults and children in the low-income population, we found no significant relationship between being a healthy eater and being obese (when we would have expected a negative association). In addition, among adults, we found a significant and positive association between being a healthy eater and (1) engaging in vigorous physical activity in the past 30 days and (2) having diabetes. After controlling for potential confounders, we found no significant relationship between being a healthy eater and having high blood pressure, having high cholesterol, or taking prescription medications.

Table II.6. Main Associations with Healthy Eating Status

Explanatory Variable	Adults	Children
Is obese	No association	No association
Engaged in vigorous physical activity	+	N/A
Has high blood pressure	No association	N/A
Has high cholesterol	No association	N/A
Has diabetes	+	N/A
Took prescription medication	No association	N/A

+ = Explanatory variable is positively associated with being a healthy eater (HEI $\geq$ 70).

No association = No statistically significant association between explanatory variable and healthy eating status,  $p < 0.05$ .

N/A = Not available.

One potential explanation for the lack of a negative association between being a healthy eater and being obese is that obese individuals may have selectively underreported high-calorie (high fat, high-sugar) foods, which would lead to an overstated HEI-2005 score. Another explanation is that our study was inherently constrained by the potential for reverse causality, because of its cross-sectional design. For example, those who are obese may change their diet in order to lose weight, rather than choosing a certain diet that happens to cause obesity.

For these reasons, our results regarding health outcomes such as obesity, high blood pressure and diabetes should not be over-interpreted, as they are not well suited to detect such relations. Reviews by Newby and Tucker (2004) and Togo et al. (2001) have also shown inconsistent findings between dietary patterns and weight status. A number of more recent reports have found such association in both adults (e.g., Newby et al. 2003, Schulze et al. 2006) and children (e.g., Larowe et al. 2007, Ritchie et al. 2007), however. A recent study (Chen et al. 2011) also has found that U.S. adults with diet-related chronic diseases have higher diet quality (based on the HEI-2005, as in our study) than those without these health conditions. Our finding that being a healthy eater is positively associated with having diabetes, but not with having high blood pressure or high cholesterol, suggests that individuals with diabetes may be more prone than individuals with other chronic conditions to adjust their diets in ways that affect their HEI-2005 score.

### III. DIETARY CHARACTERISTICS OF HEALTHY AND LESS-HEALTHY EATERS

In this chapter, we compare the dietary characteristics of healthy eaters and less-healthy eaters. We use five different groups of measures to assess dietary characteristics. These include: (1) measures of meal and snack patterns, such as whether breakfast was consumed, the number of snacks consumed, frequency of eating in restaurants, and the percentage of calories consumed away from home; (2) scores on the individual components of the HEI-2005; (3) measures of food choice, based on whether specific types of food were consumed during the 24-hour period reported in the dietary recall<sup>25</sup>; (4) alternative measures of food choices, based on the relative contribution of specific foods to total calories (for example, the percentage of calories obtained from sugar-sweetened beverages); and (5) measures of nutrient density and energy density. Details about variable construction are provided in Appendix A.

We compared means and proportions for healthy eaters and less-healthy eaters for all low-income individuals and for the three subgroups of SNAP participants and nonparticipants. Comparisons were done separately for adults (ages 19 and older) and children (ages 2 to 18). Findings from this analysis provide a comprehensive picture of differences in the dietary characteristics of healthy eaters and less-healthy eaters.

#### A. Adults

Below, we summarize the dietary characteristics for which we observed statistically significant differences between healthy eaters and less-healthy eaters for low-income adults overall or in one or more of the subgroups of SNAP participants and nonparticipants.<sup>26</sup> Graphics are used to summarize

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<sup>25</sup> HEI-2005 component scores consider foods from all sources including, for example, fruit contributed by breakfast cereals, juice, or cookies. In contrast, the measures of food choice reflect foods consumed as discrete food items. So, for example, the ‘fruit’ variable in this analysis includes only fresh, canned, and frozen fruit.

<sup>26</sup> Due to the large number of comparisons tested, the discussion in the text focuses on differences between healthy and less-healthy eaters that are statistically significant and points out instances of no significant differences without much additional comment. For many variables, differences between healthy eaters and less-healthy eaters among SNAP participants are not statistically significant even though the magnitude of the difference is large. In some of these

key variables. Results for the full set of variables used in the analysis are presented in Tables C.1 through C.5.<sup>27</sup>

## 1. Meal and Snack Patterns

- Among all low-income adults, healthy eaters were significantly more likely than less-healthy eaters to eat breakfast (92 percent versus 67 percent) and significantly more likely to eat three meals (65 percent versus 39 percent) (Figure III.1). This pattern was also observed in all three subgroups.
- Among low-income adults overall, there was no significant difference between healthy eaters and less-healthy eaters in the number of snacks consumed (Figure III.2). However, among income-eligible nonparticipants and other low-income individuals, healthy eaters were less likely than less-healthy eaters to consume any snacks. Among other low-income individuals, healthy eaters were also less likely than less-healthy eaters to consume three or more snacks.
- Compared to adult less-healthy eaters, adult healthy eaters obtained a significantly greater percentage of their total daily calories from breakfast (23 percent versus 15 percent for all low-income adults) and a significantly smaller percentage from snacks (18 percent versus 27 percent) (Figure III.3). Both patterns were observed for all three subgroups although, among SNAP participants, the difference between healthy eaters and less-healthy eaters in percentage of calories from snacks was not statistically significant.
- Among all low-income adults and in all three subgroups, healthy eaters consumed a smaller percentage of calories away from home than less-healthy eaters (17 to 23 percent versus 30 to 37 percent) (Figure III.3)

## 2. Selected Dietary Behaviors

- Adult healthy eaters were less likely than adult less-healthy eaters to report eating in a restaurant three or more times per week (Figure III.1). This pattern was observed for all low-income adults (15 percent versus 31 percent) and all three subgroups.
- Among all low-income adults and among income-ineligible nonparticipants, healthy eaters were less likely than less-healthy eaters to have ever consumed alcohol. Among all low-income adults and in all three subgroups, healthy eaters were less likely than less-healthy eaters to consume alcohol three or more times per week (Table C.1).

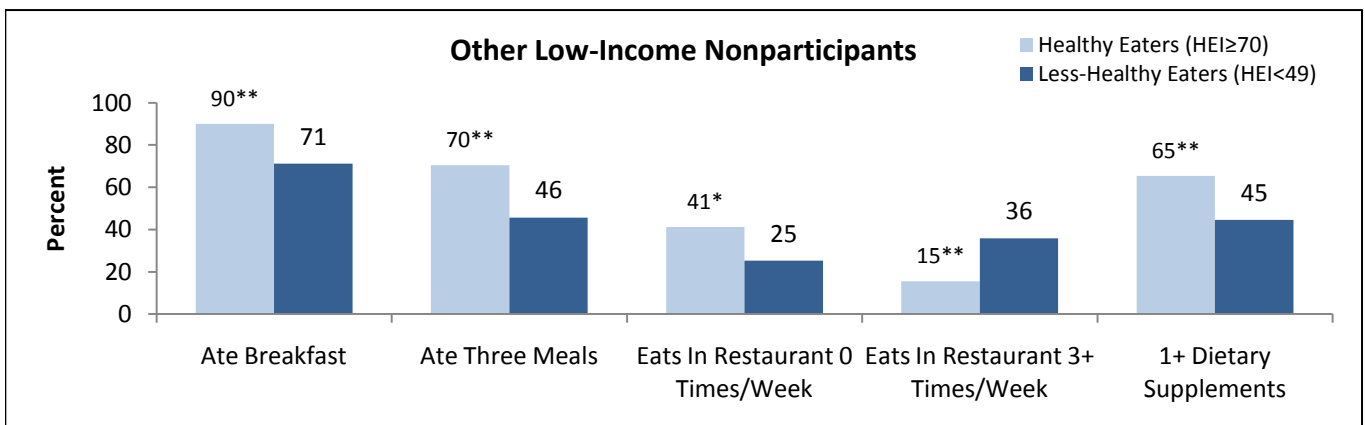
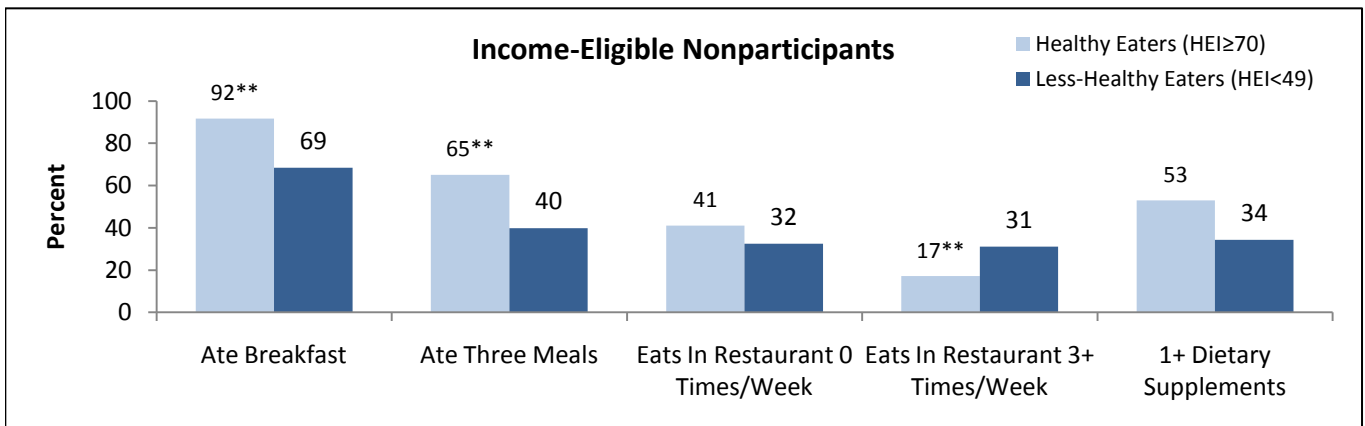
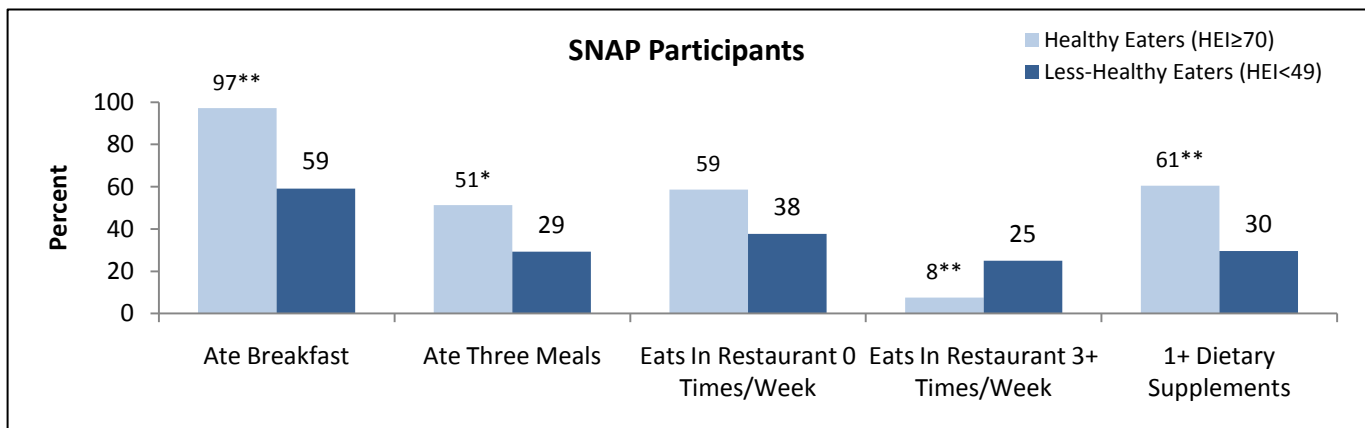
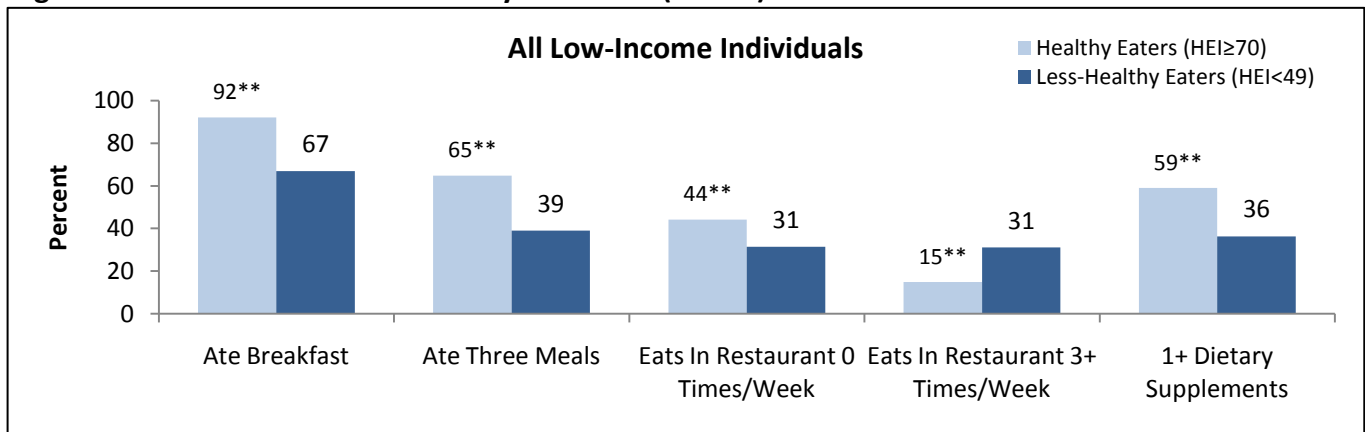
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*(continued)*

cases, the lack of statistical significance among SNAP participants is presumably due to smaller sample sizes (and, therefore, less statistical power to detect differences).

<sup>27</sup> In Appendix C tables and figures III.1 to III.10, “HEI” is used instead of “HEI-2005” because of space limitation.

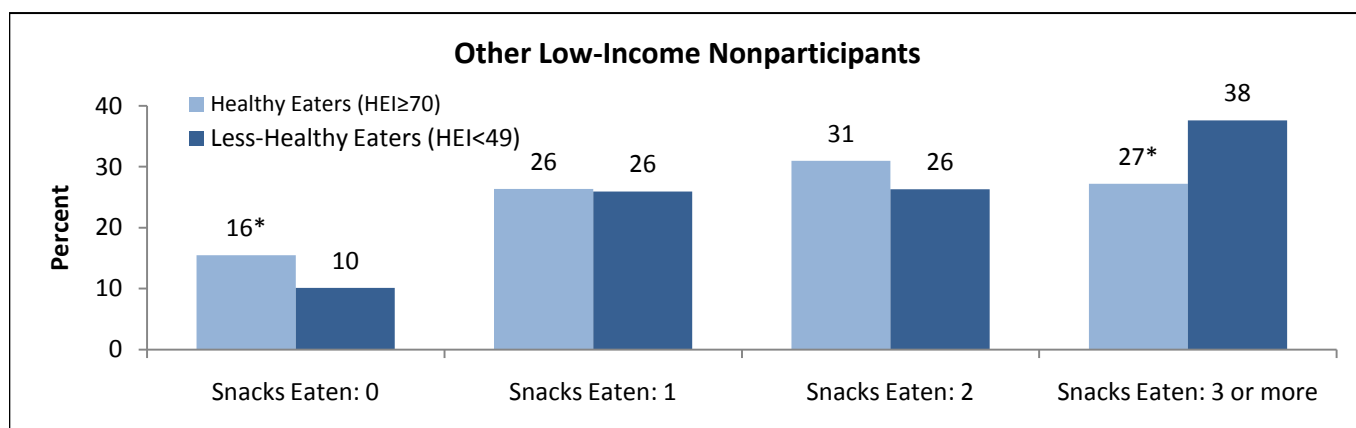
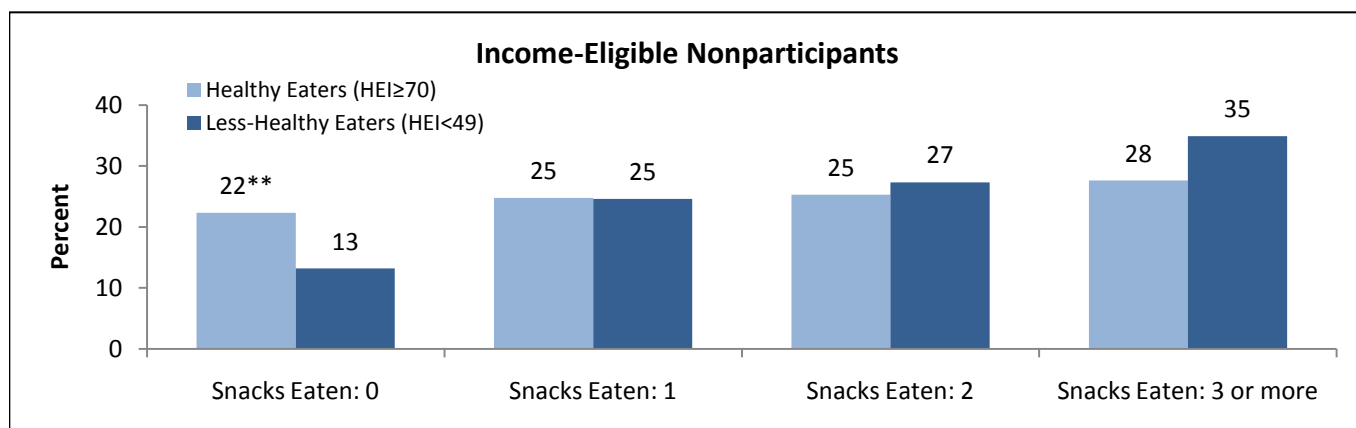
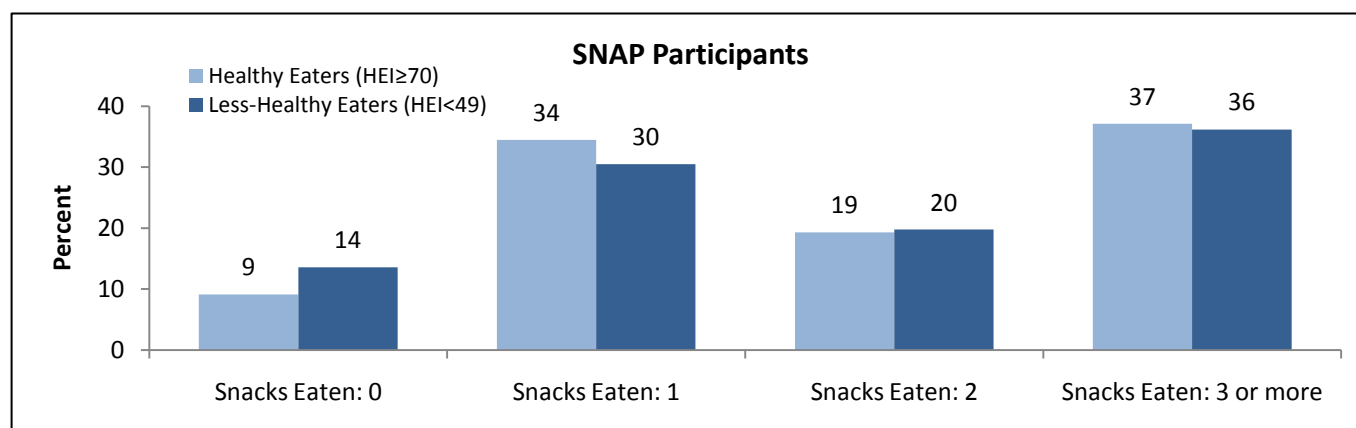
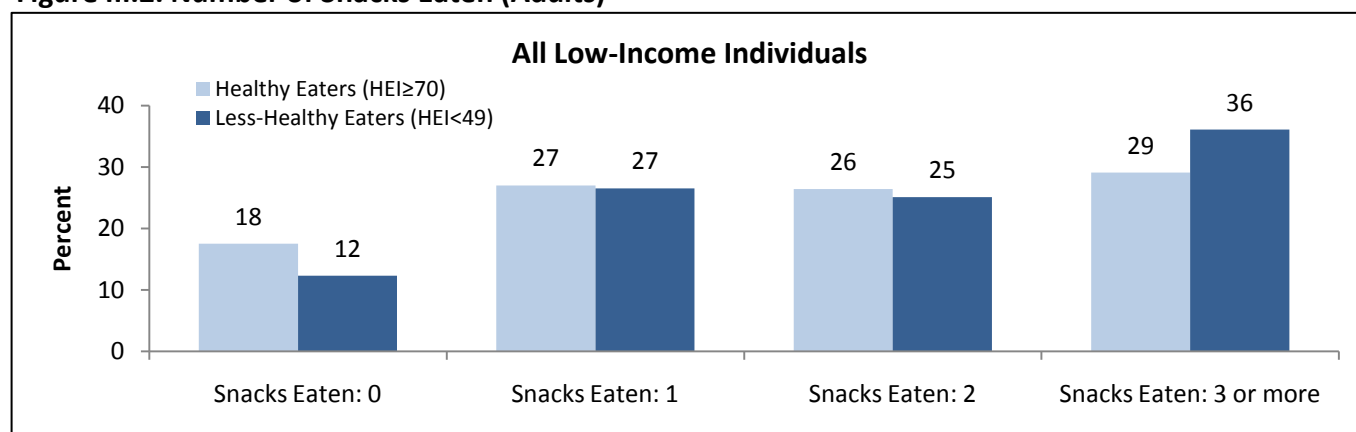
**Figure III.1. Meal Patterns and Dietary Behaviors (Adults)**



\* Significantly different from less-healthy eaters,  $p < .05$ , two-tailed test with BH adjustment

\*\* Significantly different from less-healthy eaters,  $p < .01$ , two-tailed test with BH adjustment

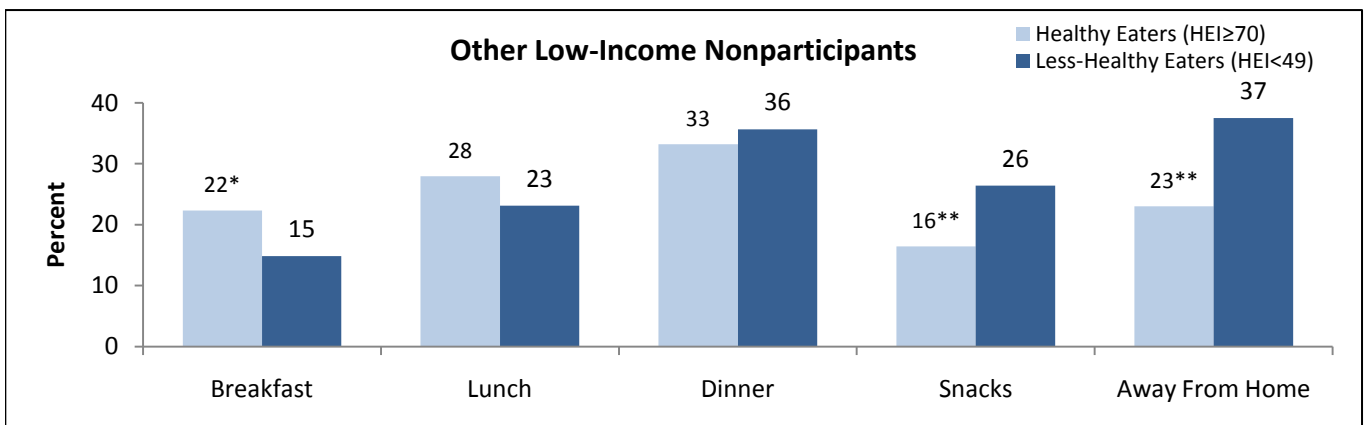
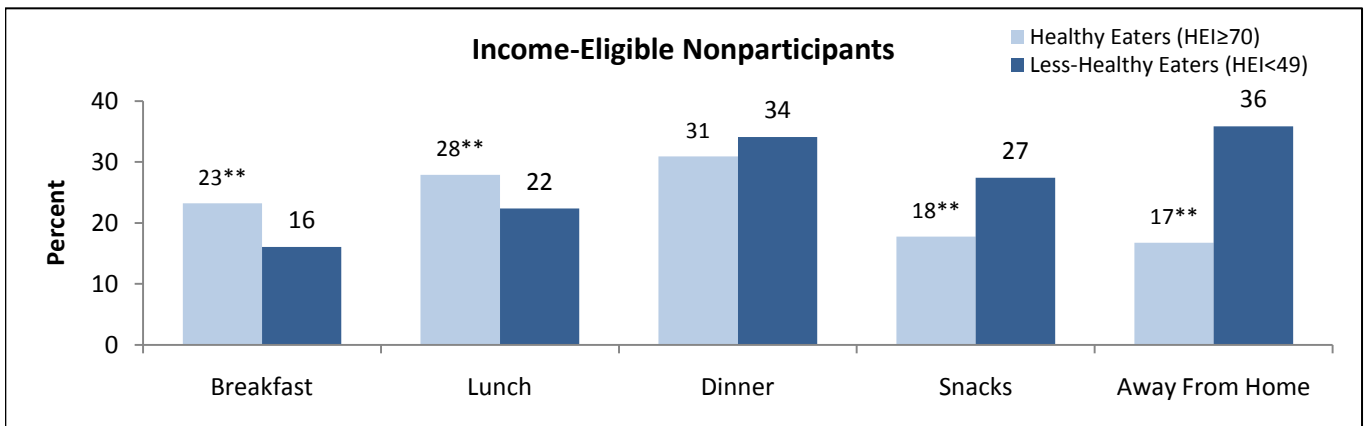
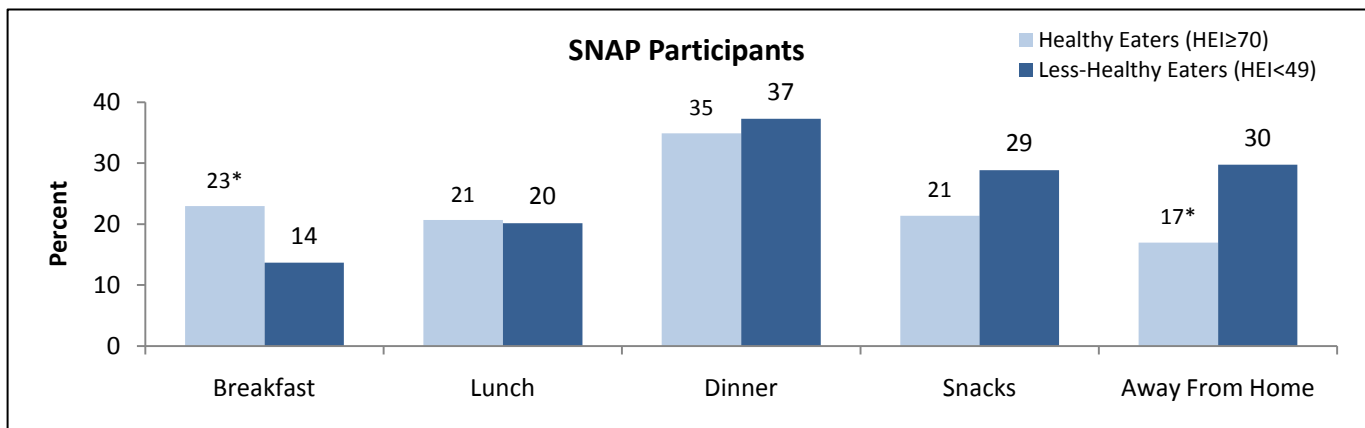
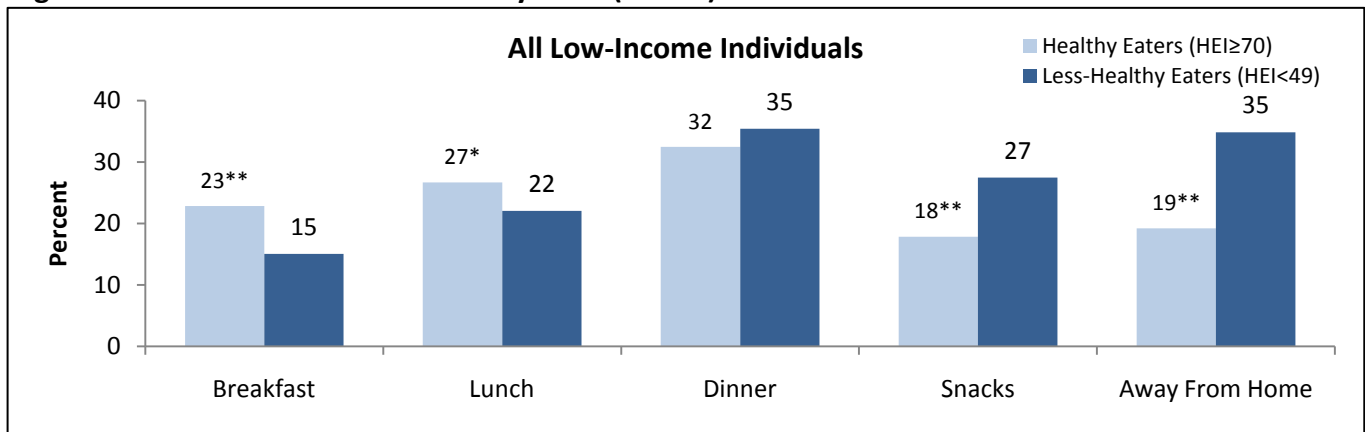
**Figure III.2. Number of Snacks Eaten (Adults)**



\* Significantly different from less-healthy eaters,  $p < .05$ , two-tailed test with BH adjustment

\*\* Significantly different from less-healthy eaters,  $p < .01$ , two-tailed test with BH adjustment

**Figure III.3. Percent of Total Calories by Meal (Adults)**



\* Significantly different from less-healthy eaters,  $p < .05$ , two-tailed test with BH adjustment

\*\* Significantly different from less-healthy eaters,  $p < .01$ , two-tailed test with BH adjustment



- Adult healthy eaters in all groups were significantly more likely than adult less-healthy eaters to use dietary supplements (Figure III.1).

### 3. HEI-2005 Component Scores

- Among all low-income adults, healthy eaters scored significantly higher than less-healthy eaters on all 12 of the HEI-2005 components (Figure III.4).<sup>28</sup> Differences were most dramatic for the calories from the SoFAAS component (93 percent of the maximum possible score, on average, versus 19 percent), the whole fruit component (82 percent of the maximum possible score versus 15 percent), and the total fruit component (85 percent versus 21 percent).
- This pattern was observed for all three subgroups of adults and, with only two exceptions, differences between healthy eaters and less-healthy eaters were statistically significant. Among SNAP participants, there was no statistically significant difference between healthy eaters and less-healthy eaters in mean score on the total grains component. In addition, among both groups of nonparticipants, there were no statistically significant differences between healthy eaters and less-healthy eaters in mean score on the sodium component (Figure III.4).

### 4. Food Choices, Based on Consumption

There were widespread differences between adult healthy eaters and less-healthy eaters in the proportion of individuals who reported eating specific types of food (Table C.3).<sup>29</sup>

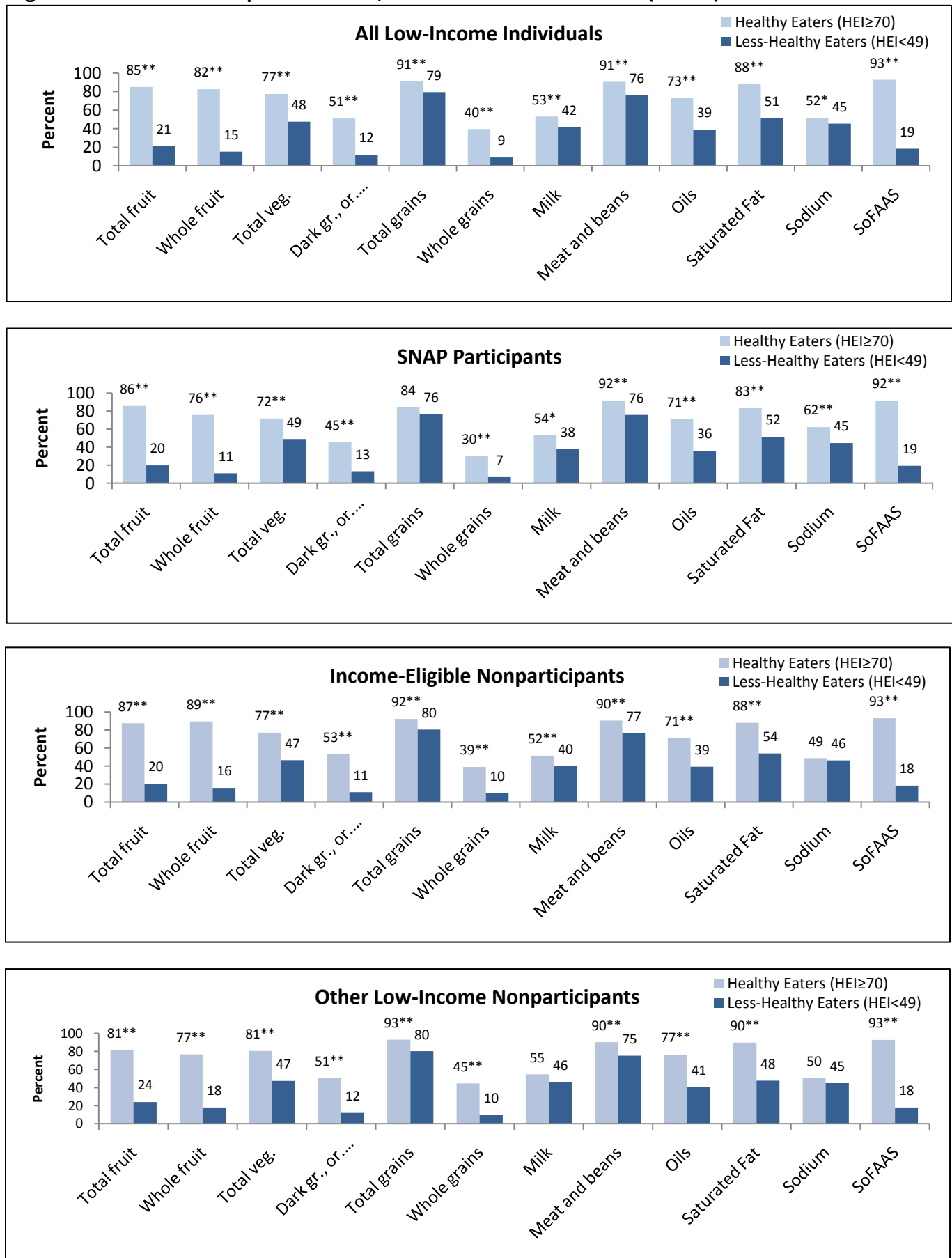
- Among all low-income adults and in all three subgroups, healthy eaters were significantly more likely than less-healthy eaters to consume:
  - Discrete servings of milk (of any type)
  - One percent or skim milk
  - Fruit
  - Fresh fruit
  - Fruit juice
  - Whole grains
  - Nuts and seeds (including peanut butter)

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<sup>28</sup> For ease in presentation, HEI-2005 scores are reported in the figure as percentages of the maximum possible scores. Actual mean scores are presented in Table C.2. The scoring criteria for HEI-2005 components assign higher scores for greater consumption of food-based components and lower scores for greater consumption of sodium, saturated fat, and SoFAAS.

<sup>29</sup> Individuals were considered to have consumed a food if any amount of the food was reported. The analysis is based on foods as consumed and does not consider individual components of mixed foods.

**Figure III.4. HEI-2005 Component Scores, Mean Percent of Maximum (Adults)**



\* Significantly different from less-healthy eaters,  $p < .05$ , two-tailed test with BH adjustment

\*\* Significantly different from less-healthy eaters,  $p < .01$ , two-tailed test with BH adjustment

- Adult healthy eaters were significantly more likely than adult less-healthy eaters to consume discrete servings of vegetables (Figure III.5). This finding, which was observed for all low-income adults and all three subgroups, is not affected by whether potatoes, including french fries and other starchy vegetables are counted as vegetables.
- Adult healthy eaters were significantly less likely than adult less-healthy eaters to consume sugar-sweetened beverages as well as all types of sweetened beverages, including those containing artificial sweeteners (Figure III.6). Among SNAP participants, the difference between healthy eaters and less-healthy eaters was not statistically significant for all types of sweetened beverages.
- There were few differences between adult healthy eaters and less-healthy eaters in the proportion of individuals who consumed sweets, desserts, or candy (Figure III.6). Among SNAP participants, healthy eaters were significantly more likely than less healthy eaters to consume any type of sweet, dessert, or candy (83 percent versus 71 percent). This difference was not observed among nonparticipants.

## 5. Food Choices, Based on Relative Energy Contribution

- Overall, adult healthy eaters, compared to adult less-healthy eaters, obtained larger shares of their daily calorie intakes from foods in the MyPyramid food groups—milk and milk products, meat and beans, grains, fruit, and vegetables—and smaller shares from mixed dishes and sweets, desserts, and candy (including sweetened beverages) (Figure III.7).<sup>30</sup>
- Compared to adult less-healthy eaters, adult healthy eaters obtained significantly smaller shares of their daily calorie intakes from added sugars, discretionary solid fat, and alcohol (Figure III.8).<sup>31</sup>
- Among all low-income adults and in all three subgroups, compared to less-healthy eaters, healthy eaters obtained significantly larger shares of their total daily calories from foods suggested for frequent and selective consumption, relative to guidance provided in the *Dietary Guidelines for Americans*, and significantly smaller shares from foods suggested for occasional consumption (Figure III.9).<sup>32</sup> However, even healthy eaters obtained more than half of their total daily calories from foods suggested for occasional consumption.

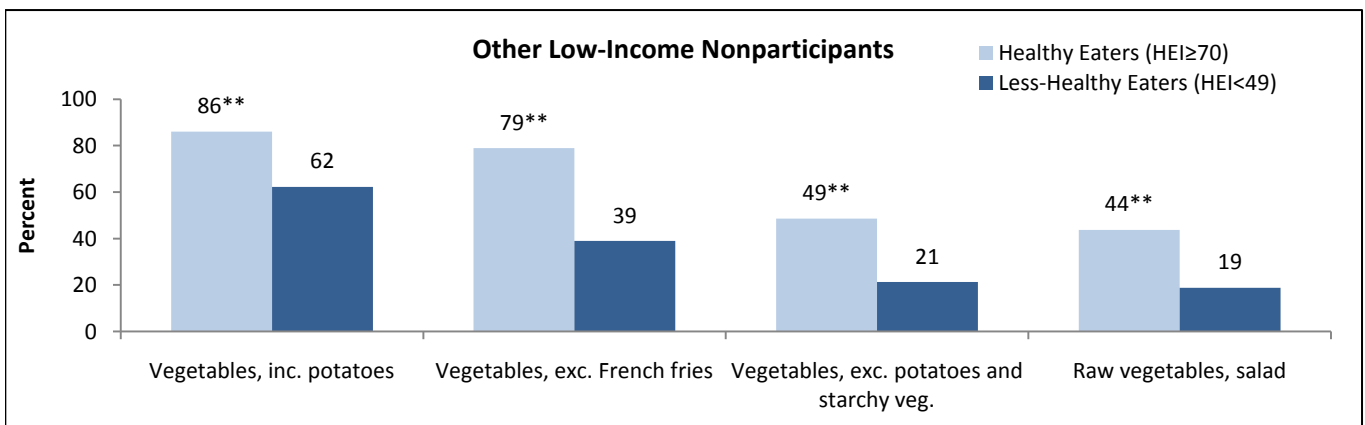
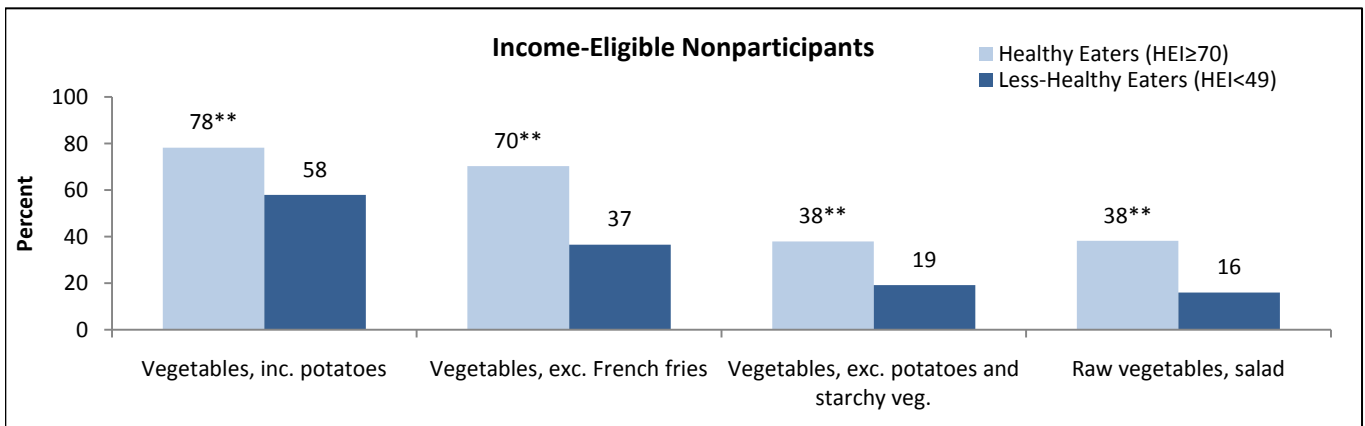
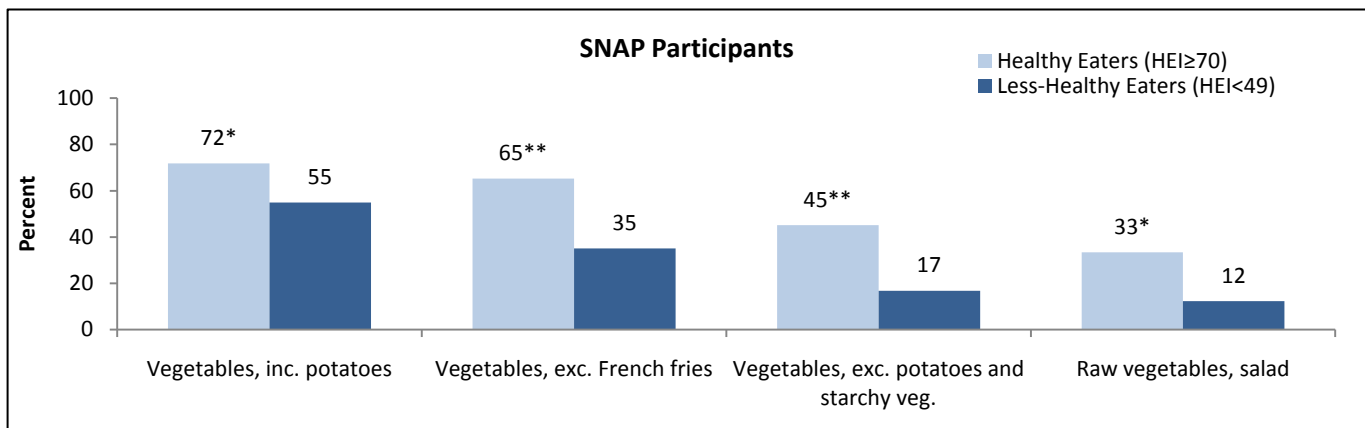
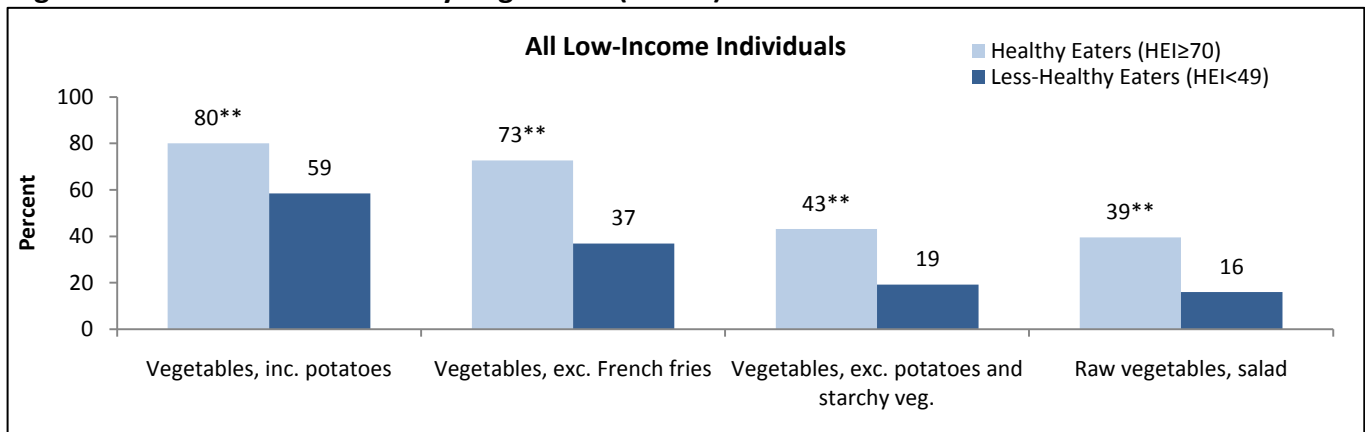
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<sup>30</sup> The analysis is based on foods as consumed and does not consider individual components of mixed foods.

<sup>31</sup> Analysis of added sugars and discretionary solid fat is based on the MyPyramid equivalents data used to compute HEI-2005 scores. Estimates include sugars and fats reported separately as well as sugars and solid fats occurring as ingredients in other foods. See Appendix A for a description of the MyPyramid Equivalents Database. The SoFAAS score in the HEI-2005 captures calories from added sugars, added fats, and alcohol. This analysis was done to look at the components of the SoFAAS score.

<sup>32</sup> Food classifications were based on work done by Cole and Fox (2008). All foods reported by sample members were assigned to one of the three groups based on nutrient density and calories from added sugars and discretionary solid fat. Additional details are provided in Appendix A, including a summary of foods assigned to each category (Table A.4).

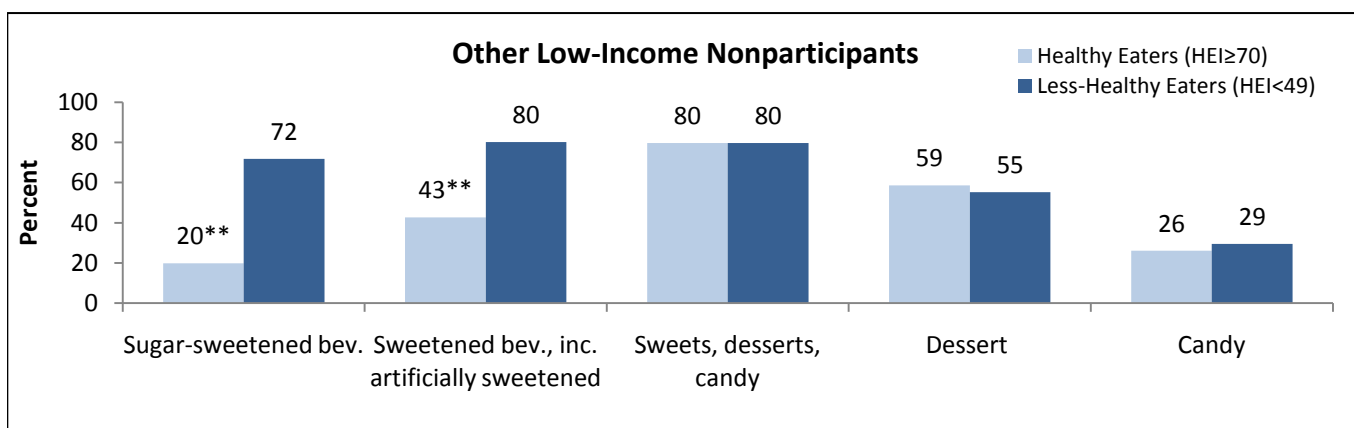
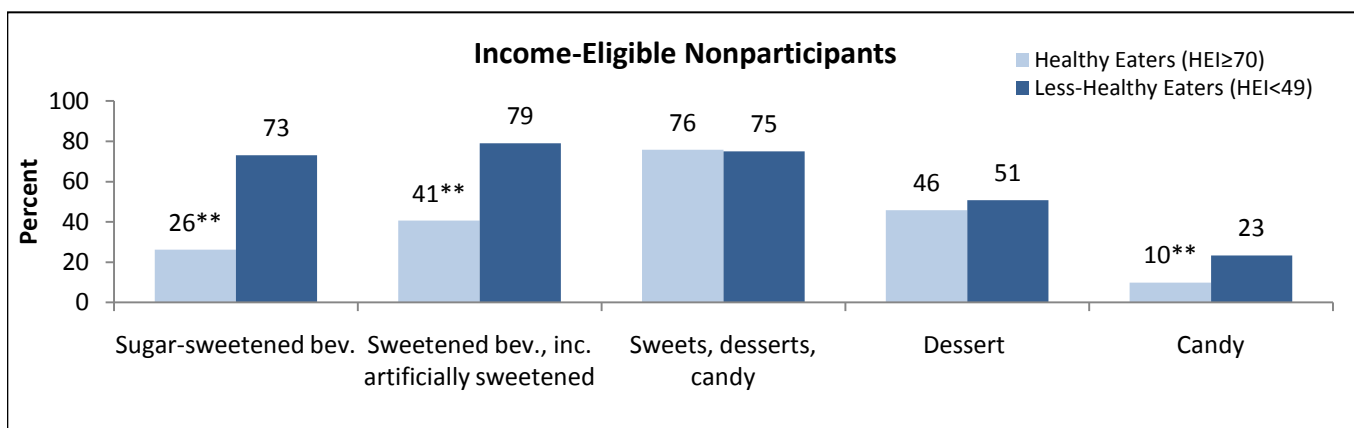
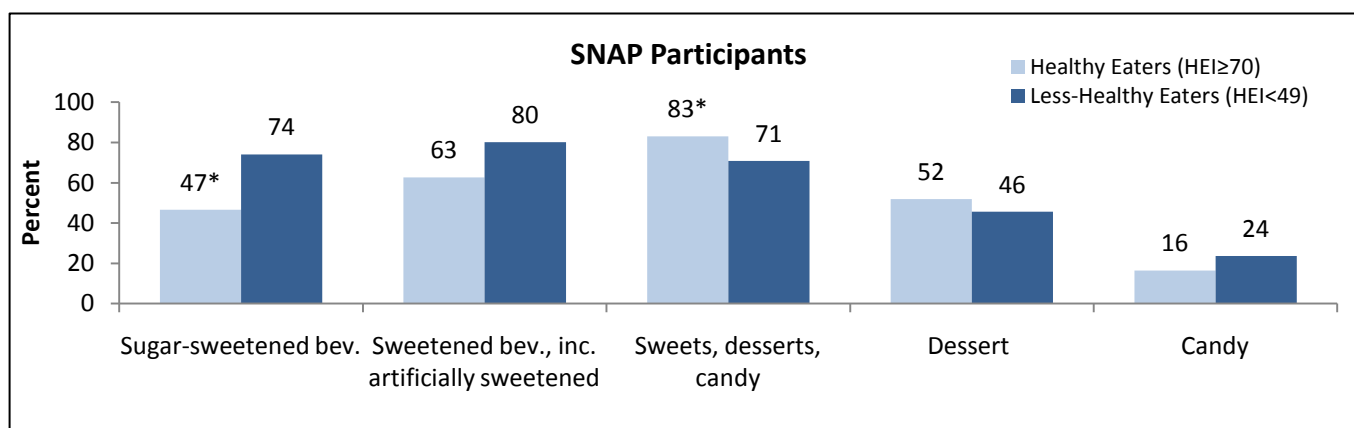
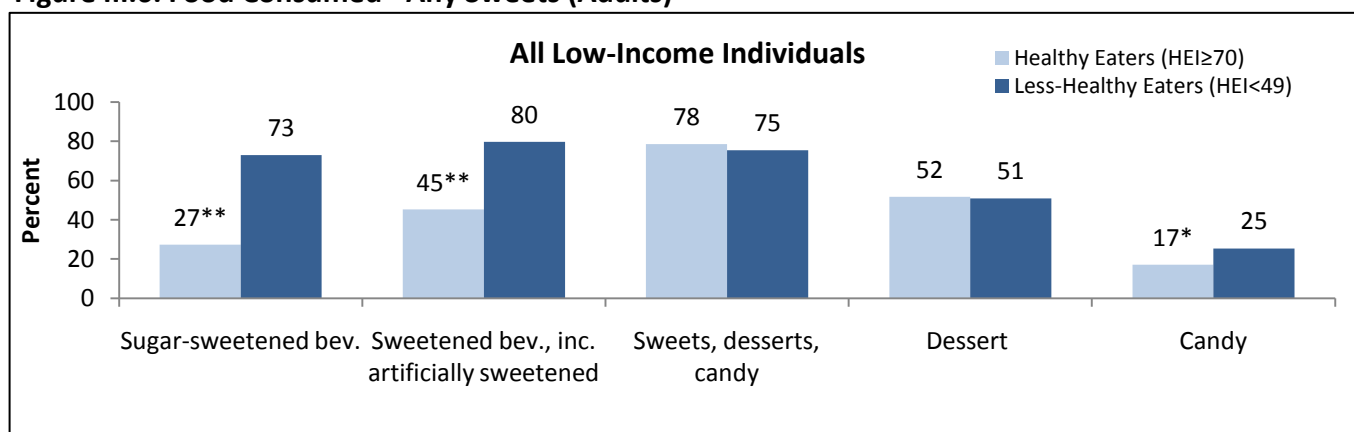
**Figure III.5. Food Consumed - Any Vegetables (Adults)**



\* Significantly different from less-healthy eaters,  $p < .05$ , two-tailed test with BH adjustment

\*\* Significantly different from less-healthy eaters,  $p < .01$ , two-tailed test with BH adjustment

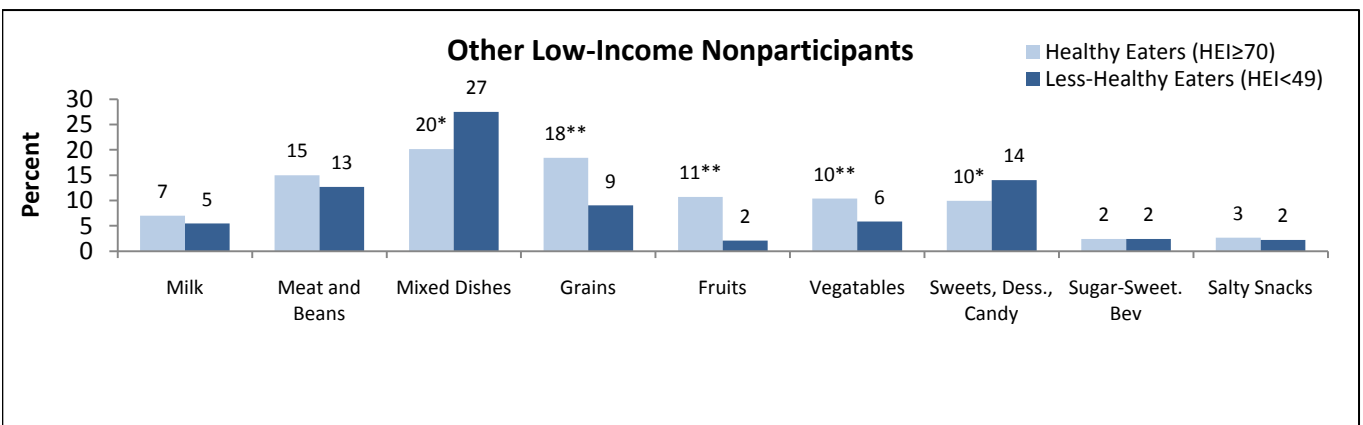
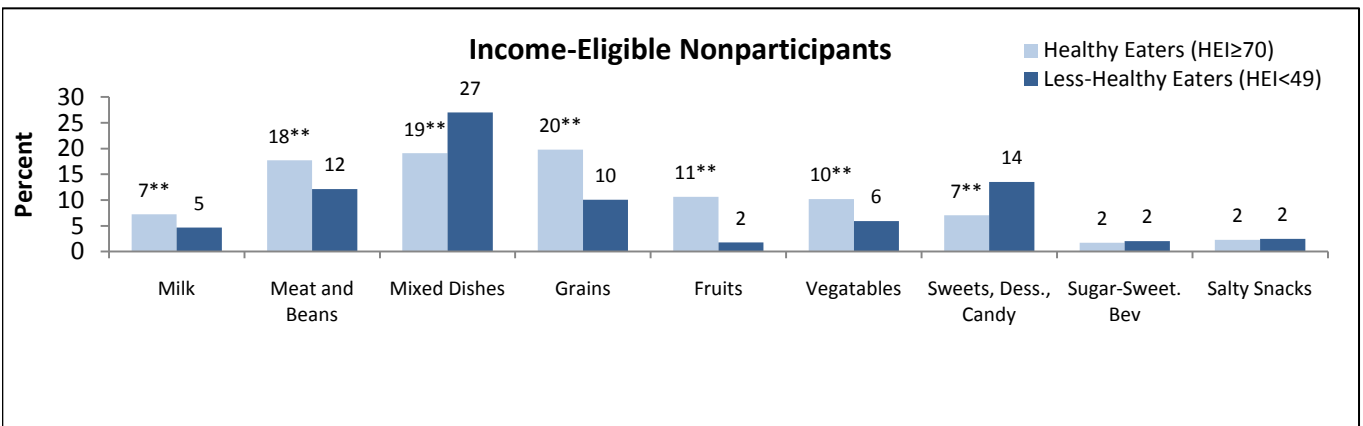
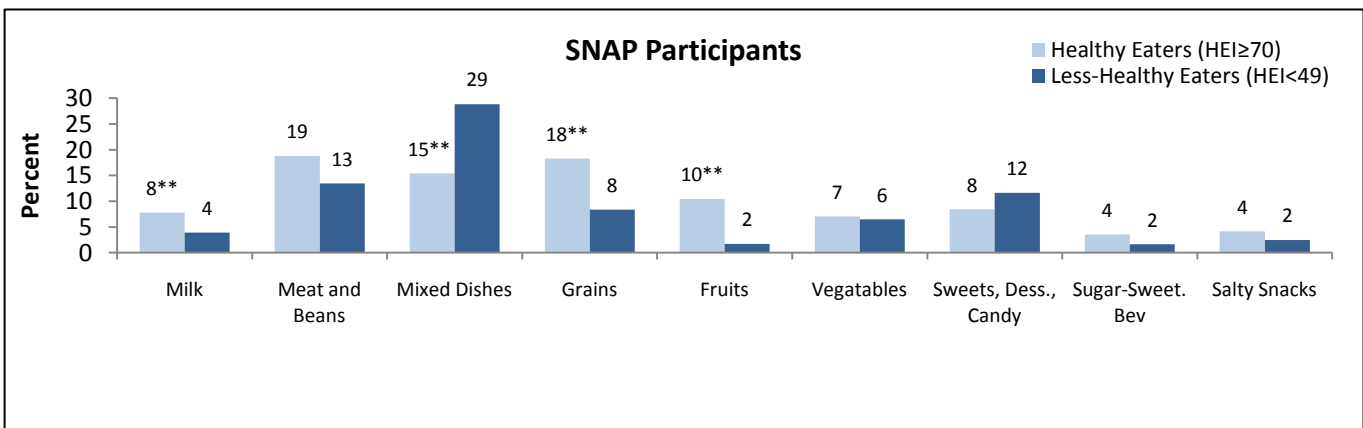
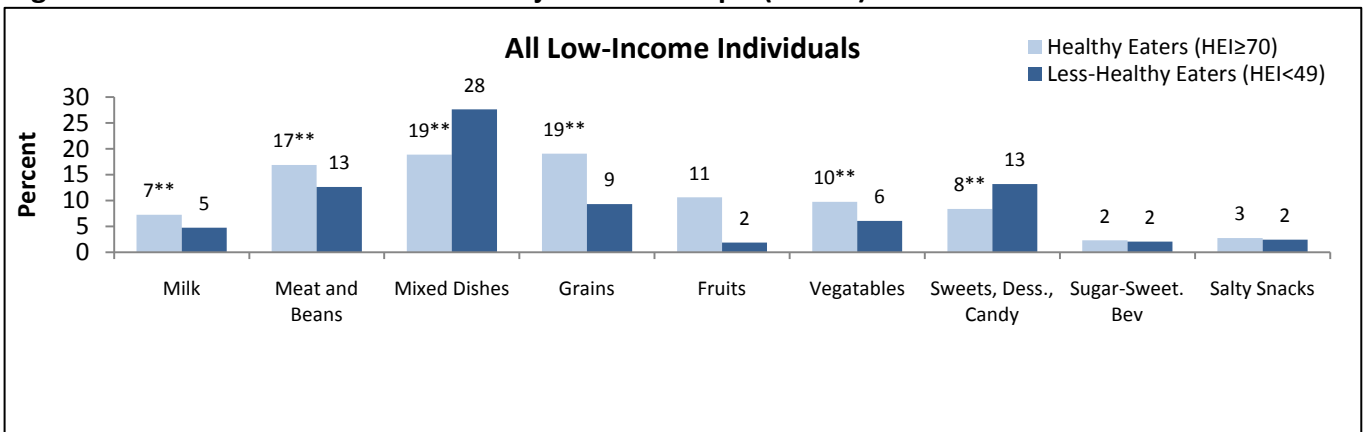
**Figure III.6. Food Consumed - Any Sweets (Adults)**



\* Significantly different from less-healthy eaters,  $p < .05$ , two-tailed test with BH adjustment

\*\* Significantly different from less-healthy eaters,  $p < .01$ , two-tailed test with BH adjustment

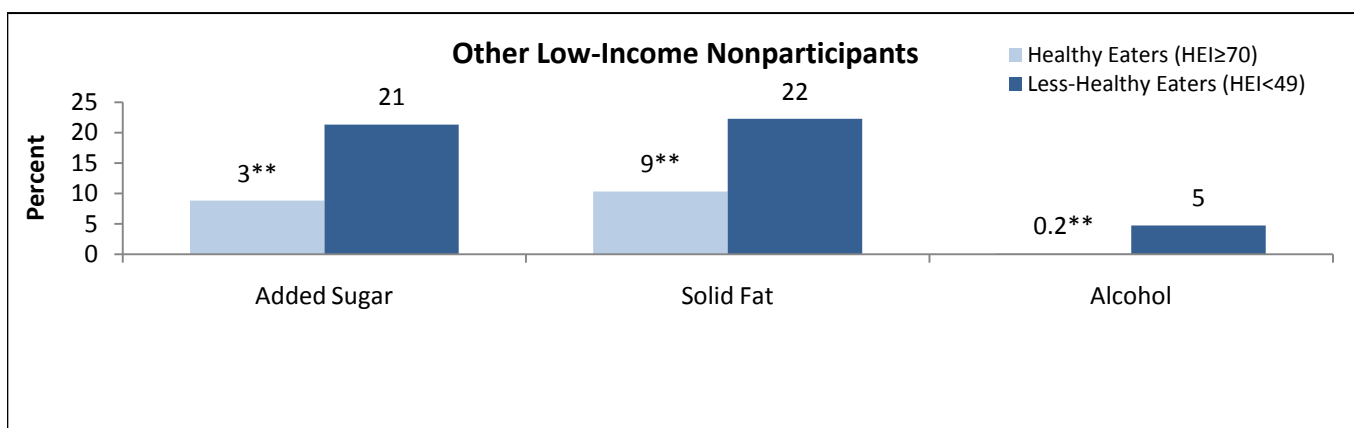
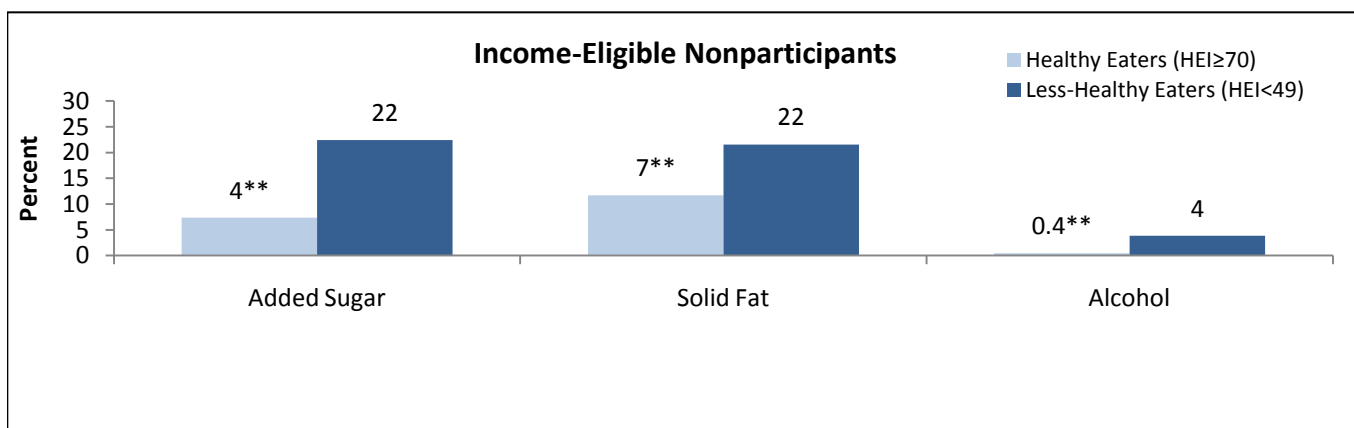
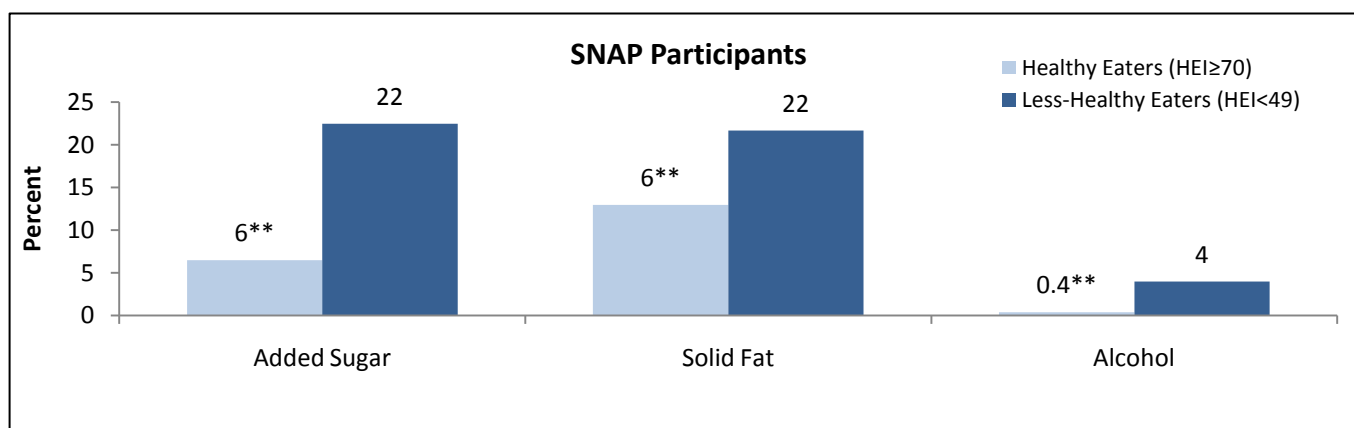
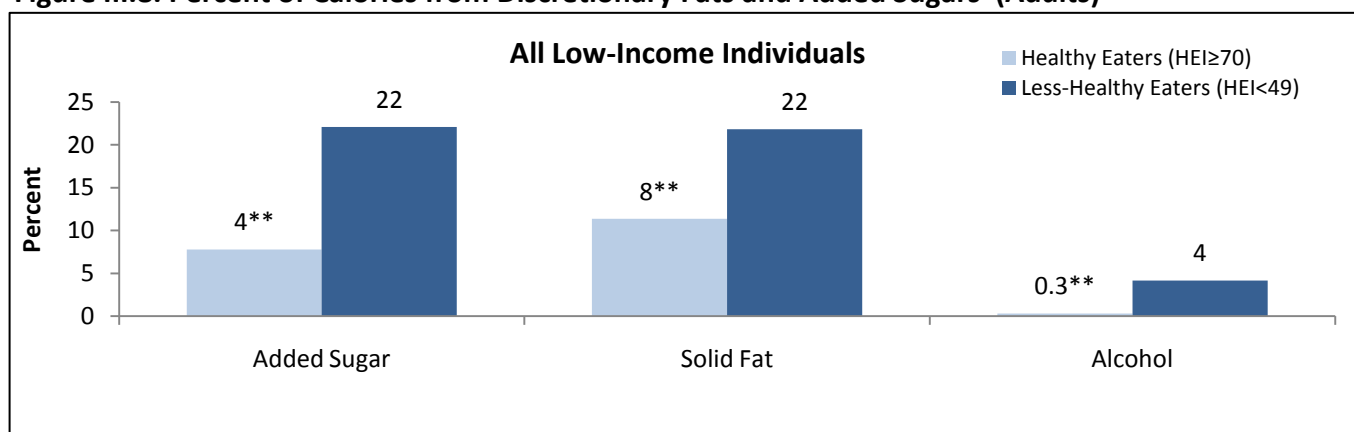
**Figure III.7. Percent of Calories from Major Food Groups (Adults)**



\* Significantly different from less-healthy eaters,  $p < .05$ , two-tailed test with BH adjustment

\*\* Significantly different from less-healthy eaters,  $p < .01$ , two-tailed test with BH adjustment

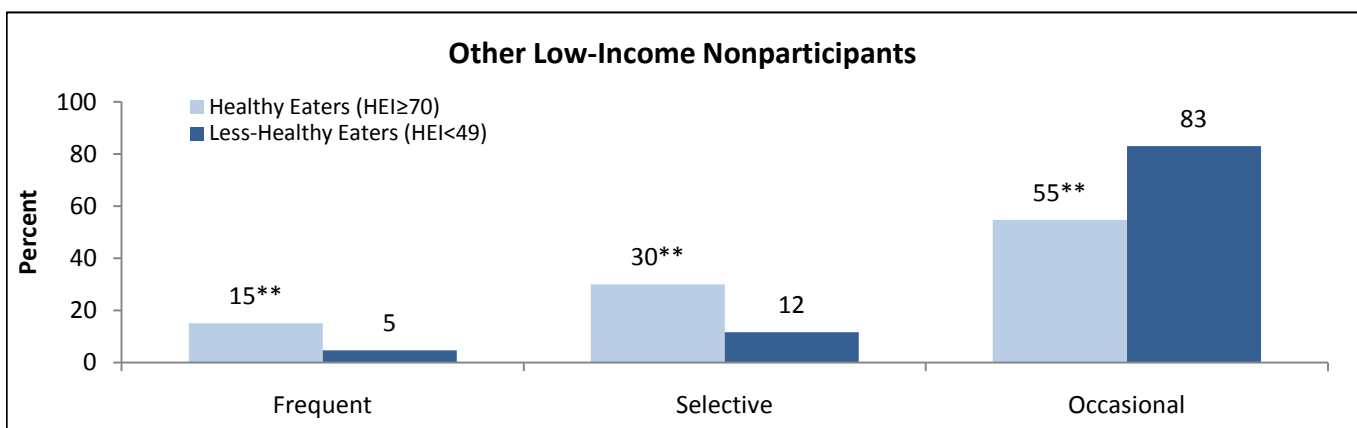
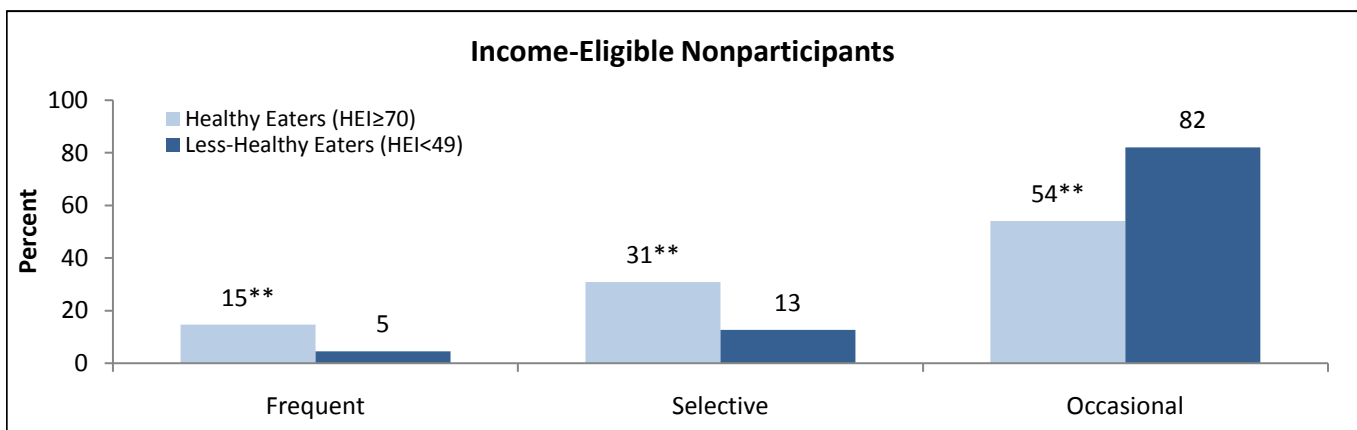
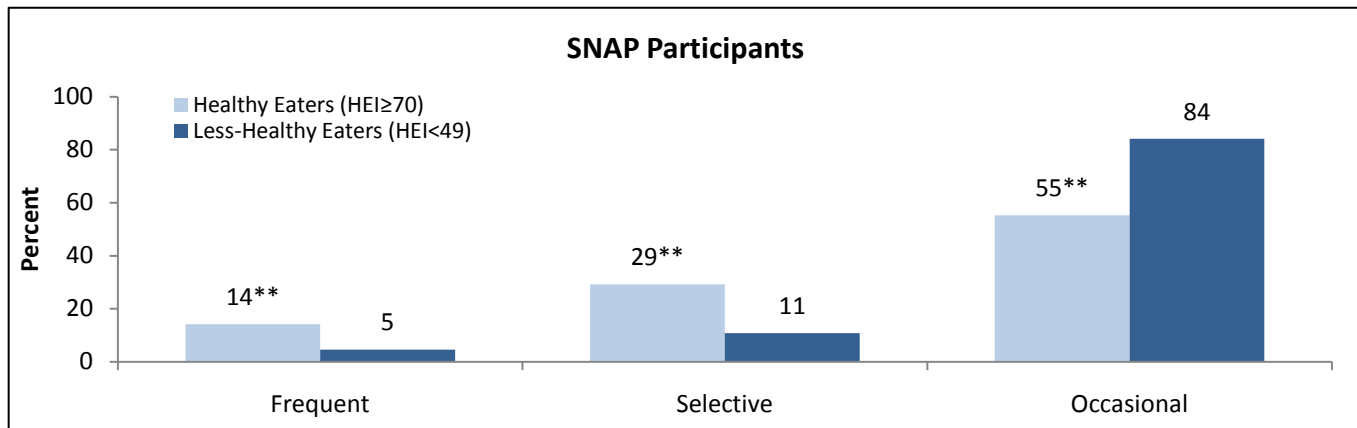
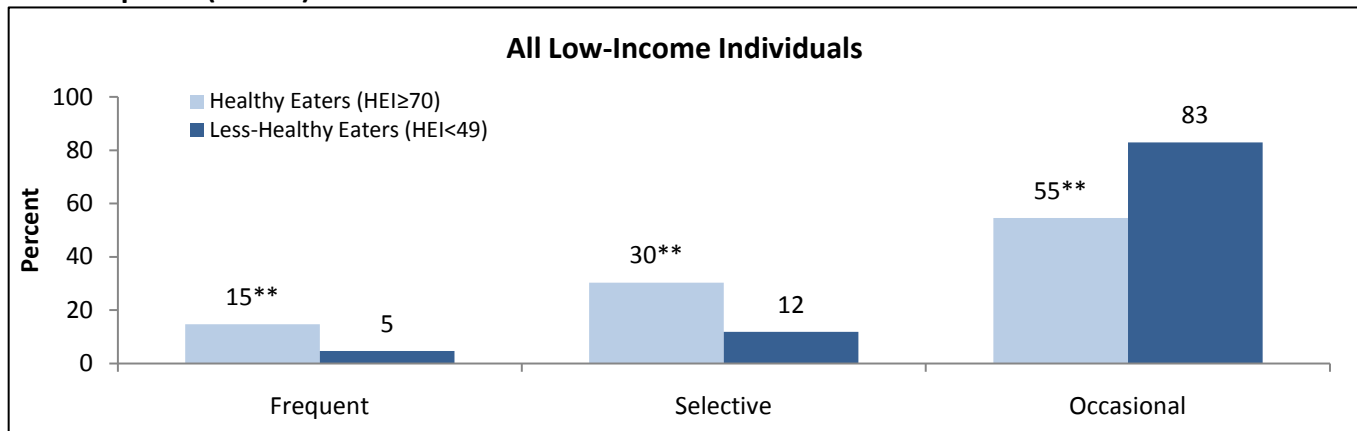
**Figure III.8. Percent of Calories from Discretionary Fats and Added Sugars (Adults)**



\* Significantly different from less-healthy eaters,  $p < .05$ , two-tailed test with BH adjustment

\*\* Significantly different from less-healthy eaters,  $p < .01$ , two-tailed test with BH adjustment

**Figure III.9. Percent of Calories from Foods Recommended for Frequent, Selective, and Occasional Consumption (Adults)**



\* Significantly different from less-healthy eaters,  $p < .05$ , two-tailed test with BH adjustment

\*\* Significantly different from less-healthy eaters,  $p < .01$ , two-tailed test with BH adjustment



## 6. Nutrient Density and Energy Density

- Adult healthy eaters had significantly higher mean scores on the Nutrient Rich (NR) score, a composite measure of nutrient density (see Appendix A) than adult less-healthy eaters (Figure III.10). This was true for all low-income adults and all three subgroups.
- The energy density of diets consumed by adult healthy eaters was significantly lower than the energy density of diets consumed by adult less-healthy eaters (Figure III.10).<sup>33</sup>

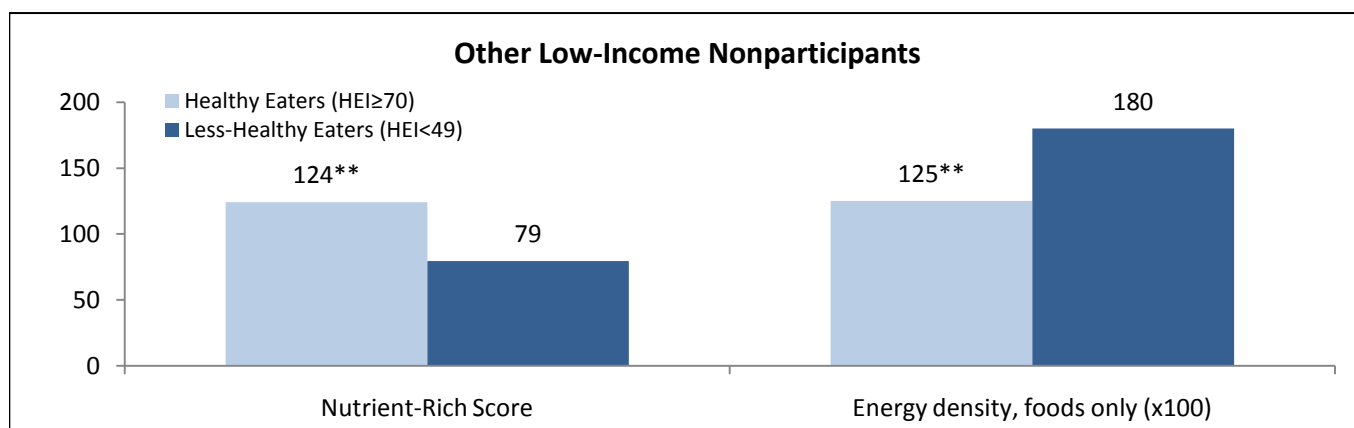
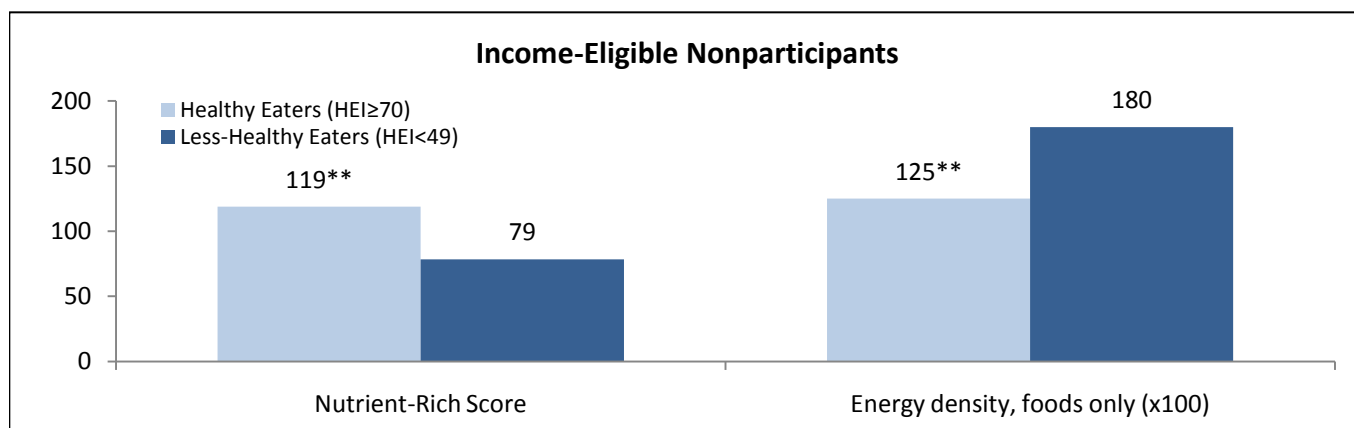
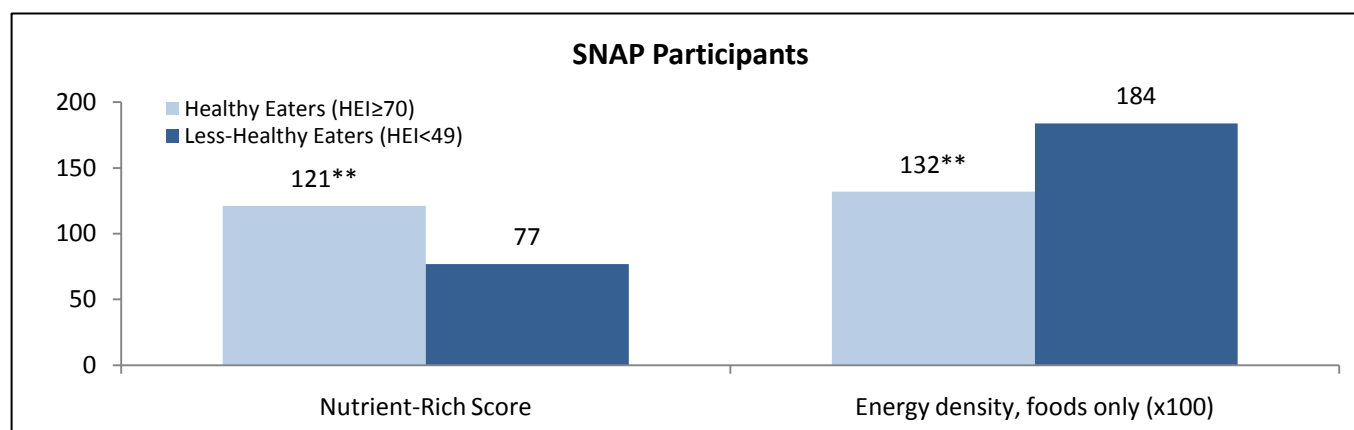
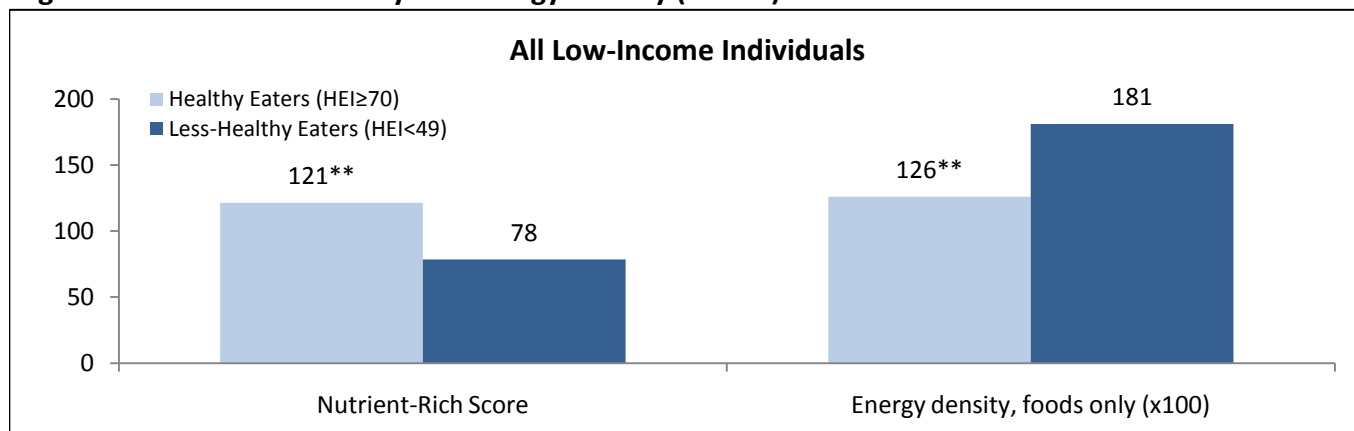
## 7. Summary

We found widespread differences in the dietary characteristics of healthy and less-healthy eaters in the low-income adult population. Key findings are summarized in Table III.1. Among adults, healthy eaters were more likely than less-healthy eaters to eat breakfast; eat three meals daily; use dietary supplements; consume milk of any type; consume fruit, fresh fruit, and fruit juice; consume vegetables and whole grains; consume nuts and seeds; have higher mean scores on all HEI-2005 components; obtain smaller shares of their total daily calories from foods suggested for occasional consumption; and consume high nutrient density diets. Less-healthy eaters were more likely to eat in restaurants three or more times per week; consume alcohol three or more times per week; consume sweetened beverages of any type; obtain larger shares of calories from snacks, mixed dishes, added sugars, and discretionary solid fats; and consume high energy density diets. Most of the patterns observed were consistent for SNAP participants and the two groups of nonparticipants included in the analysis.

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<sup>33</sup> Estimates of energy density were based on foods only, as recommended by Ledikwe et al. (2005). For presentation in the graph estimates were multiplied by 100. Actual estimates are provided in Table C.5. The table also includes results for an alternative measure of energy density which includes juice and milk. Findings for the alternative measure are consistent with findings for the foods-only measure.

**Figure III.10. Nutrient Density and Energy Density (Adults)**



\* Significantly different from less-healthy eaters,  $p < .05$ , two-tailed test with BH adjustment

\*\* Significantly different from less-healthy eaters,  $p < .01$ , two-tailed test with BH adjustment

Table III.1. Summary of Key Differences in Dietary Characteristics of Adult Healthy and Less-Healthy Eaters.

Healthy eaters (HEI $\geq$ 70) were more likely to:	Less-healthy eaters (HEI<49) were more likely to:
<ul style="list-style-type: none"> <li>• Eat breakfast</li> <li>• Eat three meals daily</li> <li>• Use dietary supplements</li> <li>• Consume milk of any type</li> <li>• Consume fruit, fresh fruit, and fruit juice</li> <li>• Consume vegetables and whole grains</li> <li>• Consume nuts and seeds</li> <li>• Have higher mean scores on all HEI-2005 components</li> <li>• Obtain smaller shares of their total daily calories from foods suggested for occasional consumption</li> <li>• Consume high nutrient density diets</li> </ul>	<ul style="list-style-type: none"> <li>• Eat in a restaurant 3+ times per week</li> <li>• Consume alcohol 3+ times per week</li> <li>• Consume sweetened beverages of any type</li> <li>• Obtain larger shares of calories from: snacks, mixed dishes, added sugars, and discretionary solid fats</li> <li>• Consume high energy density diets</li> </ul>

HEI = Score on Healthy Eating Index-2005

In some cases, however (HEI-2005 component score for total grains and the relative energy contribution of sweets, desserts, and candy, for example), the difference between healthy and less-healthy eaters is not statistically significant for SNAP participants, even though the difference is in the same direction as it is for the two subgroups of nonparticipants. This could be because the sample of healthy eaters among SNAP participants was too small to detect a statistically significant difference, or because the association between healthy eating and the dietary characteristic is weaker for SNAP participants than it is for nonparticipants, or even in the opposite direction.

## B. Children

Below, we summarize the dietary characteristics for which we observed statistically significant differences between child healthy eaters and child less-healthy eaters in the low-income population,

overall or in one or more of the subgroups of SNAP participants and nonparticipants.<sup>34</sup> With the exception of variables related to alcohol consumption, all of the dietary characteristics used in the preceding adult analysis were also used in this analysis. For children, we also examined differences between healthy eaters and less-healthy eaters in the proportion of children who reported that they regularly consumed school breakfast or school lunch (five days per week). Graphics are used to summarize key variables. Results for the full set of variables used in the analysis are presented in Tables C.6 through C.10.<sup>35</sup>

### 1. Meal and Snack Patterns

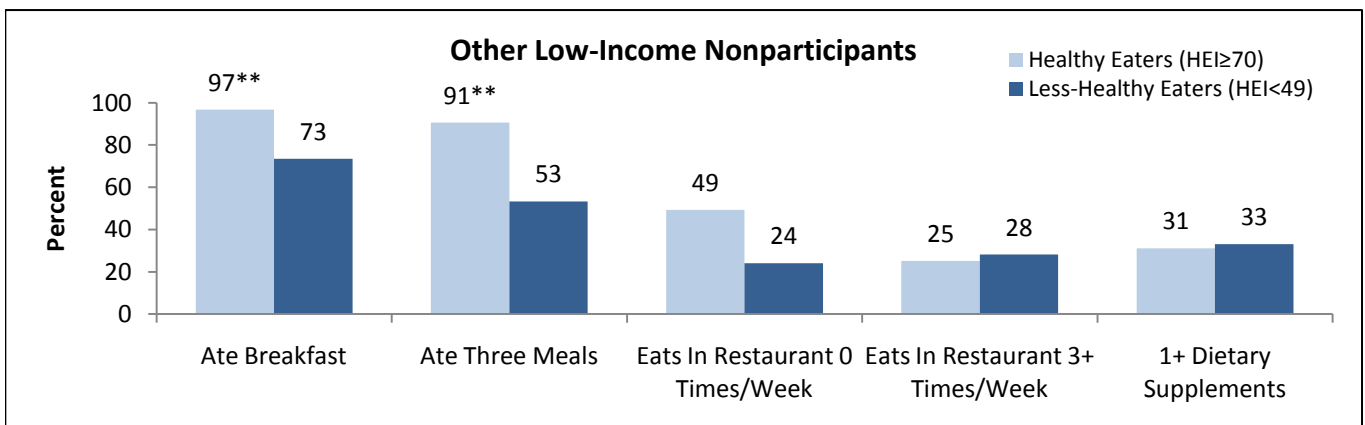
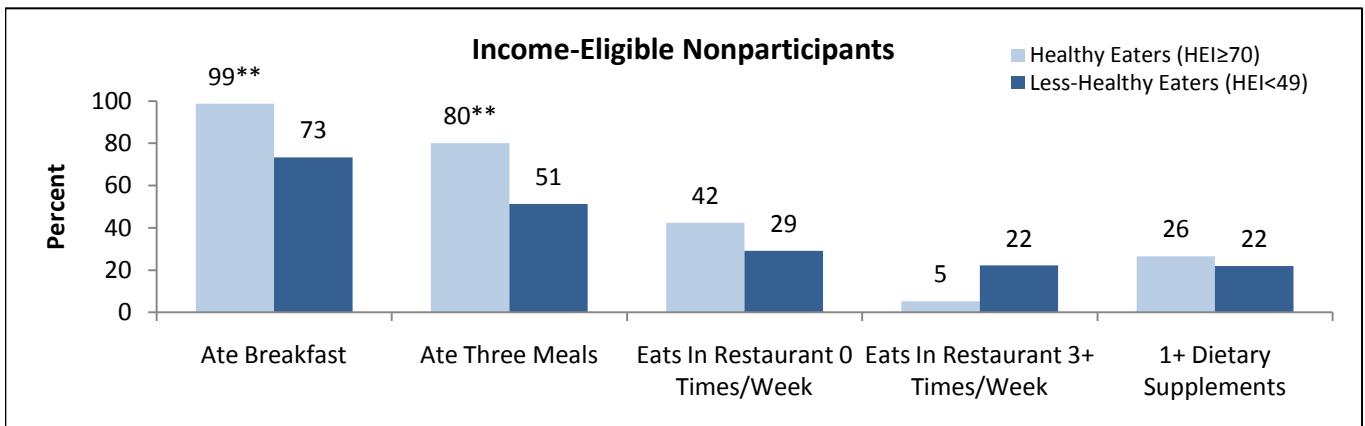
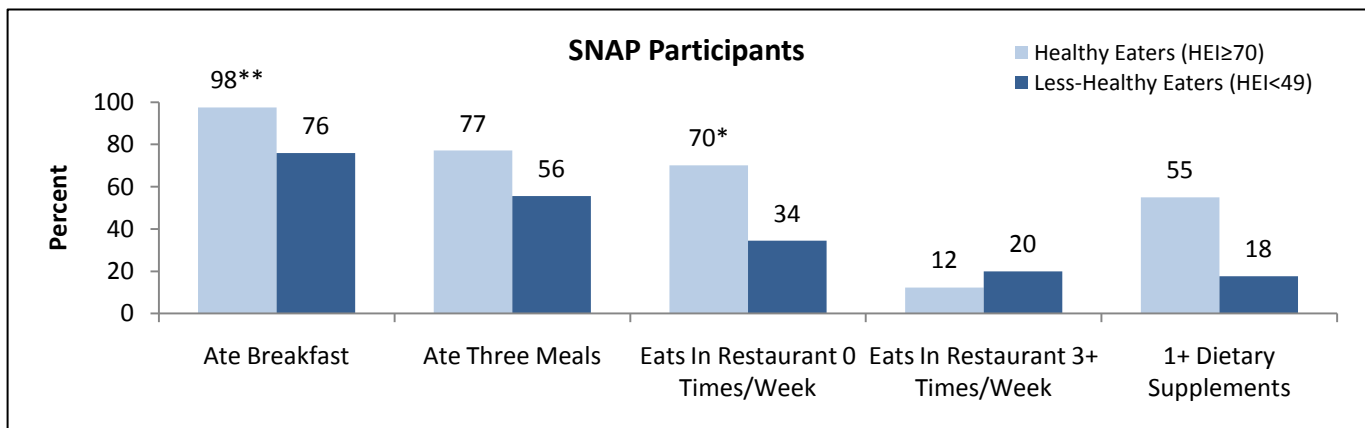
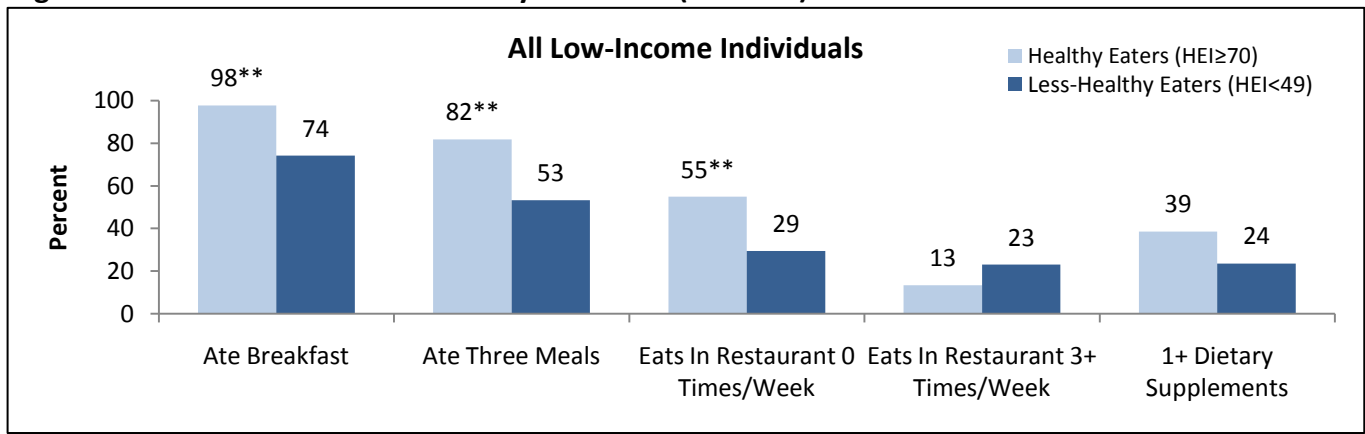
- Among all low-income children, healthy eaters were significantly more likely than less-healthy eaters to eat breakfast (98 percent versus 74 percent) (Figure III.11). This pattern was also observed among SNAP participants and both groups of nonparticipants.
- Overall, child healthy eaters were more likely than child less-healthy eaters to eat three meals a day (82 percent versus 53 percent) (Figure III.11). This pattern was also observed among children in the two groups of nonparticipants. However, among SNAP participants, the difference between the proportions of healthy eaters and less-healthy eaters who reported eating three meals was not statistically significant.
- Among low-income children overall and for two of the three subgroups, there was no significant difference between healthy eaters and less-healthy eaters in the number of snacks consumed (Figure III.12). However, among income-eligible nonparticipants healthy eaters were significantly more likely than less-healthy eaters to consume three or more snacks.

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<sup>34</sup> Due to the large number of comparisons tested, the discussion in the text focuses on differences between healthy and less-healthy eaters that are statistically significant and points out instances of no significant differences without much additional comment.

<sup>35</sup> In Appendix C tables and figures III.11 to III.21, “HEP” is used instead of “HEI-2005” because of space limitation.

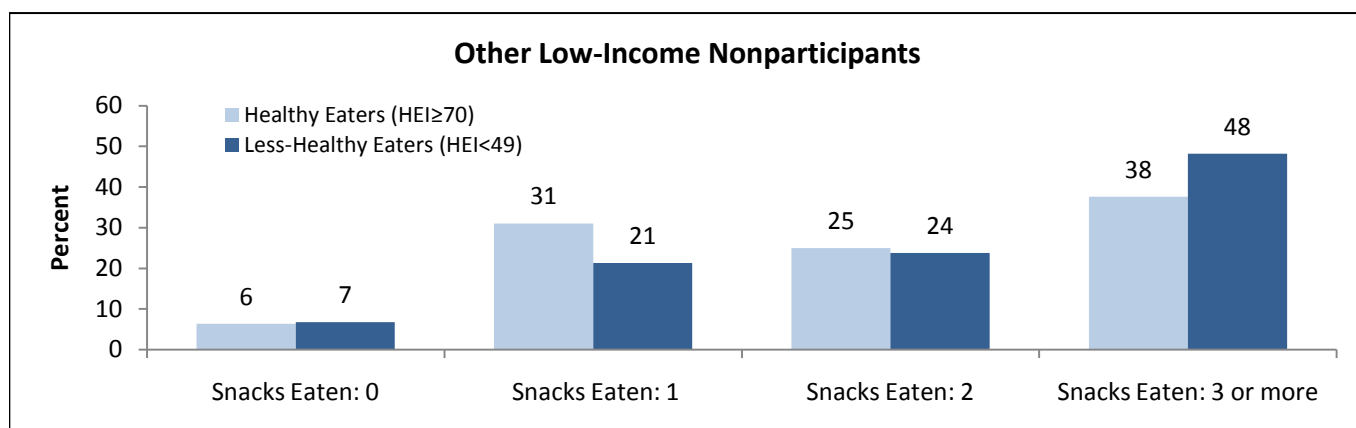
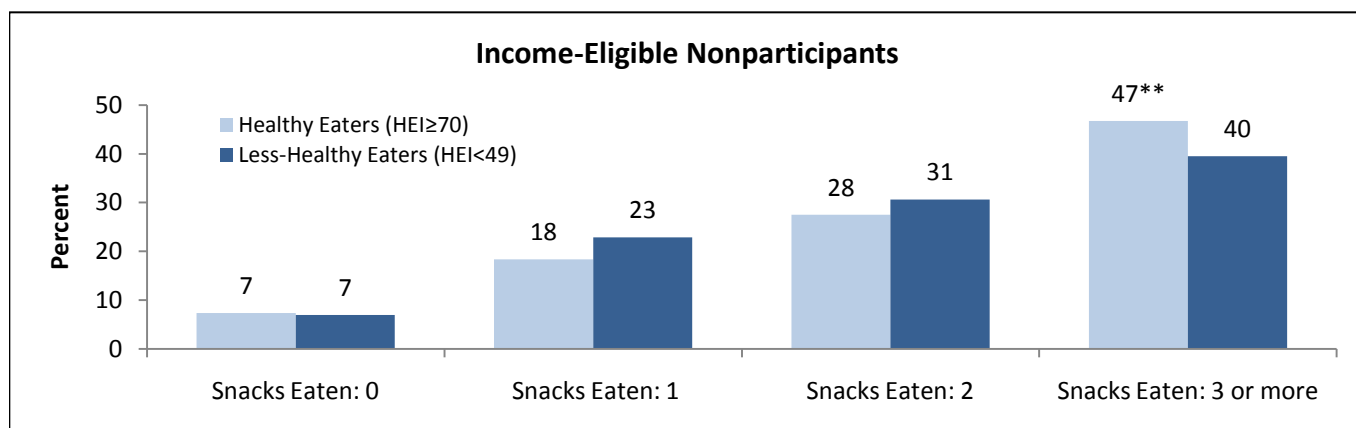
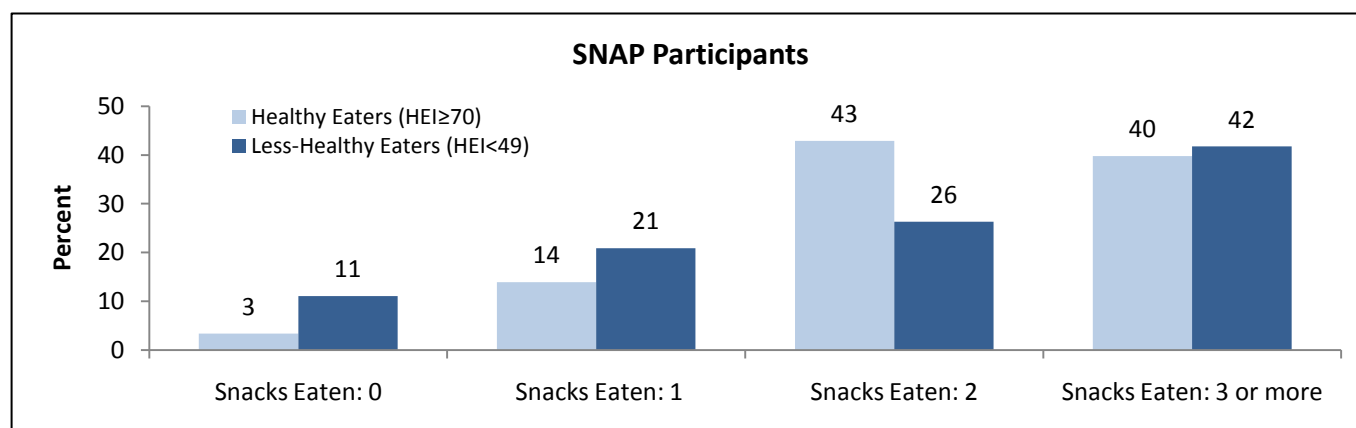
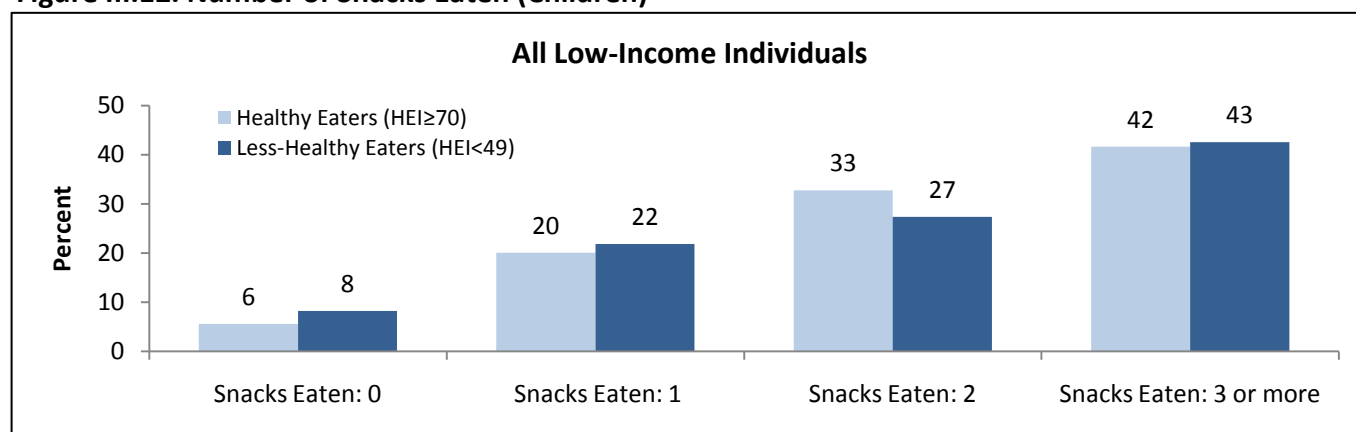
**Figure III.11. Meal Patterns and Dietary Behaviors (Children)**



\* Significantly different from less-healthy eaters,  $p < .05$ , two-tailed test with BH adjustment

\*\* Significantly different from less-healthy eaters,  $p < .01$ , two-tailed test with BH adjustment

**Figure III.12. Number of Snacks Eaten (Children)**



\* Significantly different from less-healthy eaters,  $p < .05$ , two-tailed test with BH adjustment

\*\* Significantly different from less-healthy eaters,  $p < .01$ , two-tailed test with BH adjustment

- Compared to child less-healthy eaters, child healthy eaters obtained a significantly greater percentage of their total daily calories from breakfast (23 percent versus 16 percent for all low-income children) and a significantly smaller percentage from snacks (24 percent versus 30 percent) (Figure III.13). These differences were concentrated among the two groups of nonparticipants. Among child SNAP participants, there were no significant differences between healthy eaters and less-healthy eaters in the percentage of calories obtained from breakfast or snacks.
- In the two groups of child nonparticipants, healthy eaters consumed a smaller percentage of calories away from home than less-healthy eaters (22 to 26 percent versus 35 to 40 percent) (Figure III.13). This difference was not statistically significant among SNAP participants.

## 2. Selected Dietary Behaviors

- Overall and among SNAP participants, child healthy eaters were more likely than child less-healthy eaters to report eating in a restaurant less than one time per week and less likely to report eating in a restaurant twice a week (Figure III.11 and Table C.6).
- There were no significant differences between child healthy eaters and child less-healthy eaters in the proportion who reported regular participation in the school lunch program (generally ate school lunch five days per week) (Figure III.14).
- Among income-eligible nonparticipants, child healthy eaters were significantly more likely than child less-healthy eaters to be regular participants in the school breakfast program (67 percent versus 38 percent) (Figure III.14).

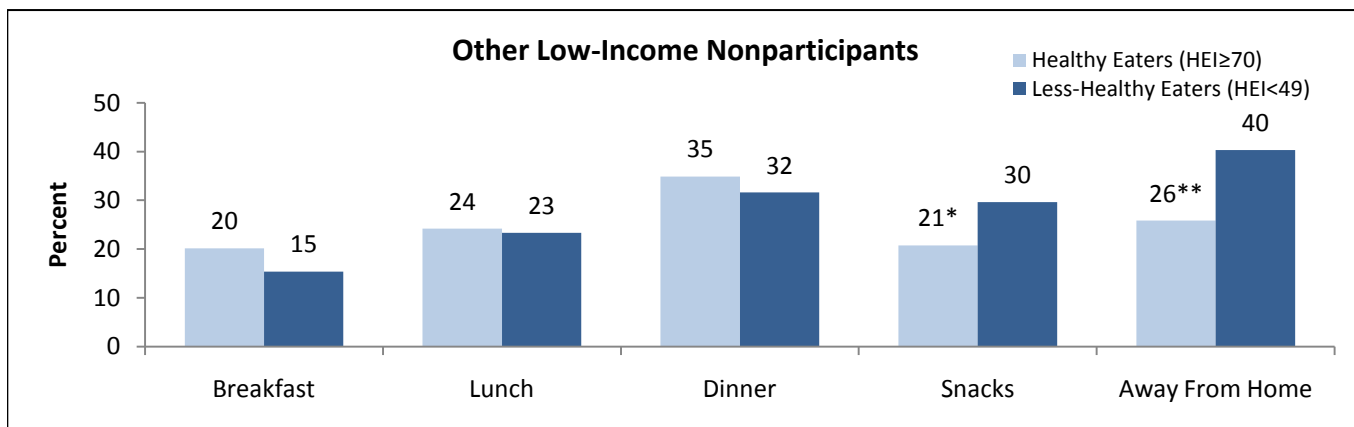
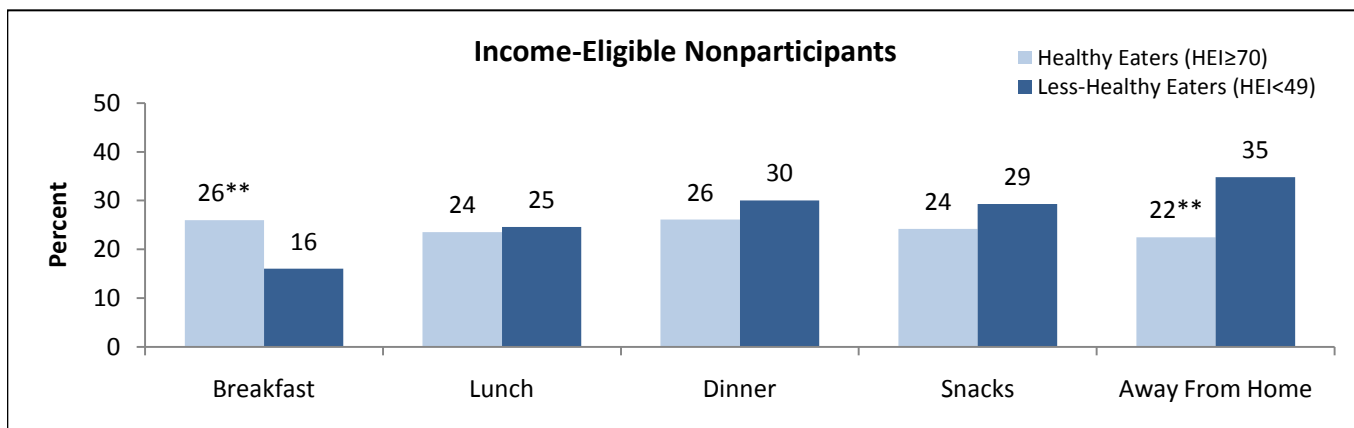
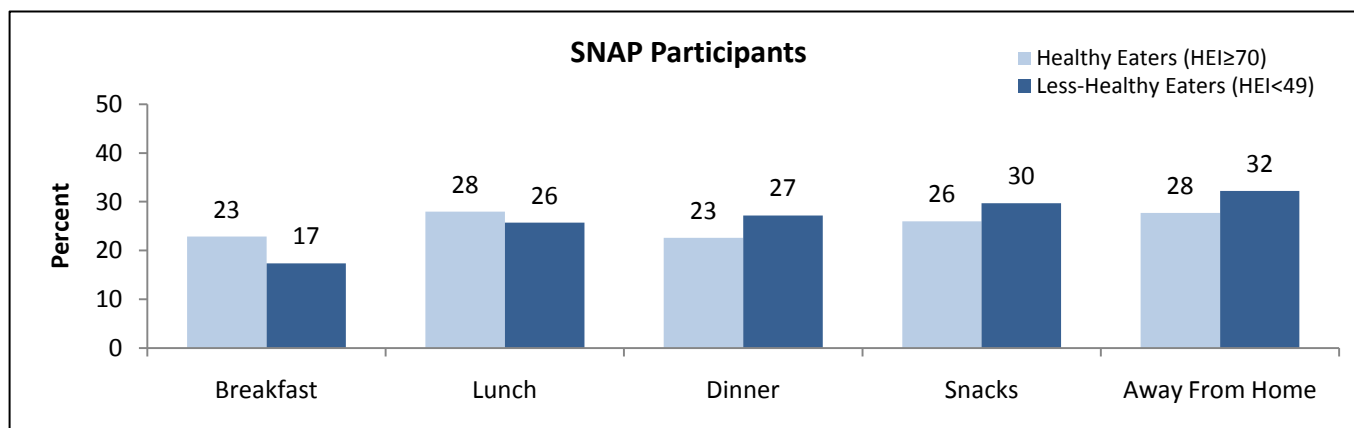
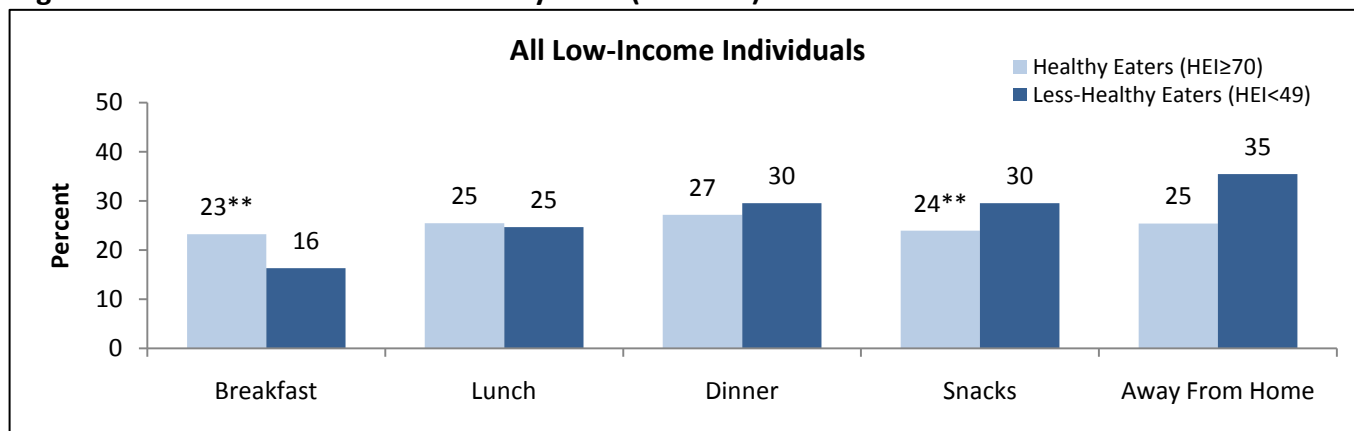
## 3. HEI-2005 Component Scores

- Among all low-income children, healthy eaters scored significantly higher than less-healthy eaters on all of the HEI-2005 components except the grain component (Figure III.15).<sup>36</sup> As with adults, differences were most dramatic for the calories from SoFAAS component (94 percent of the maximum possible score, on average, versus 21 percent), the whole fruit component (82 percent of the maximum possible score versus 16 percent), and the total fruit component (93 percent versus 29 percent).
- Among child SNAP participants, there were no significant differences between healthy eaters and less-healthy eaters on the milk component or the oils component (Figure III.15). Among other (income-ineligible) nonparticipants, there were no significant differences between healthy eaters and less-healthy eaters on the milk component or the sodium component.

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<sup>36</sup> For ease in presentation, HEI-2005 scores are reported in the figure as percentages of the maximum possible scores. Actual mean scores are presented in Table C.7.

**Figure III.13. Percent of Total Calories by Meal (Children)**

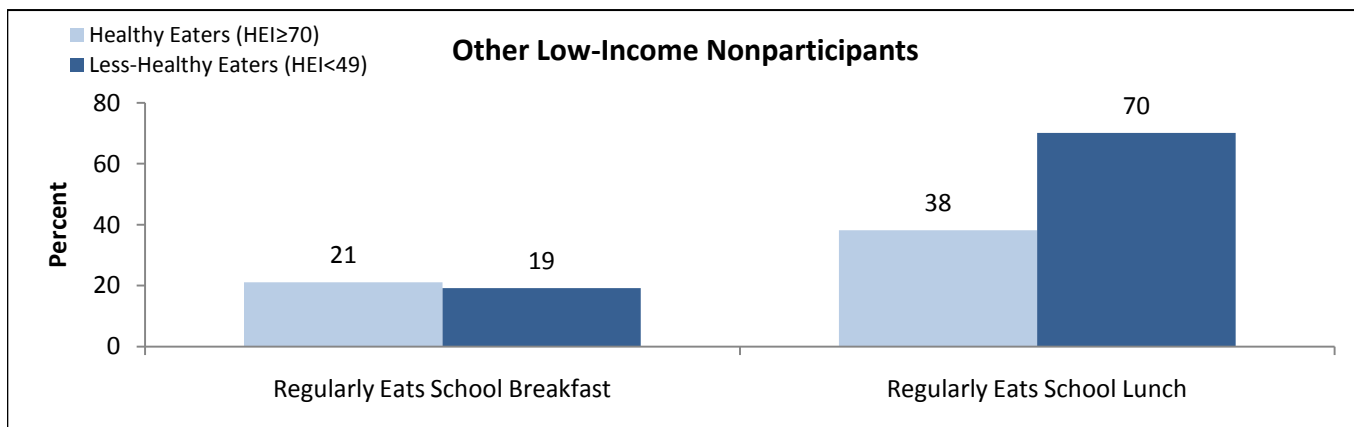
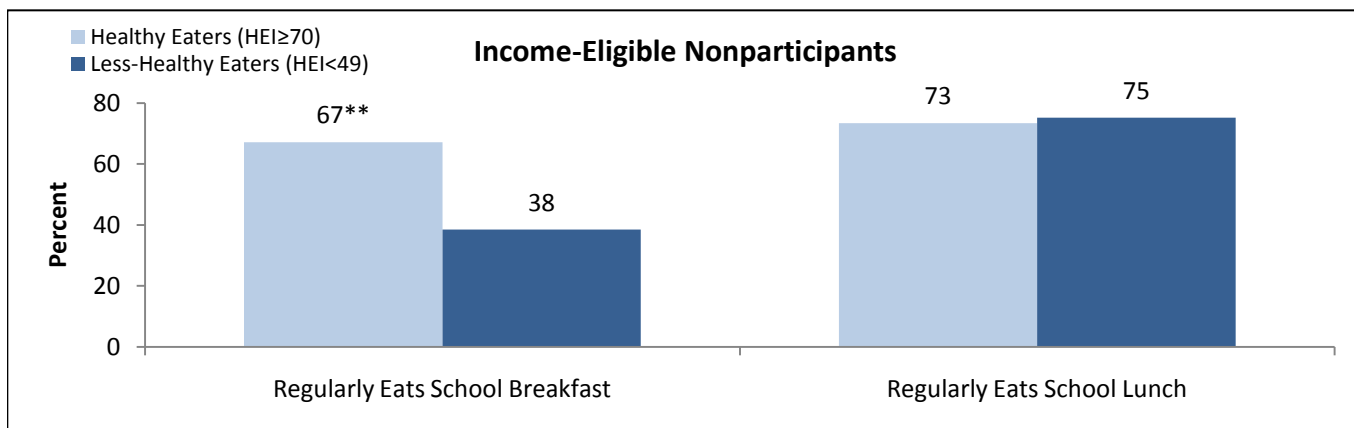
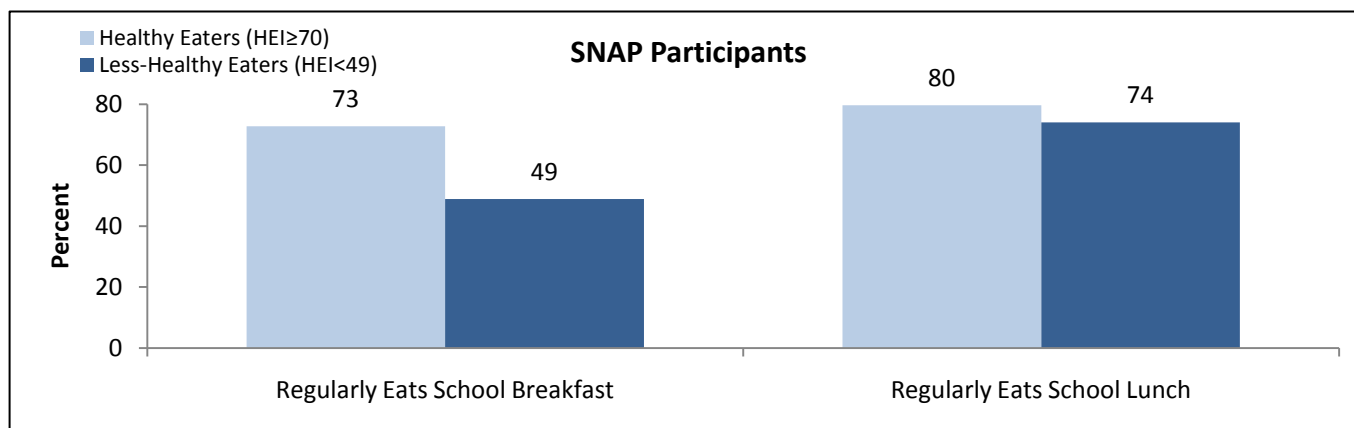
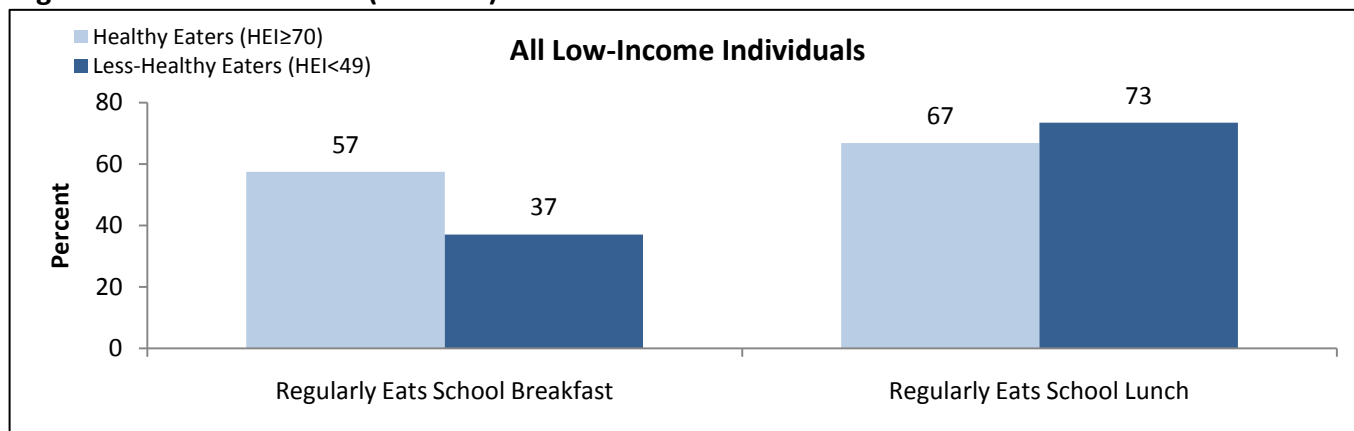


\* Significantly different from less-healthy eaters,  $p < .05$ , two-tailed test with BH adjustment

\*\* Significantly different from less-healthy eaters,  $p < .01$ , two-tailed test with BH adjustment



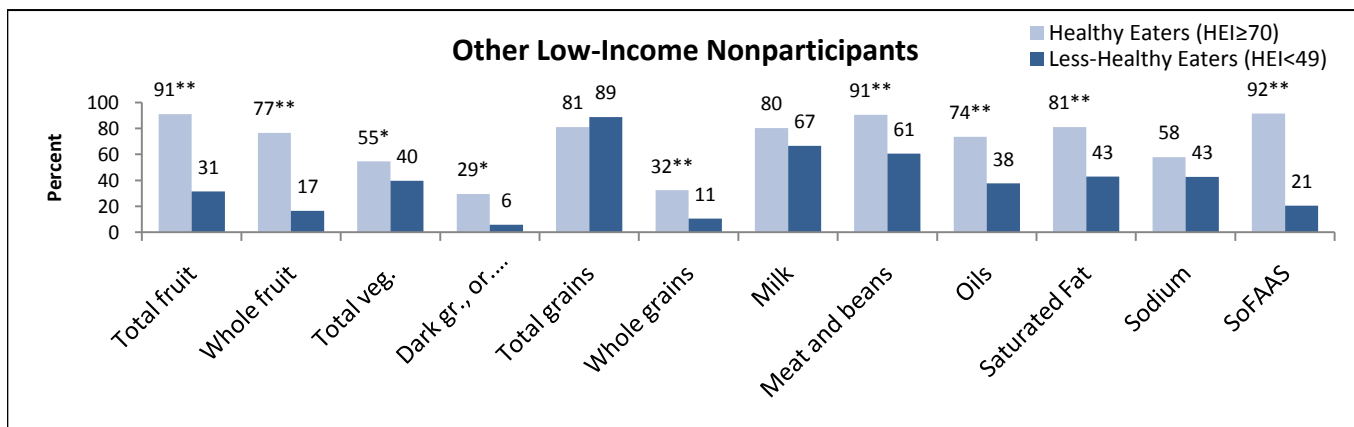
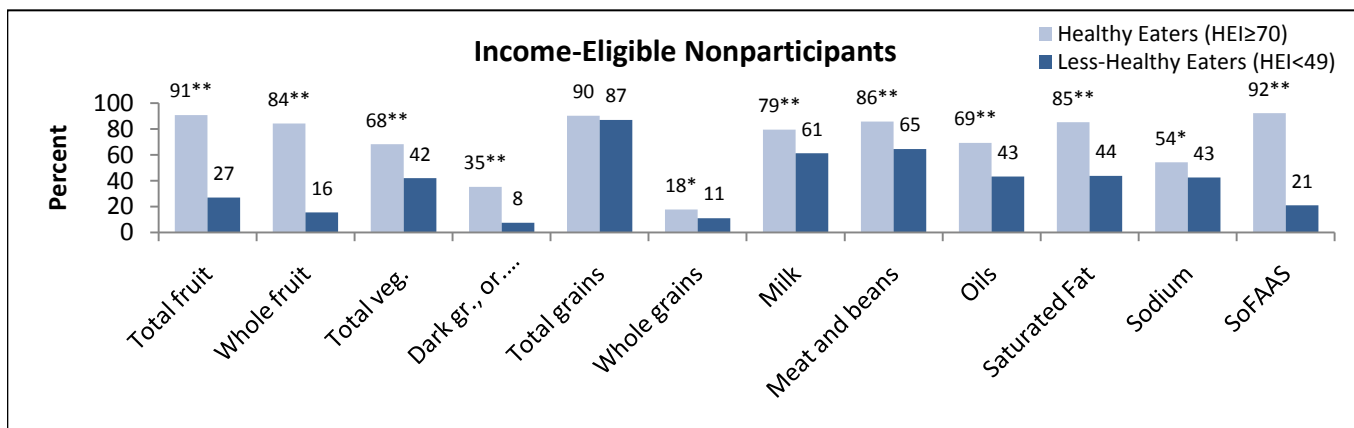
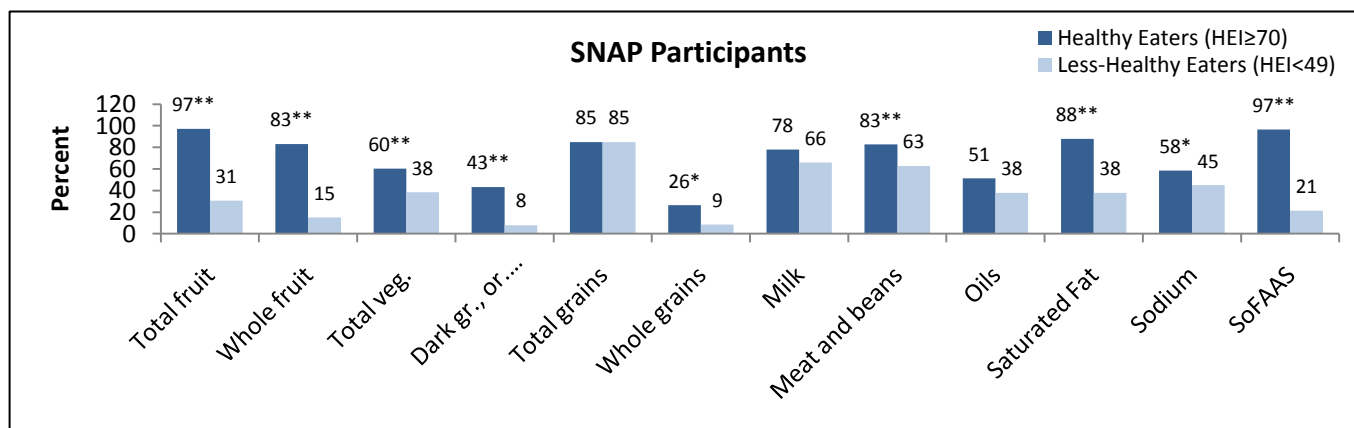
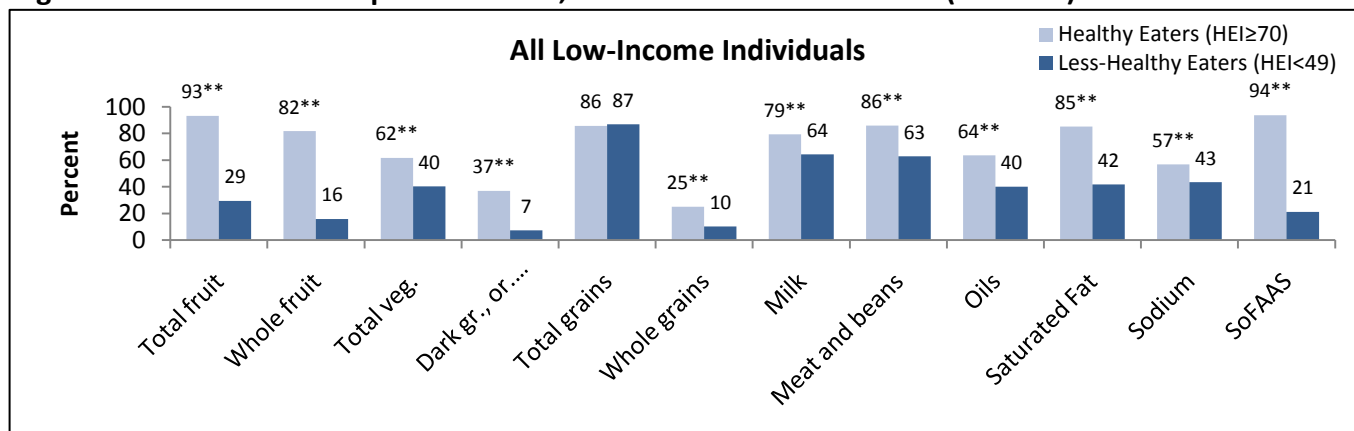
**Figure III.14. School Meals (Children)**



\* Significantly different from less-healthy eaters,  $p < .05$ , two-tailed test with BH adjustment

\*\* Significantly different from less-healthy eaters,  $p < .01$ , two-tailed test with BH adjustment

**Figure III.15. HEI-2005 Component Scores, Mean Percent of Maximum (Children)**



\* Significantly different from less-healthy eaters,  $p < .05$ , two-tailed test with BH adjustment

\*\* Significantly different from less-healthy eaters,  $p < .01$ , two-tailed test with BH adjustment

#### 4. Food Choices, Based on Consumption

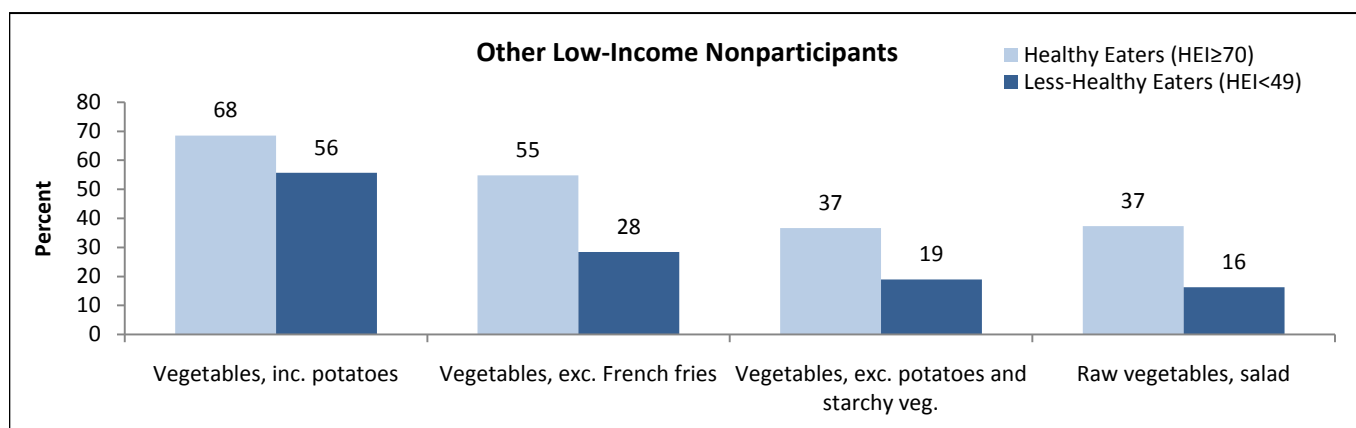
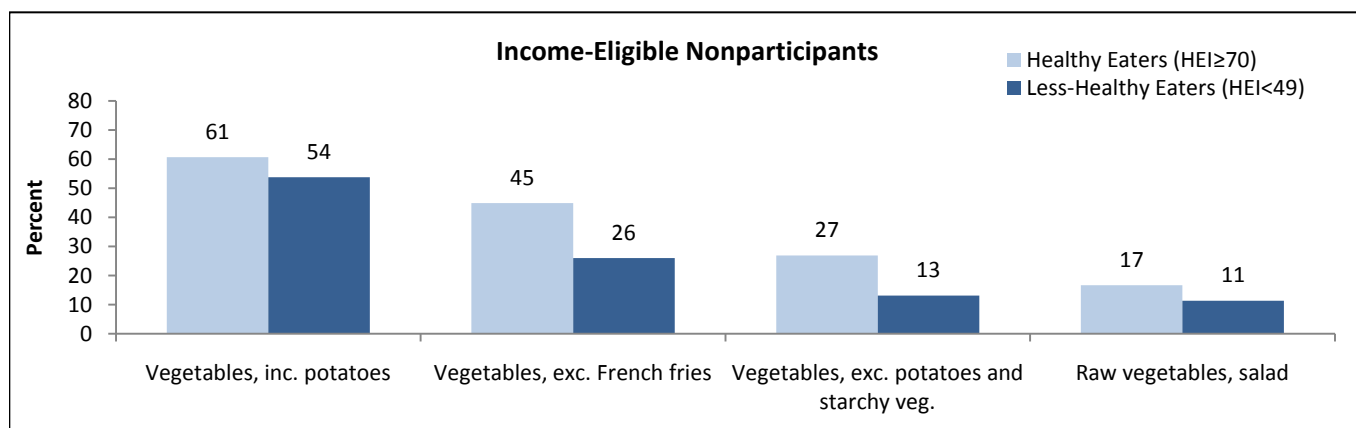
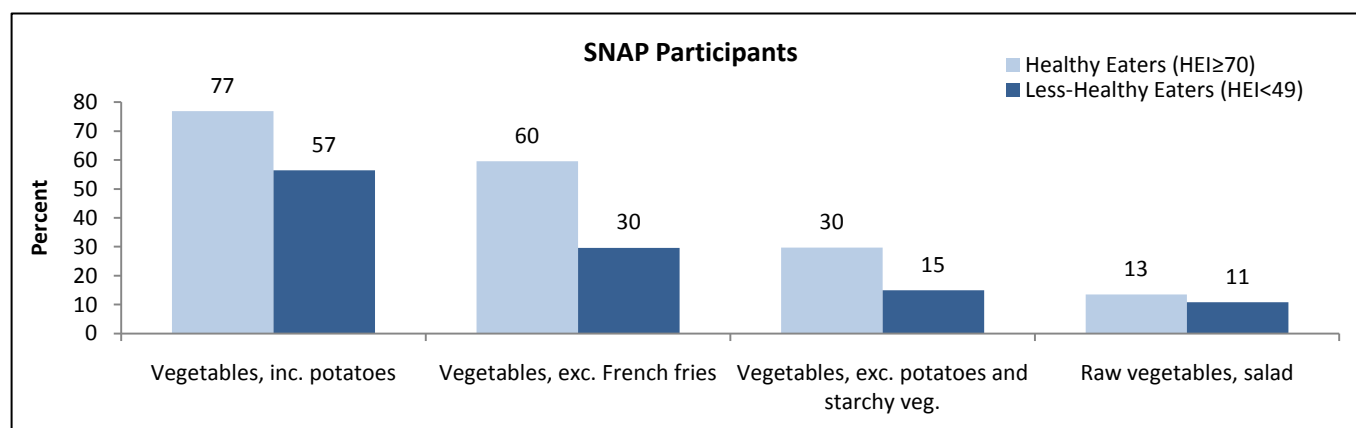
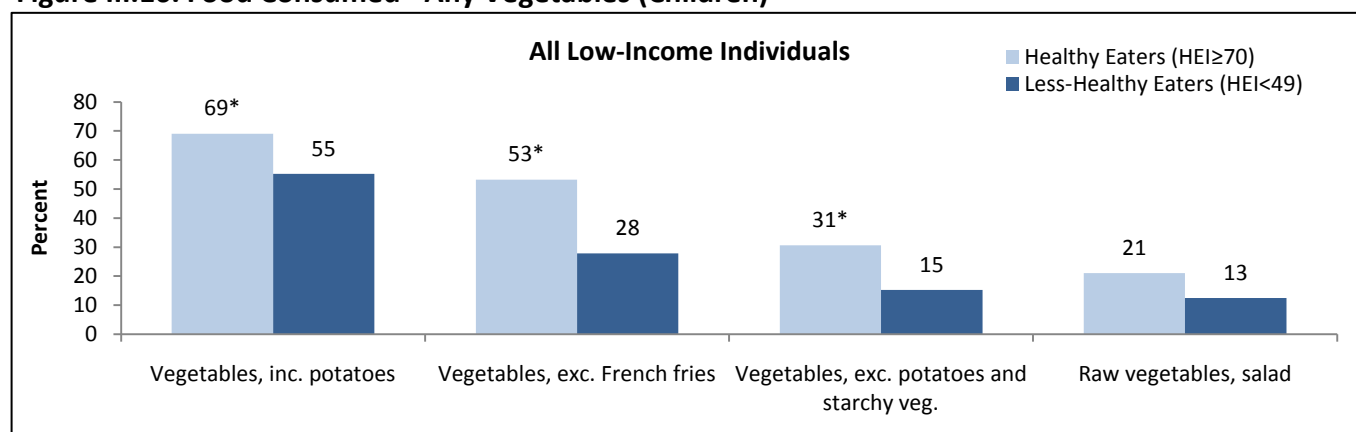
There were widespread differences between child healthy eaters and less-healthy eaters in the proportion of individuals who reported eating specific types of food (Table C.8).<sup>37</sup>

- Among all low-income children, healthy eaters were significantly more likely than less-healthy eaters to consume:
  - Discrete servings of milk (of any type)
  - One percent or skim milk
  - Fruit
  - Fresh fruit
  - Fruit juice
  - Whole grains
- Overall, child healthy eaters were also significantly more likely than child less-healthy eaters to consume discrete servings of vegetables (Figure III.16). This finding is not affected by whether potatoes, fries, and other starchy vegetables are counted as vegetables.
- Overall, child healthy eaters were significantly less likely than child less-healthy eaters to consume sugar-sweetened beverages or any type of sweetened beverage, including those sweetened with artificial sweeteners (Figure III.17). They were also less likely to consume any type of sweet, dessert, or candy.
- Among all low-income children, healthy eaters were as likely as less-healthy eaters to consume discrete servings of candy (Figure III.17). Among SNAP participants, healthy eaters were significantly more likely than less-healthy eaters to consume discrete servings of candy, while healthy eaters in both groups of nonparticipants were less likely than less-healthy eaters in these groups to consume discrete servings of candy. This seemingly odd finding might have to do with the younger age of SNAP participants, compared to nonparticipants.
- Findings related to the food choices of child healthy eaters and less-healthy eaters varied for SNAP participants and nonparticipants. Among SNAP participants, only the differences in the proportions consuming discrete servings of fruit, fresh fruit, fruit juice, and sweets, desserts, and candy were statistically significant (differences for milk, one percent or skim milk, vegetables, whole grains, and sweetened beverages were not significant) (Table C.8).

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<sup>37</sup> Individuals were considered to have consumed a food if any amount of the food was reported. The analysis is based on foods as consumed and does not consider individual components of mixed foods.

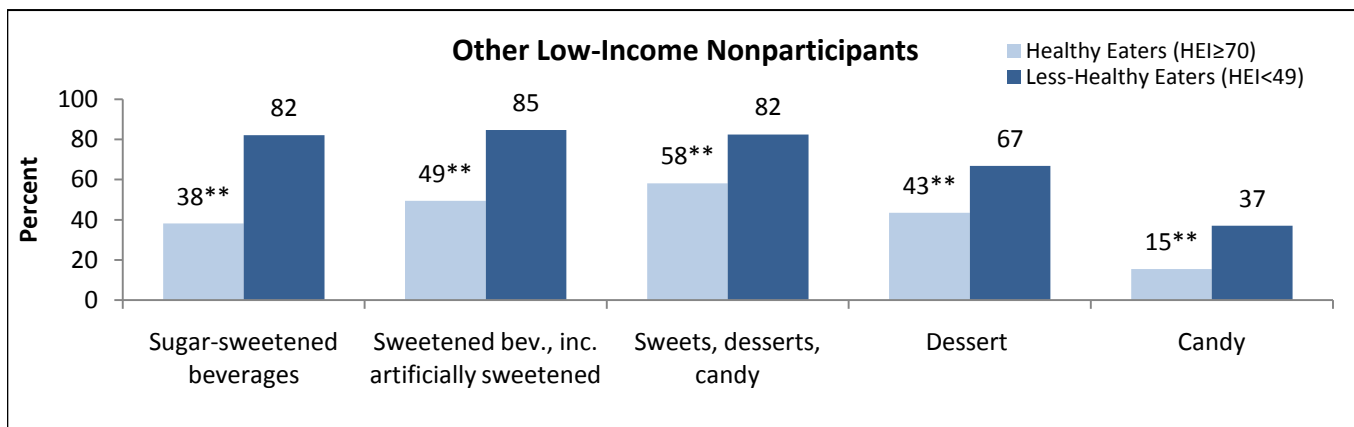
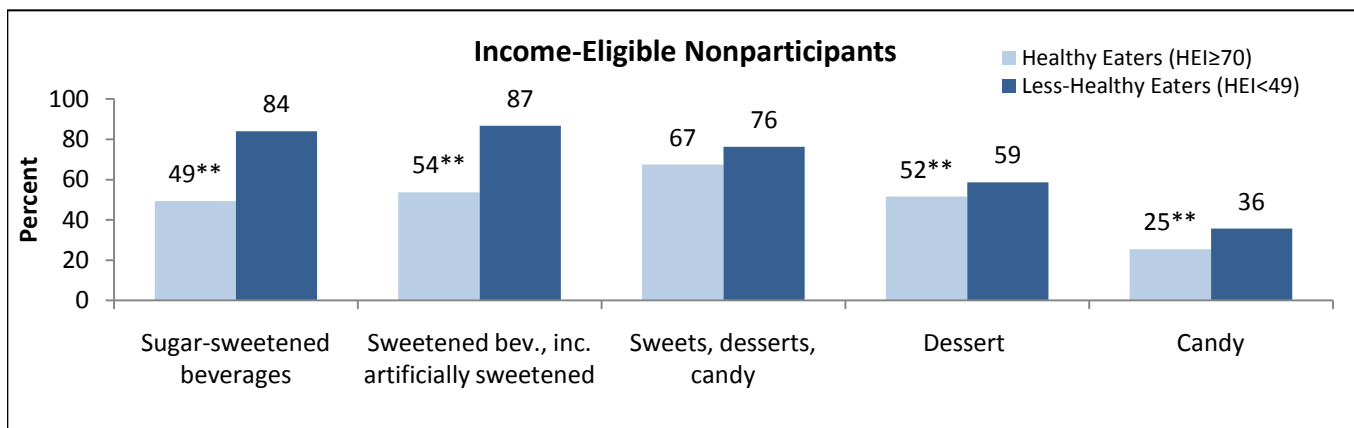
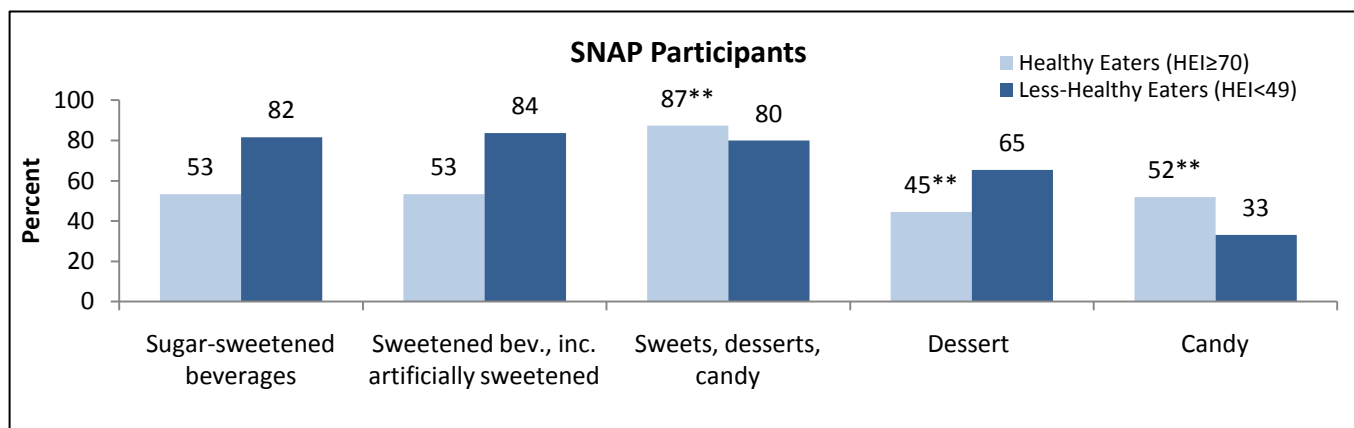
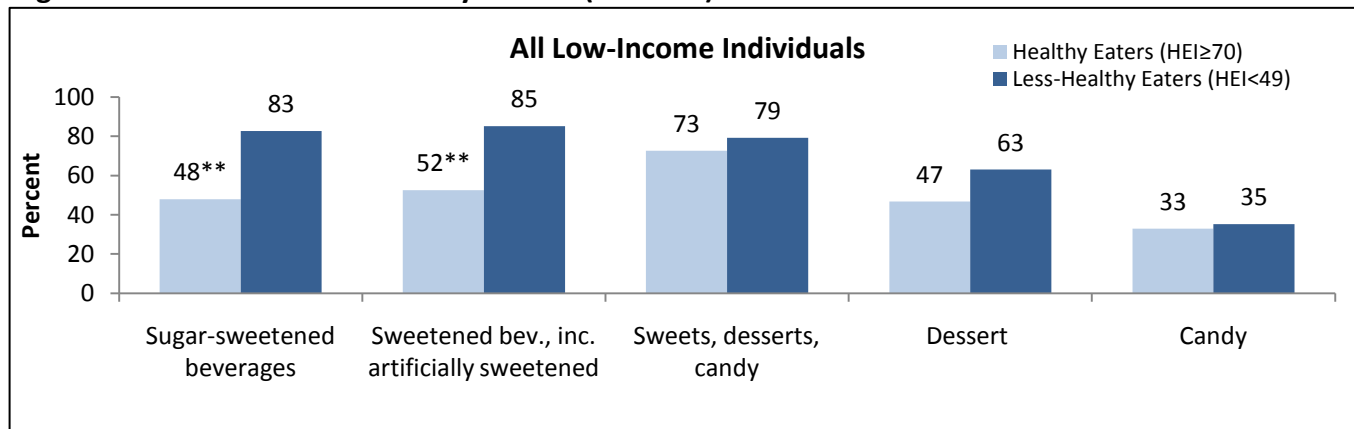
**Figure III.16. Food Consumed - Any Vegetables (Children)**



\* Significantly different from less-healthy eaters,  $p < .05$ , two-tailed test with BH adjustment

\*\* Significantly different from less-healthy eaters,  $p < .01$ , two-tailed test with BH adjustment

**Figure III.17. Food Consumed - Any Sweets (Children)**



\* Significantly different from less-healthy eaters,  $p < .05$ , two-tailed test with BH adjustment

\*\* Significantly different from less-healthy eaters,  $p < .01$ , two-tailed test with BH adjustment

## 5. Food Choices, Based on Relative Energy Contribution

- Overall, child healthy eaters obtained larger shares of their daily calorie intakes from foods in the MyPyramid food groups—milk and milk products, meat and beans, grains, and fruit (there was no difference in the proportion of calories contributed by vegetables)—and smaller shares from mixed dishes and sweets, desserts, and candy (including sweetened beverages) (Figure III.18).<sup>38</sup>
- Findings varied for SNAP participants and nonparticipants. Among SNAP participants, there were no significant differences between child healthy eaters and child less-healthy eaters in the share of daily calories obtained from the milk group or the meat and beans group (Figure III.18).
- Compared to child less-healthy eaters, child healthy eaters obtained significantly smaller shares of their daily calorie intakes from added sugars and discretionary solid fat (Figure III.19). This pattern was observed for all low-income children and for all three subgroups.<sup>39</sup>
- Among all low-income children and in all three subgroups, healthy eaters obtained significantly larger shares of their total daily calories from foods suggested for frequent and selective consumption, relative to guidance provided in the *Dietary Guidelines for Americans*, and significantly smaller shares from foods suggested for occasional consumption (Figure III.20).<sup>40</sup>

## 6. Nutrient Density and Energy Density

- Overall, and in all groups except other (income-ineligible) nonparticipants, child healthy eaters had significantly higher mean scores on the NR score, the composite measure of nutrient density (see Appendix A), compared to child less-healthy eaters (Figure III.21).
- The energy density of diets consumed by healthy eaters was significantly lower than the energy density of diets consumed by less-healthy eaters (Figure III.21).<sup>41</sup>

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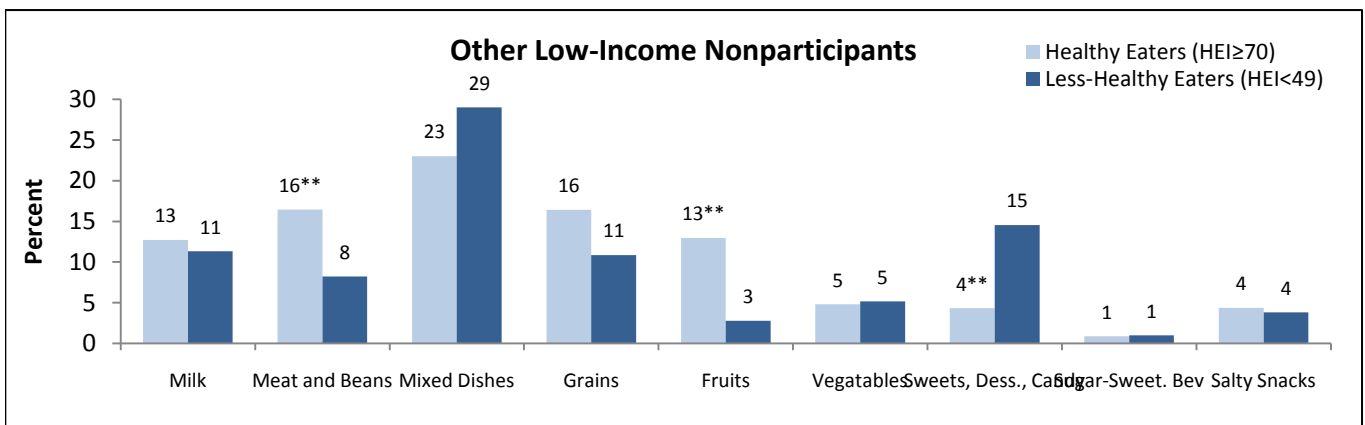
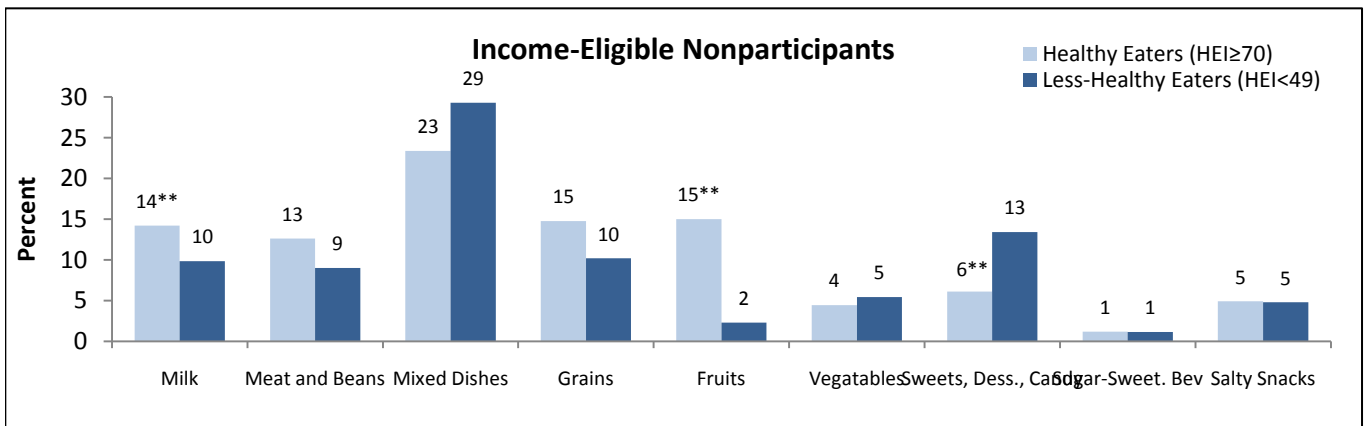
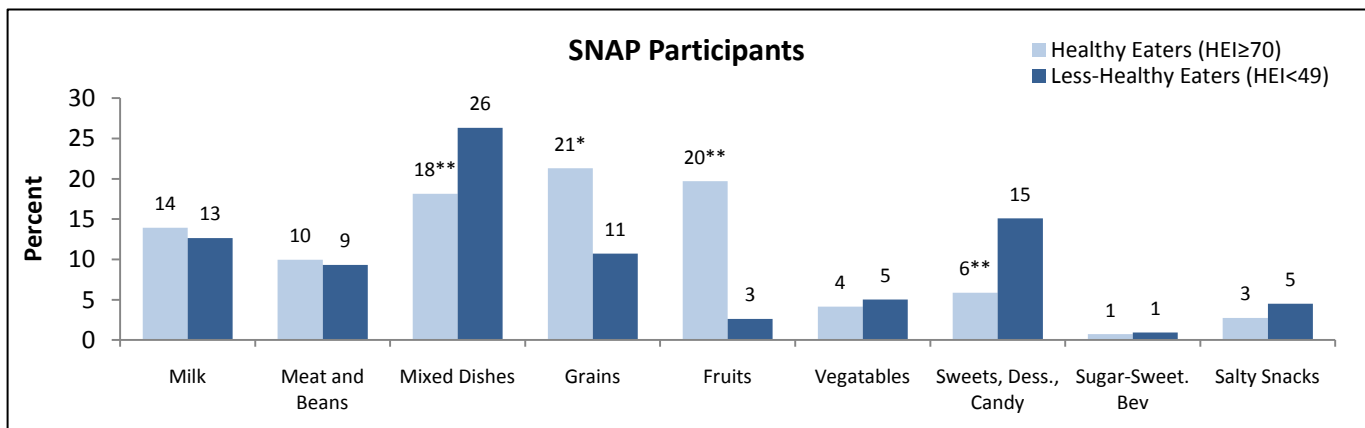
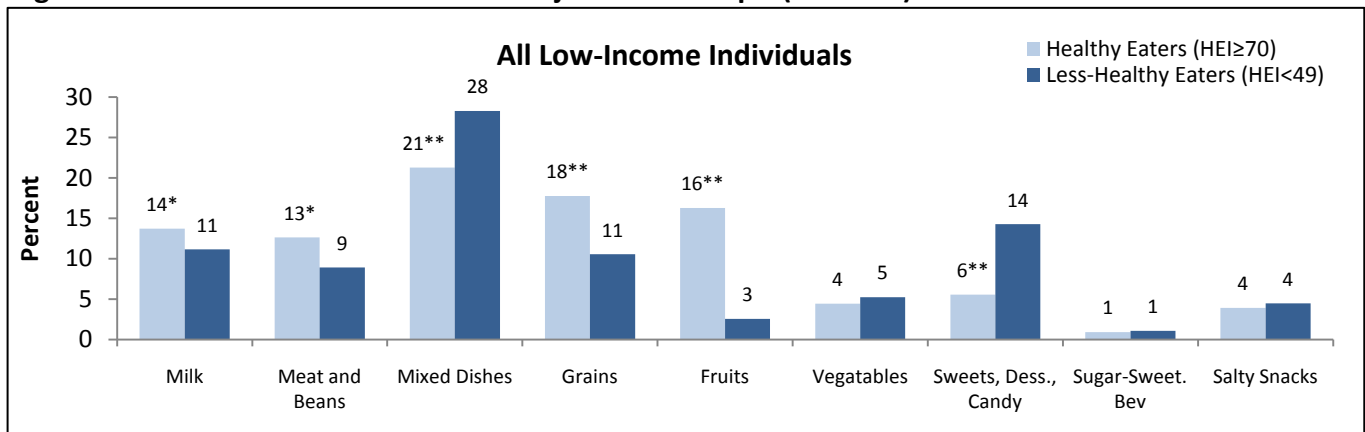
<sup>38</sup> The analysis is based on foods as consumed and does not consider individual components of mixed foods.

<sup>39</sup> Analysis of added sugars and discretionary solid fat is based on the MyPyramid equivalents data used to compute HEI-2005 scores. Estimates include sugars and fats reported separately as well as sugars and solid fats occurring as ingredients in other foods. See Appendix A for a description of the MyPyramid Equivalents Database. The SoFAAS score in the HEI-2005 captures calories from added sugars, added fats, and alcohol. This analysis was done to look at the components of the SoFAAS score.

<sup>40</sup> Food classifications were based on work done by Cole and Fox (2008). All foods reported by sample members were assigned to one of the three groups based on nutrient density and calories from added sugars and discretionary solid fat. Additional details are provided in Appendix A, including a summary of foods assigned to each category (Table A.4).

<sup>41</sup> Estimates of energy density were based on foods only, as recommended by Ledikwe et al. (2005). For presentation in the graph estimates were multiplied by 100. Actual estimates are provided in Table C.5. The table also includes results for an alternative measure of energy density which includes juice and milk. Findings for the alternative measure are consistent with findings for the foods-only measure.

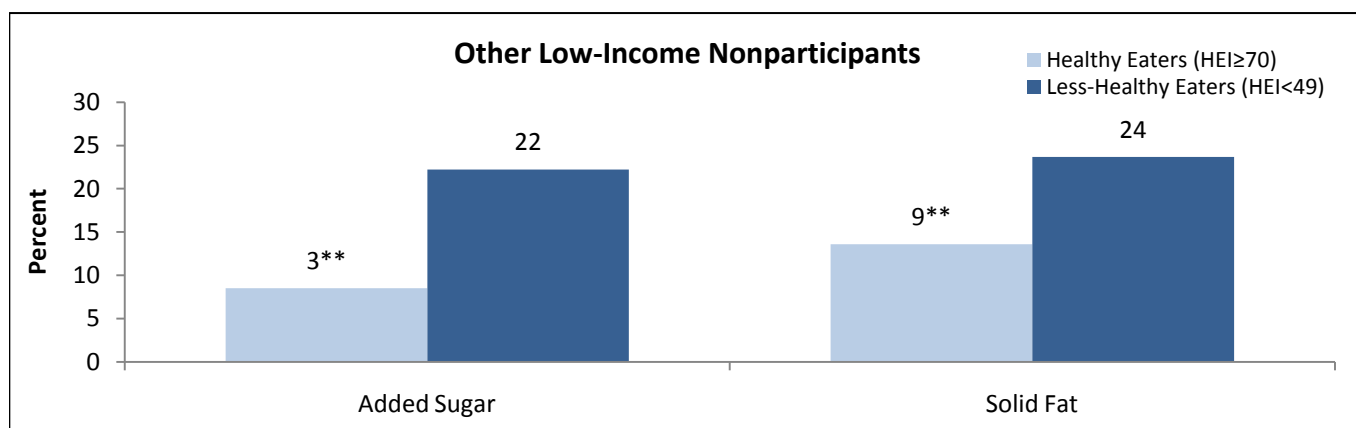
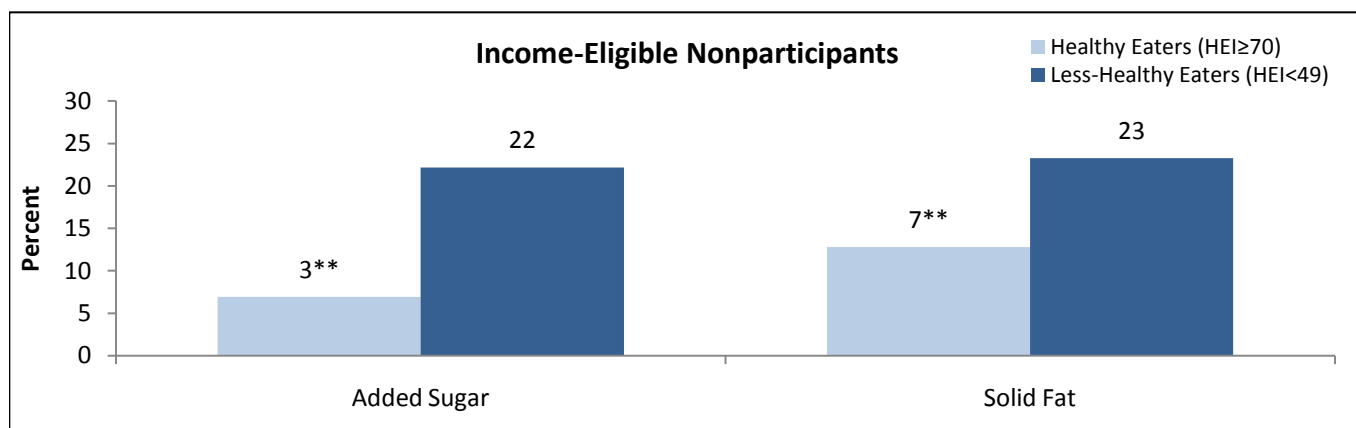
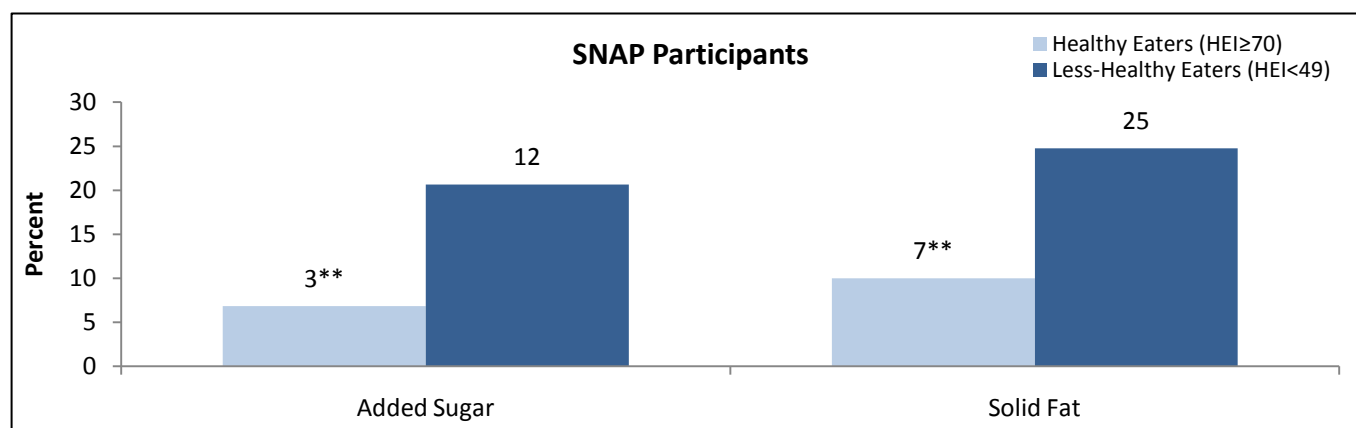
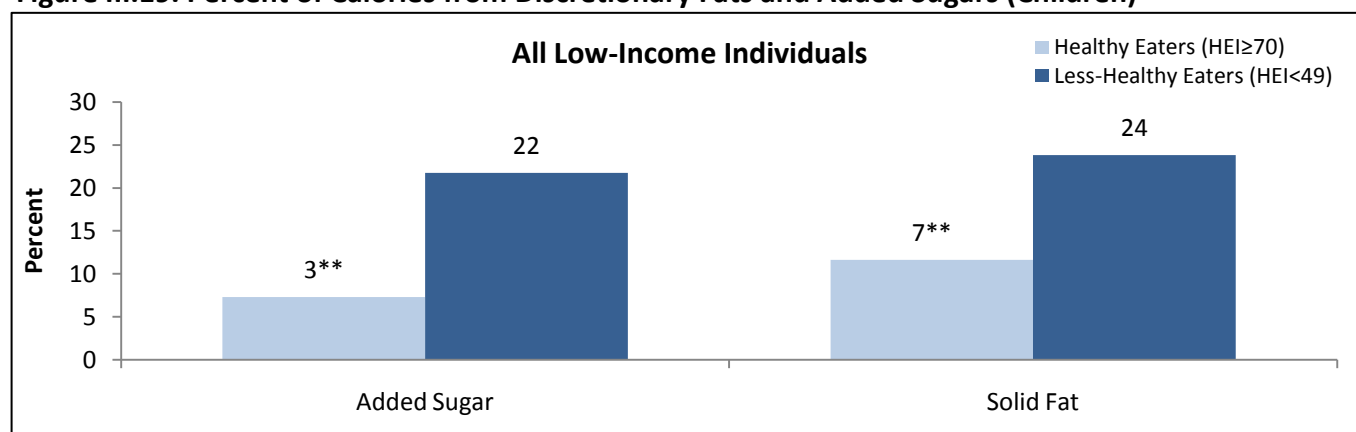
**Figure III.18. Percent of Calories from Major Food Groups (Children)**



\* Significantly different from less-healthy eaters,  $p < .05$ , two-tailed test with BH adjustment

\*\* Significantly different from less-healthy eaters,  $p < .01$ , two-tailed test with BH adjustment

**Figure III.19. Percent of Calories from Discretionary Fats and Added Sugars (Children)**

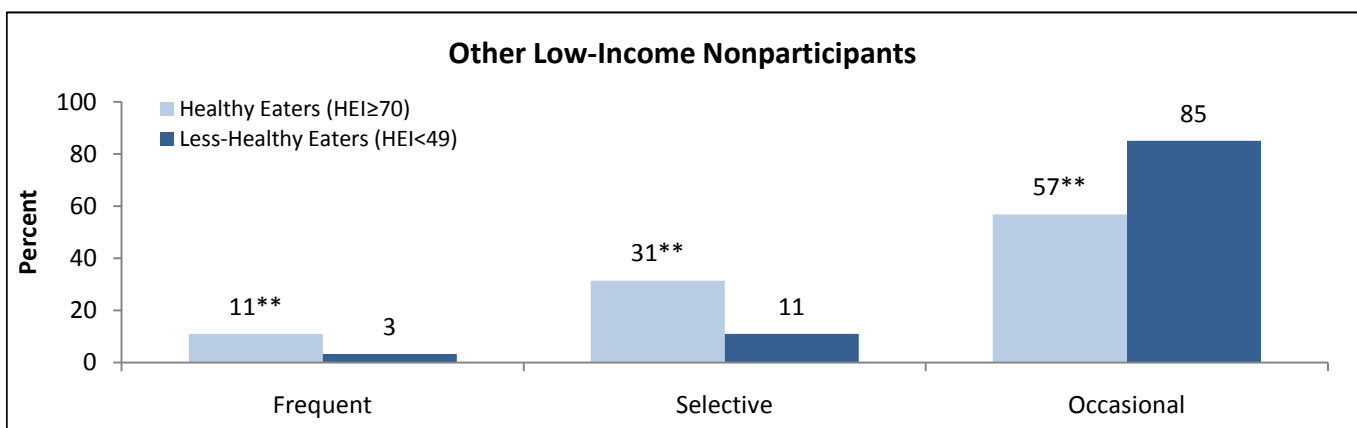
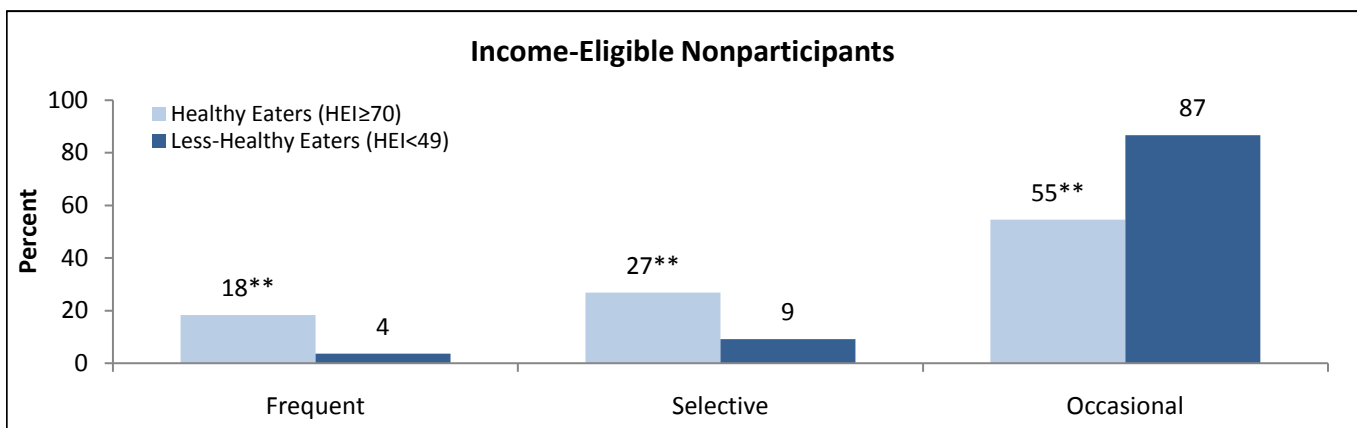
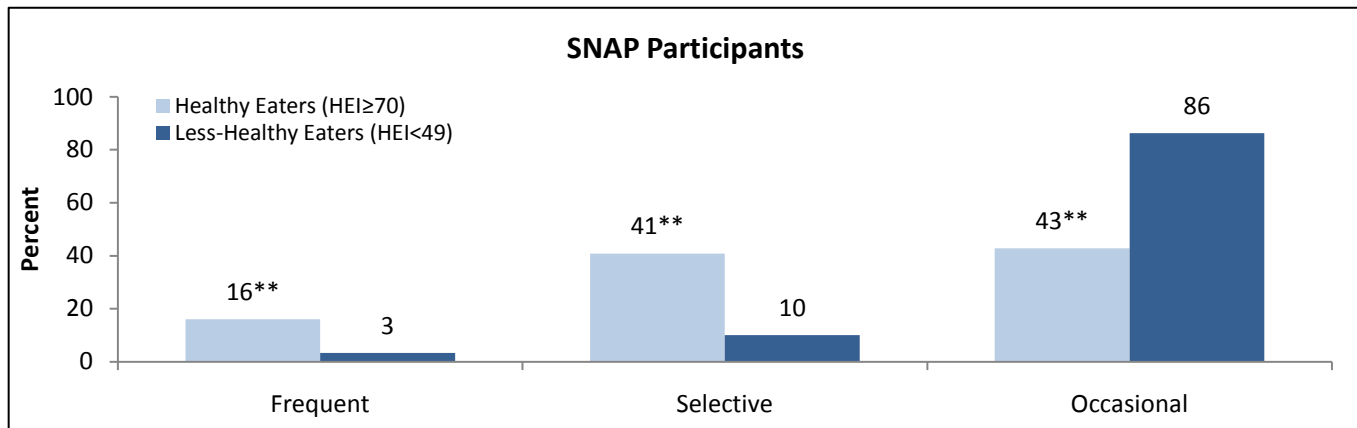
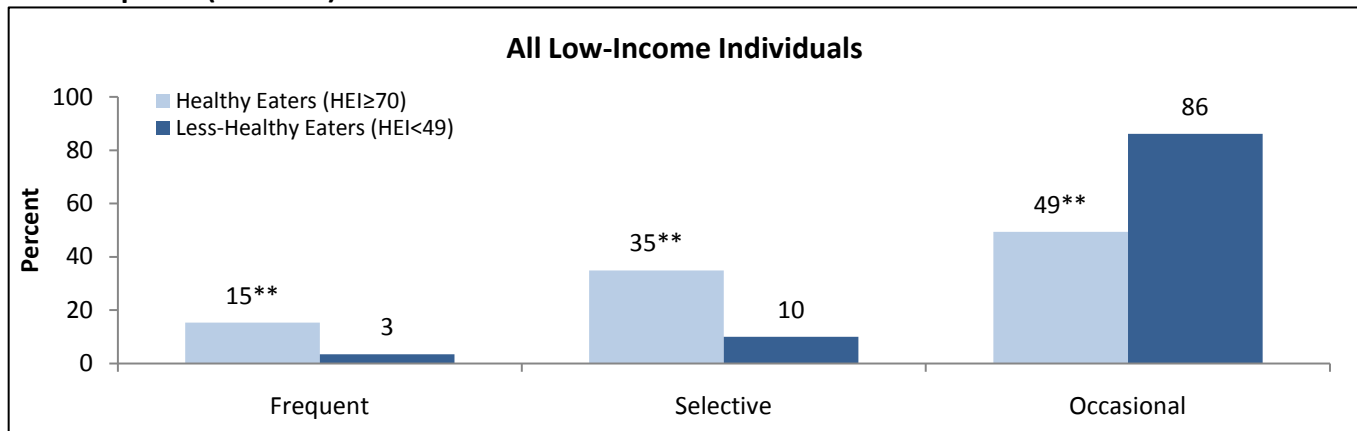


\* Significantly different from less-healthy eaters,  $p < .05$ , two-tailed test with BH adjustment

\*\* Significantly different from less-healthy eaters,  $p < .01$ , two-tailed test with BH adjustment



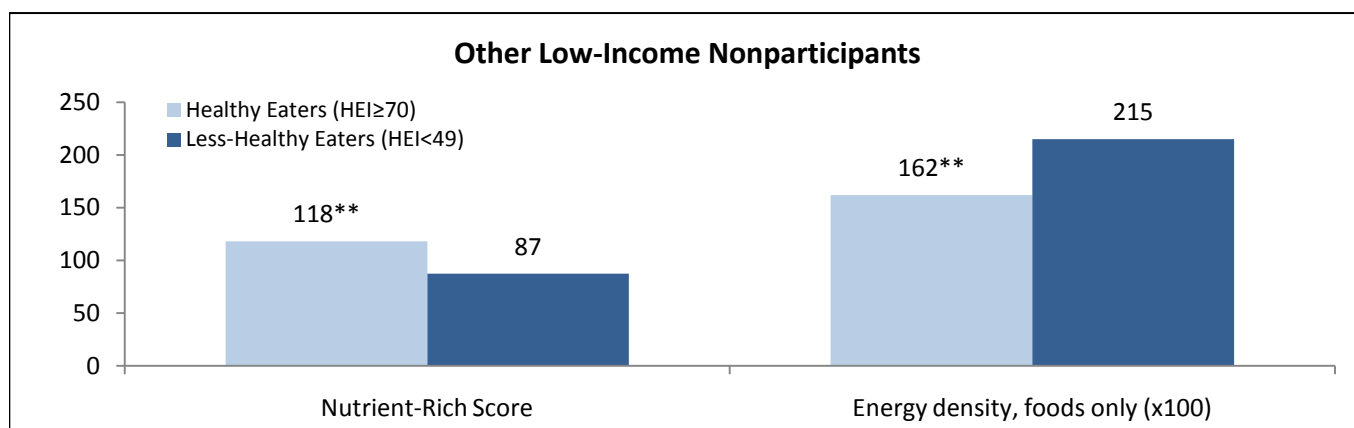
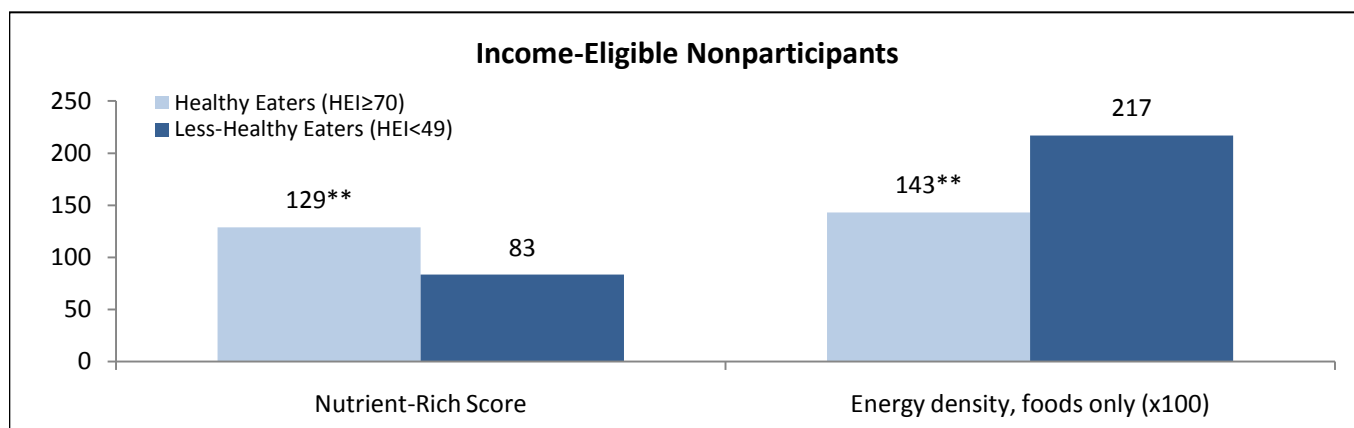
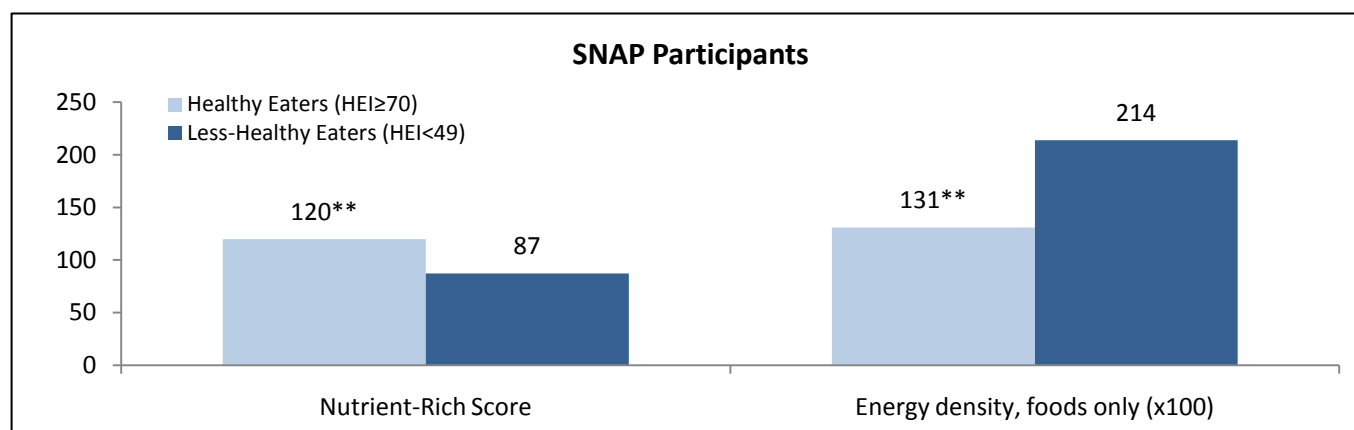
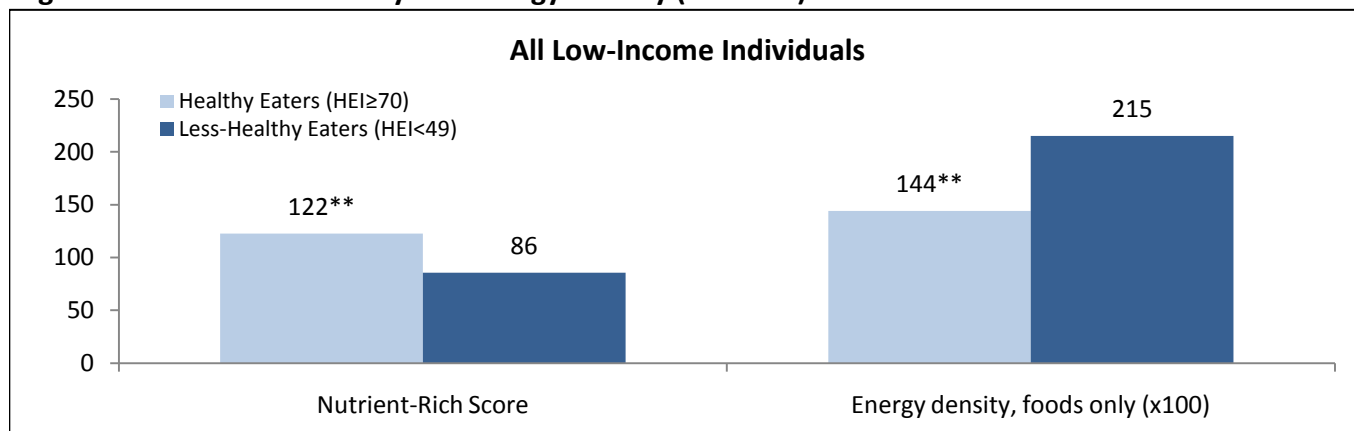
**Figure III.20. Percent of Calories from Foods Recommended for Frequent, Selective, and Occasional Consumption (Children)**



\* Significantly different from less-healthy eaters,  $p < .05$ , two-tailed test with BH adjustment

\*\* Significantly different from less-healthy eaters,  $p < .01$ , two-tailed test with BH adjustment

**Figure III.21. Nutrient Density and Energy Density (Children)**



\* Significantly different from less-healthy eaters,  $p < .05$ , two-tailed test with BH adjustment

\*\* Significantly different from less-healthy eaters,  $p < .01$ , two-tailed test with BH adjustment

## 7. Summary

Our analysis found widespread differences in the dietary characteristics of healthy and less-healthy eaters in the low-income child population. Key findings are summarized in Table III.2. Among children, healthy eaters were more likely than less-healthy eaters to eat breakfast; eat three meals daily; consume milk of any type; consume fruit, fresh fruit, and fruit juice; consume vegetables and whole grains; have higher mean scores on all HEI-2005 components except total grains; obtain smaller shares of their total daily calories from foods suggested for occasional consumption; and consume high nutrient density diets. Less-healthy eaters were more likely to eat in a restaurant at least one time per week; consume sweetened beverages of any type; obtain larger shares of calories from snacks, mixed dishes, added sugars, and discretionary solid fats; and consume high energy density diets.

Table III.2. Summary of Key Differences in Dietary Characteristics of Child Healthy and Less-Healthy Eaters.

Healthy eaters (HEI $\geq$ 70) were more likely to:	Less-healthy eaters (HEI<49) were more likely to:
<ul style="list-style-type: none"> <li>• Eat breakfast</li> <li>• Eat three meals daily</li> <li>• Consume milk of any type</li> <li>• Consume fruit, fresh fruit, and fruit juice</li> <li>• Consume vegetables and whole grains</li> <li>• Have higher mean scores on all HEI-2005 components except total grains</li> <li>• Obtain smaller shares of their total daily calories from foods suggested for occasional consumption</li> <li>• Consume high nutrient density diets</li> </ul>	<ul style="list-style-type: none"> <li>• Eat in a restaurant 1+ times per week</li> <li>• Consume sweetened beverages of any type</li> <li>• Obtain larger shares of calories from: snacks, mixed dishes, added sugars, and discretionary solid fats</li> <li>• Consume high energy density diets</li> </ul>

HEI = Score on Healthy Eating Index-2005

For the most part, the significant differences observed between healthy and less healthy eaters in the overall sample of children were consistent with findings for subgroups of SNAP participants and nonparticipants. In addition, findings for children were generally consistent with the previously reported findings for adults. Compared to adults, however, there were more dietary characteristics

for which no statistically significant differences were found between healthy and less-healthy eaters among SNAP participants, even though they were found among one or both of the other two groups (consumption of any milk or of sugar-sweetened beverages, for example). In all these instances, however, the observed difference between healthy and less-healthy eaters is in the same direction as it is among the other two groups. Possible explanations for why these differences are not detected for SNAP participants are: (1) that the association between healthy eating and these characteristics are weaker among SNAP participants, compared to the other two groups, or (2) that the variation for these dietary characteristics is relatively high among SNAP participants. It is difficult to distinguish between these two possibilities, however.

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## IV. CLUSTER ANALYSIS RESULTS

Chapter III examined the dietary characteristics (meal patterns, dietary behaviors, and food choices) of healthy and less-healthy eaters in the low-income population. For each dietary behavior or food choice examined, the basic question was whether healthy eaters (defined as those with HEI-2005 scores of 70 or greater) were more or less likely than less-healthy eaters (defined as those with HEI-2005 scores below 49) to exhibit the behavior or consume the food.

In this chapter, we take our analysis of healthy and less-healthy eaters one step further. We used cluster analysis to identify distinct dietary patterns (or “styles of eating”) among healthy eaters and less-healthy eaters. In other words, we used cluster analysis to determine whether there is more than one meaningful “healthy” pattern and/or more than one meaningful “unhealthy” pattern. Dietary quality indices such as the HEI-2005 are inherently designed to quantify a priori elements considered most healthful. Thus, the “healthy” and “less-healthy” diets will, by definition, have similarities with regard to overall composition and food-group intakes. However, because “points” that contribute to HEI-2005 scores can be accumulated in different ways, there is likely more than one meaningful variant of “healthy” and “less-healthy” dietary patterns.

To our knowledge, the separate analysis of two groups of adults (or children), defined based on the healthfulness of their diets as measured by the HEI-2005, is unique to this study. Findings from this analysis will enhance the knowledge base by illustrating the variability that can exist among dietary patterns, even those that were similarly regarded as either “healthy” or “less-healthy.” This variability emerges because people select different combinations of foods and beverages based on their individual preferences. Illustrating this variation in diets of similar “healthfulness” (or “unhealthfulness”) may be helpful to policymakers and nutrition educators in designing nutrition education and promotion efforts that target specific dietary patterns and food choices.

Cluster analysis is a multivariate method that is used to find distinct patterns within complex data (such as dietary data) by using all the data simultaneously (Knol et al. 2005; Newby and Tucker

2004). We used food group intakes (described in more detail below) as the input variables for the cluster analyses. The cluster analysis assigned each sample person within an analytic group to a unique cluster, based on similar dietary intakes. In essence, cluster analysis groups together individuals so that those in a given group are similar to one another but are different from individuals in the other groups, in terms of food group intakes.

The cluster analysis results were used to address the following three research questions:

- What are the predominant dietary patterns of low-income healthy eaters (children and adults), and how do they compare to the dietary patterns of less-healthy eaters?
- How do dietary intakes and overall diet quality differ across healthy and less-healthy dietary patterns?
- How do sociodemographic characteristics (including SNAP participation, WIC participation, and food security status) of low-income individuals differ between different healthy and less-healthy dietary patterns?

Section A describes the approach used in implementing the cluster analysis. Separate cluster analyses were implemented to identify dietary patterns for the four analytic groups used throughout this report: adult healthy eaters, adult less-healthy eaters, child healthy eaters, and child less-healthy eaters. Results are presented for each of these groups, in turn, in Sections B (adults) and C (children). For each analytic group, we name and describe the dietary patterns identified through the cluster analysis, by focusing on food group intakes that differentiate the patterns.<sup>42</sup> We then explore differences across dietary patterns in other measures of dietary intake and quality (energy and nutrient intakes, intakes of MyPyramid food groups and subgroups, and HEI-2005 scores and component scores). Finally, we look at differences across dietary patterns in the sociodemographic characteristics (including SNAP participation) of the individuals included in each dietary pattern.

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<sup>42</sup> In naming clusters, it is not always possible to mention all of the food groups with noteworthy differences. Differences across clusters that are not reflected in the assigned names are described in the text.

In comparing dietary patterns identified for healthy eaters, it is important to keep two things in mind. The first is that adults and children identified as “healthy eaters” did not consume *perfect* diets. Rather, their diets are among the healthiest, relative to others in the same age group. Moreover, there is a range of healthful eating in the healthy eaters groups—that is, some individuals had HEI-2005 scores that were right at the cutoff used to define the healthy eaters group while others had higher scores. This variability is reflected in the dietary patterns identified for healthy eaters. Second, healthy eaters do not always eat the healthiest options within a food group; for example, some healthy eaters consume more higher-fat milk rather than nonfat, reduced-fat, or lower-fat milks. Indeed, some of the dietary patterns identified for healthy eaters are defined by one or more foods or food groups that many would consider “unhealthy.” The presence of these foods in the dietary patterns of healthy eaters illustrates the fact that diet quality, as measured by the HEI-2005, is determined by the overall balance of healthy and less-healthy foods and the associated effects on intakes of saturated fat, sodium, discretionary calories from fats and sugars, and MyPyramid food groups, rather than by intakes of specific foods or food groups.

## A. Analytic Approach

### 1. Food-Grouping Scheme

The first step in implementing a cluster analysis is to define the food-grouping scheme that will be used to characterize individuals’ diets in the analysis. There is no universally accepted food-grouping scheme, so the scheme used should be driven by the research questions being asked. The focus of this analysis is to describe the dietary patterns of low-income adults and children who consume relatively healthy and less-healthy diets, based on HEI-2005 scores. Consequently, the food-grouping scheme is based on the dietary patterns recommended in the 2005 *Dietary Guidelines* and the MyPyramid food guidance systems. It separates the major MyPyramid groups into subgroups that differentiate foods along important dimensions that affect diet quality, primarily fat, fiber, and whole grain content. It also includes food groups and subgroups to accommodate mixed



foods included in the NHANES data (pizza, sandwiches, stews, casseroles, and stir fries, for example), because dietary patterns are best represented by foods as they are actually consumed rather than as separate components or ingredients. A small number of groups in the initial food-grouping scheme were consumed in such small amounts (creamed vegetables, for example) that they were combined with other groups, based on patterns revealed in preliminary analyses. The full list of food groups used in the analysis can be seen in the Appendix G tables. Intakes of these food groups, measured in total grams per day, were used as input variables in the cluster analysis.

## 2. Cluster Analysis Methods

As noted previously, cluster analyses were implemented separately for adult healthy eaters, adult less-healthy eaters, child healthy eaters, and child less-healthy eaters, respectively. Using intakes of all food groups simultaneously, cluster analysis assigns each individual in a group to distinct, nonoverlapping clusters, based on similar food group intakes. As noted above, cluster analysis essentially groups together individuals so that those in a given group are similar to one another but are different from individuals in the other groups, in terms of food group intakes. There are multiple cluster analysis methods available; we used the k-means method, an iterative procedure that begins with  $k$  initial cluster “centers” defined by unique combinations of food group intakes. In each iteration of the k-means method, individuals are assigned to the cluster (representing, in this case, a dietary pattern) with the most similar or “closest” center, and the center for each cluster is recalculated based on the intakes of all individuals in the cluster.<sup>43</sup> Clusters are finalized when all individuals remain in the same cluster from the previous iteration. The final  $k$  clusters constitute a

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<sup>43</sup> The “distance” of an individual from a group center is a function of the differences between the food group intakes of the individual and those in the group center.

“cluster solution.” We implemented the k-means method using the cluster kmeans command in Stata SE version 10.1. (StataCorp 2007).<sup>44</sup> More details are provided in Appendix A.

## B. Adults

### 1. Healthy Eaters

Four distinct dietary patterns were identified for adult healthy eaters. We note that some of the dietary patterns identified for adult healthy eaters are defined by one or more foods or food groups that many would consider “unhealthy.” The presence of these foods in the dietary patterns of healthy eaters illustrates the fact that diet quality, as measured by the HEI-2005, is determined by the overall balance of healthy and less-healthy foods rather than by intakes of specific foods or food groups. We labeled the four patterns identified for adult healthy eaters as (1) Beverages; (2) Plant-Based; (3) Breakfast and Sweets; and (4) Low-fat milk, diet soda, and eggs (hereafter “Low-Fat Milk”). Table IV.1 shows the prevalence of these clusters among adult healthy eaters, the main food groups that distinguish each cluster from the other three clusters, and the proportion in each cluster who are SNAP participants. The Beverages and Plant-Based patterns were the most prevalent, accounting for 38 percent and 34 percent of adult healthy eaters, respectively. Eighteen percent of adult healthy eaters were included in the Breakfast pattern and another 11 percent were included in the Low-Fat Milk pattern. Differences across dietary patterns in the defining food groups, other measures of dietary intake and quality, and the sociodemographic characteristics of the individuals included in each dietary pattern are discussed for each cluster separately below.

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<sup>44</sup> We used the default option for this command, specifying that  $k$  unique observations are to be chosen at random from among those to be clustered as the initial  $k$  group centers.

Table IV.1. Dietary Patterns Identified for Adult Healthy Eaters (**HEI ≥ 70**)

	Beverages n = 149	Plant-Based n = 136	Breakfast and Sweets n = 61	Low-Fat Milk n = 51
Weighted Percent of Adult Healthy Eaters <sup>a</sup>	38	34	18	11
Defining Food Groups				
<i>Relative to other adult healthy eaters, adults in this pattern had higher mean intakes of:</i>				
	Unsweetened high-fat milk	Soy milk and soy products	Coffee and tea	Unsweetened low-fat, reduced fat, and nonfat milk
	100% fruit juice	Fresh melons and berries	Whole-grain cereal	Diet drinks
	Sugar-sweetened drinks (other than soda)	Salads and other raw vegetables	Sweet breakfast foods	Eggs and egg dishes
	Non-diet sodas	Cooked, non- starchy vegetables with added fat	Miscellaneous sugary foods	
Percent SNAP participants	25	15	7	11

<sup>a</sup> Prevalence rates for clusters are weighted using the six-year weights for dietary recall data in NHANES 1999-2004.

HEI = Score on Healthy Eating Index-2005

### The Beverages Pattern

Table IV.2 shows the mean intakes of selected food groups (grams consumed per day) for individuals in each of the four dietary patterns identified for adult healthy eaters. For each food group, the highest intake across patterns is highlighted in bold and the lowest intake is underlined. These data show that, compared to other adult healthy eaters, adults in the Beverages pattern had substantially higher mean intakes of four different types of beverages—unsweetened high-fat milk, 100% fruit juice, sugar-sweetened drinks other than soda, and non-diet soda. They also had notably higher mean intakes of mixed dishes that included grains and vegetables, but no meat; Mexican dishes; and salty snacks. In addition, adult healthy eaters in the Beverages pattern had notably lower

Table IV.2. Mean Grams Per Day from Selected Food Groups Across the 4 Dietary Patterns Identified in Cluster Analysis of Adult Healthy Eaters

Food or Food Group	Mean Grams Consumed Per Day			
	Cluster 1	Cluster 2	Cluster 3	Cluster 4
	Beverages n = 149 Mean	Plant-based n = 136 Mean	Breakfast and Sweets n = 61 Mean	Low-Fat Milk n = 51 Mean
Milk, high fat, not sweetened	197.9	70.3	90.0	<u>44.5</u>
Milk, high fat, sweetened	0.0	0.0	0.0	0.0
Milk, low-fat, reduced fat, nonfat, not sweetened	<u>2.4</u>	39.1	120.2	433.9
Milk, low-fat, reduced fat, nonfat, sweetened	2.3	<u>0.0</u>	4.7	3.4
Dairy products (not milk), high fat	<u>3.6</u>	8.0	10.9	5.9
Dairy products (not milk), low-fat, reduced fat, nonfat	18.0	13.7	12.3	<u>10.5</u>
Dairy desserts and beverages, high fat	<u>4.7</u>	14.2	13.3	9.4
Dairy desserts and beverages, reduced-fat	7.7	4.6	1.6	<u>0.0</u>
Red meats, not fried	15.1	10.3	<u>7.9</u>	14.7
Chicken and turkey, not fried	<u>17.3</u>	28.7	31.8	23.0
Processed meat	8.8	<u>6.6</u>	12.1	6.9
Fish and shellfish, not fried	<u>8.4</u>	16.6	9.6	19.6
Fried meat, poultry, or fish	18.4	16.2	16.8	<u>7.5</u>
Mixed dishes with meat (including organ meats and processed meat)	43.0	30.2	39.5	<u>15.5</u>
Mixed dishes with fish and shellfish	<u>3.5</u>	30.7	14.3	14.1
Mixed dishes with chicken and turkey	27.0	<u>19.8</u>	20.2	35.0
Mixed dishes, grain and vegetable (no meat)	68.8	6.8	15.3	<u>2.1</u>
Hamburgers and cheeseburgers	2.1	0.1	0.0	0.0
Pizza	0.5	10.2	1.5	<u>0.0</u>
Mexican dishes	26.5	12.5	<u>8.7</u>	12.6
Soups	53.2	<u>24.4</u>	61.8	66.4
Eggs and egg dishes	10.3	17.9	<u>10.1</u>	33.4
Beans and legumes, soy milk and soy products	13.9	26.0	7.8	<u>1.0</u>
Beans and legumes, beans, nuts, and seeds	49.1	50.3	36.9	<u>31.4</u>
White/non-whole-grain bread	47.8	47.4	51.1	<u>44.4</u>
Whole grain bread	<u>2.0</u>	3.6	3.4	2.6
Rice, pasta, noodles, dumplings, similar grain products, non-whole grain	50.7	38.7	<u>25.1</u>	43.1
Rice, pasta, noodles, dumplings, similar grain products whole grain	7.9	4.1	<u>0.0</u>	7.1
Other grains, whole grain	2.4	2.8	4.4	<u>0.5</u>
Cereal, non-whole grain	6.3	<u>4.2</u>	15.7	16.3
Cereal, whole grain	<u>36.1</u>	56.1	79.8	39.8
Sweet breakfast foods/breads	<u>10.0</u>	10.7	20.1	18.7
Desserts (non-dairy)	15.7	<u>14.8</u>	20.9	24.5
Salty snacks	9.9	4.0	<u>1.5</u>	3.8
Fruit, fresh, citrus	24.1	25.4	23.5	<u>18.5</u>
Fruit, fresh, melons and berries	15.8	55.8	<u>12.1</u>	35.0
Fruit, fresh, other	109.4	<u>90.5</u>	136.0	117.8
Fruit, canned or frozen	14.0	16.4	17.5	<u>5.4</u>
100% fruit juice	211.8	112.5	109.9	<u>103.1</u>
Vegetables, raw and salad	<u>51.4</u>	77.1	73.2	56.7
Vegetables, cooked, not starchy, fried, creamed, w/cheese, or stuffed	57.9	65.5	<u>31.8</u>	56.5
Vegetables, cooked, starchy (not fried)	<u>21.1</u>	35.2	42.0	29.9
Fried potatoes	11.5	<u>1.9</u>	13.3	4.5
Butter, margarine, and other added fats	<u>1.8</u>	4.1	4.8	2.1
Salad Dressings and mayo, regular, and added oils	11.6	8.7	15.4	<u>4.1</u>
Miscellaneous sugary foods	10.3	8.5	24.4	<u>2.4</u>
Coffee or tea (not sweetened)	<u>55.7</u>	411.2	996.1	128.4
Sugar-sweetened drinks (with calories), other than carbonated sodas	119.3	55.1	<u>30.7</u>	31.6
Sweetened drinks without calories (no calories or art. sweetener)	104.2	74.5	<u>29.5</u>	299.5
Carbonated soda (not diet)	91.5	71.3	<u>2.4</u>	59.2
Alcoholic drinks	4.7	16.0	<u>2.3</u>	4.8

Note: For each food or food group, the highest intake across clusters is in boldface and the lowest intake is underlined. The table excludes food groups that do not contribute to interpretation of the differences between clusters. A version of this table, including all food groups used in the cluster analysis, is provided in Appendix G, Table G.1

mean intakes of unsweetened low-fat, reduced-fat, and nonfat milks; high-fat dairy desserts and beverages; mixed dishes made with fish and shellfish; and coffee and tea.<sup>45</sup>

Adult healthy eaters in the Beverages pattern consumed more calories, on average, than adult healthy eaters in the other patterns (Table IV.3). They also had the highest intake of saturated fat (both in grams and as a percentage of total energy), relative to the three other patterns.<sup>46</sup> Adults in the Beverages pattern also had the highest intake of carbohydrates (in grams); the second highest intake of calcium; and the lowest percentage of energy from protein, compared to other adult healthy eaters. In terms of MyPyramid food groups, adult healthy eaters in the Beverages pattern had the highest intakes of total grains, non-whole grains, total fruit (which includes contributions from 100% fruit juice), and healthy discretionary oils (Table IV.4). They also had the highest intakes of discretionary solid fat and added sugars.

Based on HEI-2005 scores, the Beverages pattern was the least healthy of the four patterns identified for adult healthy eaters. Adults in the Beverages pattern had a mean HEI-2005 score of 74.5, the lowest of the four healthy patterns (Table IV.5). They also had the lowest score for the whole grain and saturated fat components of the HEI-2005 and tied for the lowest score for the calories from SoFAAS, total vegetables, and total grains components. At the same time, they had the highest score among adult healthy eaters for the healthy oils component and the second highest score for the total fruit, whole fruit (tied), dark green and orange vegetables, and sodium components.

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<sup>45</sup> In describing differences in food intake, we focus on food groups for which differences across groups were most substantial.

<sup>46</sup> However, the saturated fat intake of adults in the Beverages pattern, like all adult healthy eaters, was consistent with the *Dietary Guidelines* when measured in terms of the percentage of total calories (< 10 percent).

Table IV.3. Mean Energy and Nutrient Intakes Across the 4 Dietary Patterns Identified in Cluster Analysis of Adult Healthy Eaters

Energy/Nutrient	Mean Intake Over 24 Hours			
	Cluster 1	Cluster 2	Cluster 3	Cluster 4
	Beverages	Plant-based	Breakfast and Sweets	Low-Fat Milk
	n = 149 Mean	n = 136 Mean	n = 61 Mean	n = 51 Mean
Energy (kcal)	1,758.6	1,529.9	1,556.8	1,525.5
Fat (g)	60.6	53.2	51.4	49.7
Percent of Total Energy from Fat	30.6	30.2	30.3	28.5
Sodium (mg)	2,458.9	2,219.8	2,462.8	2,282.7
Calcium (mg)	707.8 <sup>c</sup>	627.1 <sup>e</sup>	697.7 <sup>f</sup>	997.6
Folate (mcg FE)	619.7	534.6	528.1	569.6
Cholesterol (mg)	171.3	185.0	173.9	130.2
Fiber (gm)	19.8	19.2	20.0	17.4
Protein (g)	68.7	65.7	64.6	73.3
Percent of Total Energy from Protein	15.8 <sup>a,c</sup>	17.5 <sup>e</sup>	16.9 <sup>f</sup>	19.8
Carbohydrate (g)	243.7 <sup>a</sup>	204.3	220.1	206.0
Percent of Total Energy from Carbohydrate	55.6	54.3	55.7	54.2
Saturated Fat (g)	16.4 <sup>a,b,c</sup>	13.1	13.8	12.6
Percent of Total Energy from Saturated Fat	8.3	7.6	8.0	7.3

<sup>a</sup> Difference between Cluster 1 and Cluster 2 is statistically significant at the  $p < .05$  level.

<sup>b</sup> Difference between Cluster 1 and Cluster 3 is statistically significant at the  $p < .05$  level.

<sup>c</sup> Difference between Cluster 1 and Cluster 4 is statistically significant at the  $p < .05$  level.

<sup>d</sup> Difference between Cluster 2 and Cluster 3 is statistically significant at the  $p < .05$  level.

<sup>e</sup> Difference between Cluster 2 and Cluster 4 is statistically significant at the  $p < .05$  level.

<sup>f</sup> Difference between Cluster 3 and Cluster 4 is statistically significant at the  $p < .05$  level.

Table IV.4. Mean Intake of MyPyramid Food Groups and Subgroups Across the 4 Dietary Patterns Identified in Cluster Analysis of Adult Healthy Eaters

MyPyramid Food Group/Subgroup	Mean Intake of MyPyramid Food Groups and Subgroups Over 24 Hours			
	Cluster 1	Cluster 2	Cluster 3	Cluster 4
	Beverages n = 149	Plant-based n = 136	Breakfast and Sweets n = 61	Low-Fat Milk n = 51
	Mean	Mean	Mean	Mean
Total grains (oz. equivalents)	6.4	5.3	5.7	5.3
Whole grains (oz. equivalents)	1.0	1.2	1.5	1.3
Non-whole grains (oz. equivalents)	5.4 <sup>a,b</sup>	4.0	4.1	4.0
Total vegetables (cup equivalents)	1.5	1.8	1.5	1.5
Dark-green, leafy vegetables (cup equivalents)	0.1	0.3	0.1	0.1
Orange vegetables (cup equivalents)	0.2	0.2	0.1	0.1
White potatoes (cup equivalents)	0.3	0.3	0.3	0.3
Other starchy vegetables (cup equivalents)	0.1	0.1	0.2	0.1
Tomatoes (cup equivalents)	0.2	0.2	0.3	0.3
Other vegetables (cup equivalents)	0.5	0.7	0.6	0.5
Total fruit (cup equivalents)	2.1	1.8	1.9	1.8
Citrus fruit, melons, and berries (cup equivalents)	0.9	0.8	0.7	0.8
Other fruit (cup equivalents)	1.2	1.0	1.2	1.0
Total milk (cup equivalents)	1.2 <sup>a,c</sup>	0.9 <sup>e</sup>	1.2 <sup>f</sup>	2.2
Milk (cup equivalents)	1.0 <sup>a,c</sup>	0.6 <sup>d,e</sup>	1.0 <sup>f</sup>	2.1
Yogurt (cup equivalents)	0.1	0.0	0.0	0.0
Cheese (cup equivalents)	0.2	0.2	0.2	0.1
Meat, poultry, fish (oz. equivalents)	3.2	3.6	3.3	3.3
Red meat (oz. equivalents)	1.1	0.8	0.6	0.8
Organ meats (oz. equivalents)	0.1	0.0	0.0	0.0
Frankfurters, sausages, and luncheon meat (oz. equivalents)	0.3	0.2	0.4	0.3
Poultry (oz. equivalents)	1.3	1.4	1.5	1.5
Fish and shellfish high in Omega-3 fatty acids (oz. equivalents)	0.1	0.5	0.3	0.3
Fish and shellfish low in Omega-3 fatty acids (oz. equivalents)	0.3	0.7	0.4	0.5
Eggs (oz. equivalents)	0.2	0.4	0.3	0.7
Cooked dry beans and peas (oz. equivalents)	0.2 <sup>c</sup>	0.2 <sup>e</sup>	0.2	0.0
Soybean products (oz. equivalents)	0.4	0.2	0.1	0.0
Nuts and seeds (oz. equivalents)	1.2	1.1	0.6	1.5
Discretionary oil (Grams)	24.2	22.2	17.0	16.8
Discretionary solid fat (Grams)	23.5 <sup>a</sup>	18.1	21.0	18.5
Added sugars (tsp. equivalents)	9.2	8.1	8.1	6.9
Alcohol (Drinks of alcohol)	0.0	0.1	0.0	0.0

<sup>a</sup> Difference between Cluster 1 and Cluster 2 is statistically significant at the  $p < .05$  level.<sup>b</sup> Difference between Cluster 1 and Cluster 3 is statistically significant at the  $p < .05$  level.<sup>c</sup> Difference between Cluster 1 and Cluster 4 is statistically significant at the  $p < .05$  level.<sup>d</sup> Difference between Cluster 2 and Cluster 3 is statistically significant at the  $p < .05$  level.<sup>e</sup> Difference between Cluster 2 and Cluster 4 is statistically significant at the  $p < .05$  level.<sup>f</sup> Difference between Cluster 3 and Cluster 4 is statistically significant at the  $p < .05$  level.

Table IV.5. Mean Healthy Eating Index-2005 Scores Across the 4 Dietary Patterns Identified in Cluster Analysis of Adult Healthy Eaters

	Mean Healthy Eating Index-2005 Scores			
	Cluster 1	Cluster 2	Cluster 3	Cluster 4
	Beverages	Plant-based	Breakfast and Sweets	Low-Fat Milk
	n = 149	n = 136	n = 61	n = 51
<i>Healthy Eating Index (HEI)-2005 Score</i>	Mean	Mean	Mean	Mean
HEI-2005 Score (Total)	74.5	75.9	75.4	77.1
HEI-2005 Component Scores				
Total Fruit	4.3	4.2	4.6	4.0
Whole Fruit	4.1	4.1	4.7	4.0
Total Vegetables	3.6	4.1	3.8	3.6
Dark Green and Orange Vegetables and Legumes	2.8	2.9	2.1	2.0
Total Grains	4.5	4.5	4.7	4.6
Whole Grains	1.6 <sup>b</sup>	2.1	2.7	2.5
Milk	5.0 <sup>c</sup>	4.3 <sup>e</sup>	5.5 <sup>f</sup>	8.5
Meat and Beans	9.0	9.5	8.7	9.2
Oils	7.5	7.3	7.1	6.1
Saturated Fat	8.6	9.0	8.9	9.2
Sodium	5.2	5.3	4.2	4.5
Calories from SoFAAS	18.4	18.6	18.4	18.9

<sup>a</sup> Difference between Cluster 1 and Cluster 2 is statistically significant at the  $p < .05$  level.

<sup>b</sup> Difference between Cluster 1 and Cluster 3 is statistically significant at the  $p < .05$  level.

<sup>c</sup> Difference between Cluster 1 and Cluster 4 is statistically significant at the  $p < .05$  level.

<sup>d</sup> Difference between Cluster 2 and Cluster 3 is statistically significant at the  $p < .05$  level.

<sup>e</sup> Difference between Cluster 2 and Cluster 4 is statistically significant at the  $p < .05$  level.

<sup>f</sup> Difference between Cluster 3 and Cluster 4 is statistically significant at the  $p < .05$  level.



**Who followed the Beverages pattern?** Adults who followed the Beverages pattern were generally younger than adults who followed the other healthy patterns; most (62 percent) were 50 years of age or younger (Table IV.6). Compared to other adult healthy eaters, those in the Beverages pattern were least likely to be non-Hispanic white (40 percent), least likely to be US-born (55 percent), most likely to live in large households (five or more household members) (27 percent), and least likely to be taking prescription medication (49 percent). In addition, compared to other patterns identified for adult healthy eaters, the Beverage pattern had the highest proportion of females (72 percent) and the highest rates of SNAP participation (25 percent), WIC participation (measured at the household level) (25 percent), employment (59 percent), and low or very low food security, measured at both the household (24 percent) and adult (23 percent) levels.

### **The Plant-Based Pattern**

Compared to other adult healthy eaters, adults in the Plant-Based pattern had substantially higher mean intakes of soy milk and soy products and fresh melons and berries (Table IV.2). They also had notably higher mean intakes of salads and other raw vegetables; cooked, non-starchy vegetables that were prepared with added fat (fried, creamed, stuffed, or with cheese); mixed dishes that included fish and shellfish; pizza; and alcohol. They had notably lower mean intakes than other adult healthy eaters of fresh fruits other than citrus, melons, and berries, and they consumed no sweetened milks.

On average, adult healthy eaters in the Plant-Based pattern had the second lowest intake of calories, relative to other adult healthy eaters (Table IV.3). They also had the lowest intakes of calcium and carbohydrates (in grams), and the second highest percentage of energy from protein. In terms of MyPyramid food group intakes, adult healthy eaters in the Plant-Based pattern had the highest intakes of total vegetables; meat, poultry, and fish; and alcoholic drinks, compared to other adult healthy eaters (however, all healthy patterns had relatively low intakes of alcoholic drinks)

Table IV.6. Sociodemographic Characteristics Across the 4 Dietary Patterns Identified in Cluster Analysis of Adult Healthy Eaters

Characteristic	Proportion with Characteristic			
	Cluster 1	Cluster 2	Cluster 3	Cluster 4
	Beverages n = 149 Mean	Plant-based n = 136 Mean	Breakfast and Sweets n = 61 Mean	Low-Fat Milk n = 51 Mean
SNAP Participation Status				
SNAP participant	25.2	14.5	6.6	11.3
Income-eligible nonparticipant	45.4	50.2	49.5	33.7
Other low-income nonparticipant	29.4	35.3	43.9	55.0
Household Participates in WIC	25.0	4.7	1.2	3.9
Sex				
Male	28.2	33.9	31.8	30.4
Female	71.8	66.1	68.2	69.6
Age				
19-30	27.3	9.0	6.5	24.1
31-40	19.9 <sup>b</sup>	7.4	3.1	7.1
41-50	14.5 <sup>c</sup>	13.9	12.9	1.3
51-60	15.2	9.8	5.2	16.5
>60	23.1 <sup>a,b</sup>	59.9	72.2	51.0
Race/Ethnicity				
Non-Hispanic, White	40.4 <sup>a,b,c</sup>	67.1	79.9	69.0
Non-Hispanic, Black	15.9	6.4	2.6	6.8
Hispanic	35.4 <sup>b</sup>	21.2	11.1	19.4
Other	8.4	5.2	6.4	4.8
US-Born	55.2 <sup>b</sup>	72.3	82.2	73.3
10 or More Years in the USA	76.8 <sup>b</sup>	92.1	98.1	90.4
Education Level				
Less than high school	33.8	33.9	34.4	23.3
High-school/GED	29.5	26.2	39.0	30.6
More than HS	36.8	39.9	26.6	46.1
Married	44.2	47.8	40.5	32.3
Work Hours				
0	58.5	81.4	69.5	81.3
1 to 34	12.2	8.5	15.3	7.0
35 or more	29.3 <sup>a</sup>	10.1	15.2	11.7
Works at Least 20 Hours	35.7	16.6	21.2	17.2
Employed	41.5	18.6	30.5	18.7
Household Size				
1	16.6	27.7	39.3	33.0
2	26.5	37.6	36.7	41.0
3	10.5	12.7	6.1	14.1
4	19.8	11.4	7.6	7.8
5+	26.6 <sup>a,b,c</sup>	10.6	10.4	4.1
Household Food Security Level				
Full food security	65.1	78.3	81	75.2
Marginal food security	11.4	5.6	12.6	7.1
Low food security	16.6	9.3	3.6	14.0
Very low food security	6.9	6.8	2.8	3.8
Adult Food Security Level				
Full food security	65.5	78.3	82.0	75.2
Marginal food security	12.0	6.6	11.6	10.0
Low food security	15.9	8.2	3.6	11.0
Very low food security	6.6	6.8	2.8	3.8
Home Owned	45.9	60.2	60.0	57.1
Someone in Household smokes	5.0	6.6	11.6	13.2
Obese	40.8	38.8	27.3	21.9
Overweight or Obese	65.0	63.7	70.0	66.0
High Blood Pressure	33.6	46.6	49.8	32.2
High Cholesterol	28.3	39.8	45.4	40.8
Diabetes	13.6	20.6	30.2	12.3

Table IV.6 (continued)

<i>Characteristic</i>	Proportion with Characteristic			
	Cluster 1	Cluster 2	Cluster 3	Cluster 4
	Beverages	Plant-based	Breakfast and Sweets	Low-Fat Milk
	n = 149	n = 136	n = 61	n = 51
	Mean	Mean	Mean	Mean
Has Health Insurance	69.7 <sup>a,c</sup>	84.9	83.6	89.8
Health Condition Good or Better	66.9	71.1	67.2	67.4
	31.8	36.4	45.4	30.2
Ever Had Cancer	10.6	20.2	18.4	11.2
Walked/Bicycled in Past 30 Days	33.8 <sup>c</sup>	28.5	22.3	12.5
Daily Physical Activity in Past 30 Days	31.8 <sup>c</sup>	17.9	23.4	7.6
Vigorous Activity in Past 30 Days	26.8	31.4	27.7	17.5
Moderate Activity in Past 30 Days	46.9	52.5	46.7	30.8
More Active than Peers	26.9	44.2	42.1	36.4
Has Work Limitations	17.7	15.7	24.1	32.0
Taken Prescriptions in Past Month	49.4 <sup>a,b,c</sup>	79.4	82.3	78.9
Now Smoking	2.7	5.2	10.7	4.4
Considers Self Overweight	58.2	53.7	52.5	49.4
Would Like to Weigh Less	59.8	63.2	53.5	46.1
Screen Time at Least 2 Hrs/Day	35.8	51.7	53.8	63.3

<sup>a</sup> Difference between Cluster 1 and Cluster 2 is statistically significant at the  $p < .05$  level.

<sup>b</sup> Difference between Cluster 1 and Cluster 3 is statistically significant at the  $p < .05$  level.

<sup>c</sup> Difference between Cluster 1 and Cluster 4 is statistically significant at the  $p < .05$  level.

<sup>d</sup> Difference between Cluster 2 and Cluster 3 is statistically significant at the  $p < .05$  level.

<sup>e</sup> Difference between Cluster 2 and Cluster 4 is statistically significant at the  $p < .05$  level.

<sup>f</sup> Difference between Cluster 3 and Cluster 4 is statistically significant at the  $p < .05$  level.

(Table IV.4). The higher intake of meat, poultry, and fish in the Plant-Based pattern was largely attributable to a higher intake of fish and shellfish. Adult healthy eaters in the Plant-Based pattern also had the lowest intake of milk and the lowest intake of discretionary solid fat.

Based on HEI-2005 scores, the Plant-Based pattern was the second most healthy of the four patterns identified for adult healthy eaters. Adults in the Plant-Based pattern had a mean HEI-2005 score of 75.9, compared to 74.5, 75.4, and 77.1 for the other three patterns (Table IV.5). They had the highest score for the total vegetables; dark green and orange vegetables and legumes; meat and beans; and sodium components. They also had the lowest score among adult healthy eaters for the total grains (tied) and milk components.

**Who followed the Plant-Based pattern?** Most adults who followed the Plant-Based pattern were female (66 percent), older than 60 (60 percent), non-Hispanic white (67 percent), US-born (72 percent), living in a one or two person household (65 percent), and taking prescription medication (79 percent) (Table IV.6). Only 15 percent participated in SNAP; 50 percent were income-eligible nonparticipants. The majority (78 percent) had full food security, at both the household and adult levels.

### **The Breakfast and Sweets Pattern**

Compared to other adult healthy eaters, adults in the Breakfast and Sweets pattern had substantially higher mean intakes of several foods typically consumed at breakfast—coffee or tea, whole-grain cereal, and sweet breakfast foods—as well as miscellaneous sugary foods (Table IV.2). They also had notably higher mean intakes than other adult healthy eaters of processed meat (which includes bacon and sausage); fresh fruit other than citrus, melons, and berries; cooked starchy vegetables (not fried); fried potatoes; and salad dressings. They had notably lower mean intakes of rice, pasta, and similar grain products; salty snacks; non-starchy vegetables that were prepared with added fat (fried, creamed, stuffed, or with cheese); and sweet drinks of any kind.

On average, adult healthy eaters in the Breakfast and Sweets pattern had the second highest intake of calories, relative to the other healthy patterns (Table IV.3). They also had the highest intakes of sodium and fiber, the highest percentage of energy from carbohydrate, and the lowest intakes of folate and protein (in grams). In terms of MyPyramid food group intakes, adult healthy eaters in the Breakfast and Sweets pattern had the highest intake of whole grains and the second highest intake of total grains (Table IV.4), compared to other adult healthy eaters. They had the lowest intakes of red meat and nuts and seeds.

Based on HEI-2005 scores, the Breakfast and Sweets pattern was the second least healthy of the four patterns identified for adult healthy eaters. Adults in the Breakfast and Sweets pattern had a mean HEI-2005 score of 75.4, compared to 77.1, 75.9, and 74.5 for the other three patterns (Table IV.5). They had the lowest score for the meat and beans and sodium components of the HEI-2005, compared to other adult healthy eaters, and tied for the lowest score for the calories from SoFAAS component. At the same time, they had the highest score for the total fruit, whole fruit, total grains, and whole grains components.

**Who followed the Breakfast and Sweets pattern?** Compared to other adult healthy eaters, those in the Breakfast and Sweets pattern were most likely to be older than 60 (72 percent), non-Hispanic white (80 percent), and US-born (82 percent) (Table IV.6). In addition, most adults who followed the Breakfast and Sweets pattern were female (68 percent), living in a one or two person household (76 percent), and taking prescription medication (82 percent). Only seven percent participated in SNAP. The majority had full food security, at both the household (81 percent) and adult (82 percent) levels.

### **The Low-Fat Milk Pattern**

Compared to other adult healthy eaters, adults in the Low-Fat Milk pattern had substantially higher mean intakes of unsweetened low-fat, reduced fat, and nonfat milks; diet drinks; and eggs and egg dishes (Table IV.2). They also had notably higher mean intakes than other healthy eaters of

mixed dishes with poultry and notably lower mean intakes of unsweetened high-fat milk; fried meat, poultry or fish; mixed dishes with meat (as opposed to poultry or fish); mixed dishes with no meat, poultry, or fish; soy milk and soy products; canned or frozen fruit; salad dressings; and miscellaneous sugary foods.

Adult healthy eaters in the Low-Fat Milk pattern consumed less calories, on average, than adult healthy eaters in any of the other patterns (Table IV.3). They had the highest intakes of calcium and protein and the lowest intakes of fat, saturated fat, and cholesterol. They also had the lowest intake of fiber. In terms of MyPyramid food group intakes, adult healthy eaters in the Low-Fat Milk pattern had the highest intakes of milk, eggs, and nuts and seeds and the lowest intakes of discretionary oils and added sugars, compared to other adult healthy eaters (Table IV.4).

Based on HEI-2005 scores, the Low-Fat Milk pattern was the healthiest of the four patterns identified for adult healthy eaters. Adults in the Low-Fat Milk pattern had a mean HEI-2005 score of 77.1, the highest of the four patterns (Table IV.5). They also had the highest score for the milk, saturated fat, and calories from SoFAAS components of the HEI-2005, compared to other adult healthy eaters. At the same time, they had the lowest scores for the total fruit, whole fruit, total vegetables (tied), dark green and orange vegetables and legumes, and discretionary oils components.

**Who followed the Low-Fat Milk Pattern?** Most adults who followed the Low-Fat Milk pattern were female (70 percent), older than 50 (68 percent), non-Hispanic white (69 percent), US-born (73 percent), living in a one or two person household (74 percent), and taking prescription medication (79 percent) (Table IV.6). Only 11 percent participated in SNAP. The majority (75 percent) had full food security, at both the household and adult levels.

## 2. Less-Healthy Eaters

Four distinct dietary patterns were identified among adult less-healthy eaters. We labeled them: (1) Soda, pizza, burgers, and fries (hereafter “Soda and Pizza”); (2) Alcohol, Mexican food, and fried meat (hereafter “Alcohol”); (3) Sugar-sweetened drinks, diet drinks, low-fat milk, and fruit (hereafter

“Non-Carbonated Sugar-Sweetened Drinks”); and (4) Coffee, high-fat dairy, white bread, and sugary foods (hereafter “Coffee”). Table IV.7 shows the prevalence of these clusters among adult less-healthy eaters, the main food groups that distinguish each cluster from the other three clusters, and the proportion in each cluster who are SNAP participants. The Non-Carbonated Sugar-Sweetened Drinks pattern was the most prevalent, accounting for 58 percent of adult less-healthy eaters. Twenty-three percent of adult less-healthy eaters were included in the Soda and Pizza pattern, 12 percent were included in the Coffee pattern, and another 8 percent were included in the Alcohol pattern. Differences across dietary patterns in the defining food groups, other measures of dietary intake and quality, and the sociodemographic characteristics of the individuals included in each dietary pattern are discussed for each cluster separately below.

Table IV.7. Dietary Patterns Identified for Adult Less-Healthy Eaters (HEI &lt; 49)

	Soda and Pizza n = 443	Alcohol n = 177	Non-Carbonated Sugar-Sweetened Drinks n = 1443	Coffee n = 185
Weighted Percent of Adult Less-Healthy Eaters <sup>a</sup>	23	8	58	12
Defining Food Groups				
	Hamburgers and cheeseburgers	Alcoholic drinks	Sugar-sweetened drinks (other than soda)	Coffee or tea
	Pizza	Fried meat, poultry, fish	Diet drinks	Unsweetened high-fat milk
	Fried potatoes	Mexican dishes	Fresh fruit other than citrus; canned fruit	Other high-fat dairy products
	Non-diet sodas		Non-dairy desserts	White bread
Percent SNAP participants	24	24	27	18

<sup>a</sup> Prevalence rates for clusters are weighted using the six-year weights for dietary recall data in NHANES 1999–2004.

HEI = Score on Healthy Eating Index–2005

### **The Soda and Pizza Pattern**

Table IV.8 shows the mean intakes of selected food groups (grams consumed per day) for individuals in each of the four dietary patterns identified for adult less-healthy eaters. For each food group, the highest intake across patterns is highlighted in bold and the lowest intake is underlined. These data show that, compared to other less-healthy eaters, adults in the Soda and Pizza pattern had a substantially higher mean intake of non-diet soda as well as the highest mean intake of hamburgers and cheeseburgers, pizza, and fried potatoes. They also had notably higher mean intakes than other less-healthy eaters of red meat and beans, nuts, and seeds. They had notably lower mean intakes than other less-healthy eaters of reduced fat dairy desserts and beverages, mixed dishes that included fish and shellfish, soups, and coffee or tea.

Adult less-healthy eaters in the Soda and Pizza pattern had the second highest intake of calories, on average, relative to the other less-healthy patterns (Table IV.9), as well as the highest intake of sodium and the highest intake of carbohydrate, both in total grams and as a percentage of total energy. They also had the second highest intake among adult less-healthy eaters (in total grams) of total fat and saturated fat and the lowest intake of protein, as a percentage of total energy. In terms of MyPyramid food group intakes, adults in the Soda and Pizza pattern had the highest mean intakes among less-healthy eaters of total grains, non-whole grains, and added sugars (Table IV.10). They also had the second highest mean intake among adult less-healthy eaters of discretionary solid fat, the lowest mean intake of fish and shellfish, and tied for the lowest mean intakes of starchy vegetables other than potatoes and total fruit.

Based on HEI-2005 scores, the Soda and Pizza pattern was the least healthy of the four patterns identified for adult less-healthy eaters (Table IV.11). Adults in the Soda and Pizza pattern had a mean HEI-2005 score of 36.6, the lowest of the four less-healthy patterns. They also had the lowest mean scores among adult less-healthy eaters for the total fruit, whole fruit, dark green and orange vegetables and legumes components of the HEI-2005, and tied for the lowest mean scores



Table IV.8. Mean Grams Per Day from Selected Food Groups Across the 4 Dietary Patterns Identified in Cluster Analysis of Adult Less-Healthy Eaters

	Mean Grams Consumed Per Day			
	Cluster 1	Cluster 2	Cluster 3	Cluster 4
	Soda and Pizza n = 443 Mean	Alcohol n = 177 Mean	Non-Carbonated Sugar- Sweetened Drinks n = 1443 Mean	Coffee n = 185 Mean
<i>Food or Food Group</i>				
Milk, high fat, not sweetened	71.7	<u>45.7</u>	98.5	125.4
Milk, high fat, sweetened	10.6	4.2	9.5	<u>1.5</u>
Milk, low-fat, reduced fat, nonfat, not sweetened	12.5	<u>0.8</u>	22.8	4.7
Milk, low-fat, reduced fat, nonfat, sweetened	4.2	3.8	7.8	<u>0.9</u>
Dairy products (not milk), high fat	24.3	<u>13.6</u>	20.6	32.7
Dairy products (not milk), low-fat, reduced fat, nonfat	3.2	<u>0.8</u>	3.5	5.7
Dairy desserts and beverages, high fat	25.2	<u>9.2</u>	26.0	31.3
Dairy desserts and beverages, reduced-fat	<u>1.5</u>	8.0	5.7	4.3
Red meats, not fried	33.7	29.1	28.3	<u>21.5</u>
Chicken and turkey, not fried	11.3	15.1	12.7	<u>3.2</u>
Processed meat	27.6	26.1	<u>25.8</u>	32.4
Fish and shellfish, not fried	3.1	2.5	3.5	<u>1.4</u>
Fried meat, poultry, or fish	29.2	40.3	24.9	<u>23.9</u>
Mixed dishes with meat (including organ meats and processed meat)	57.9	<u>46.5</u>	49.4	71.4
Mixed dishes with fish and shellfish	<u>2.6</u>	8.6	5.9	9.4
Mixed dishes with chicken and turkey	21.4	21.1	16.8	<u>14.0</u>
Mixed dishes, grain and vegetable (no meat)	<u>18.1</u>	28.2	23.9	18.1
Hamburgers and cheeseburgers	26.9	22.4	<u>16.4</u>	21.4
Pizza	52.9	<u>24.6</u>	27.5	41.4
Mexican dishes	37.0	45.5	26.0	<u>14.8</u>
Soups	<u>26.0</u>	47.4	41.3	49.2
Eggs and egg dishes	<u>22.8</u>	26.3	25.3	24.8
Beans and legumes, soy milk and soy products	1.0	<u>0.0</u>	0.5	0.7
Beans and legumes, beans, nuts, and seeds	20.1	13.6	12.4	<u>9.7</u>
White/non-whole-grain bread	41.4	<u>35.7</u>	40.8	52.4
Whole grain bread	0.1	<u>0.0</u>	0.7	1.0
Rice, pasta, noodles, dumplings, similar grain products, non-whole grain	29.5	25.2	25.1	<u>17.5</u>
Rice, pasta, noodles, dumplings, similar grain products whole grain	0.2	0.0	0.2	0.0
Other grains, whole grain	1.2	<u>0.3</u>	1.8	2.3
Cereal, non-whole grain	5.8	<u>3.4</u>	10.1	6.2
Cereal, whole grain	4.4	<u>0.4</u>	8.5	7.9
Sweet breakfast foods/breads	23.3	<u>9.2</u>	22.5	22.6
Desserts (non-dairy)	23.9	<u>16.8</u>	33.6	31.7
Salty snacks	10.5	7.2	<u>6.5</u>	10.7
Fruit, fresh, citrus	<u>1.8</u>	6.3	2.5	2.4
Fruit, fresh, melons and berries	2.7	<u>0.4</u>	5.7	1.6
Fruit, fresh, other	<u>10.4</u>	10.6	15.4	14.7
Fruit, canned or frozen	1.2	<u>0.5</u>	4.7	3.1
100% fruit juice	<u>31.1</u>	47.8	44.2	35.3
Vegetables, raw and salad	20.3	28.3	22.1	<u>15.2</u>
Vegetables, cooked, not starchy, fried, creamed, w/cheese, or stuffed	14.7	<u>13.0</u>	21.2	16.8
Vegetables, cooked, starchy (not fried)	<u>20.4</u>	23.0	35.9	33.0
Fried potatoes	27.1	23.0	<u>18.5</u>	20.1
Butter, margarine, and other added fats	5.2	<u>3.1</u>	5.8	5.3
Salad Dressings and mayo, regular, and added oils	4.3	8.3	4.6	<u>4.1</u>
Miscellaneous sugary foods	14.9	<u>9.5</u>	15.8	31.3
Coffee or tea (not sweetened)	<u>119.5</u>	264.5	181.1	1662.5
Sugar-sweetened drinks (with calories), other than carbonated sodas	114.7	103.9	279.3	<u>38.8</u>
Sweetened drinks without calories (no calories or art. sweetener)	<u>16.5</u>	35.0	104.5	57.9
Carbonated soda (not diet)	1511.7	391.1	<u>266.3</u>	420.6
Alcoholic drinks	<u>63.8</u>	2097.4	70.8	85.6

Note: For each food or food group, the highest intake across clusters is in boldface and the lowest intake is underlined. The table excludes food groups that do not contribute to interpretation of the differences between clusters. A version of this table, including all food groups used in the cluster analysis, is provided in Appendix G, Table G.3

Table IV.9. Mean Energy and Nutrient Intakes Across the 4 Dietary Patterns Identified in Cluster Analysis of Adult Less-Healthy Eaters

Energy/Nutrient	Mean Intake Over 24 Hours			
	Cluster 1	Cluster 2	Cluster 3	Cluster 4
	Soda and Pizza	Alcohol	Non-Carbonated Sugar-Sweetened Drinks	Coffee
	n = 443 Mean	n = 177 Mean	n = 1443 Mean	n = 185 Mean
Energy (kcal)	2,405.8 <sup>b,c</sup>	2,529.5 <sup>d,e</sup>	1,839.0	2,004.0
Fat (g)	81.7 <sup>b</sup>	71.6	73.4	83.5
Percent of Total Energy from Fat	29.6 <sup>a,b,c</sup>	24.5 <sup>d,e</sup>	35.5 <sup>f</sup>	37.1
Sodium (mg)	3,316.9 <sup>a,b</sup>	2,966.1	2,984.2	3,177.6
Calcium (mg)	719.0	620.1	697.4	738.4
Folate (mcg FE)	391.4	436.2	386.5	408.7
Cholesterol (mg)	275.7	276.5	277.1	275.4
Fiber (gm)	10.8	10.6	10.3	10.4
Protein (g)	73.3 <sup>b</sup>	75.4 <sup>d</sup>	66.7	68.7
Percent of Total Energy from Protein	11.9 <sup>b,c</sup>	12.0 <sup>d,e</sup>	14.5	13.8
Carbohydrate (g)	344.2 <sup>a,b,c</sup>	250.7 <sup>d</sup>	224.5	245.4
Percent of Total Energy from Carbohydrate	58.6 <sup>a,b,c</sup>	39.4 <sup>d,e</sup>	49.3	49.5
Saturated Fat (g)	28.3 <sup>a</sup>	23.1 <sup>e</sup>	25.9	29.4
Percent of Total Energy from Saturated Fat	10.2 <sup>a,b,c</sup>	7.8 <sup>d,e</sup>	12.5	13.0

<sup>a</sup> Difference between Cluster 1 and Cluster 2 is statistically significant at the  $p < .05$  level.

<sup>b</sup> Difference between Cluster 1 and Cluster 3 is statistically significant at the  $p < .05$  level.

<sup>c</sup> Difference between Cluster 1 and Cluster 4 is statistically significant at the  $p < .05$  level.

<sup>d</sup> Difference between Cluster 2 and Cluster 3 is statistically significant at the  $p < .05$  level.

<sup>e</sup> Difference between Cluster 2 and Cluster 4 is statistically significant at the  $p < .05$  level.

<sup>f</sup> Difference between Cluster 3 and Cluster 4 is statistically significant at the  $p < .05$  level.

Table IV.10. Mean Intake of MyPyramid Food Groups and Subgroups Across the 4 Dietary Patterns Identified in Cluster Analysis of Adult Less-Healthy Eaters

MyPyramid Food Group/Subgroup	Mean Intake of MyPyramid Food Groups and Subgroups Over 24 Hours			
	Cluster 1	Cluster 2	Cluster 3	Cluster 4
	Soda and Pizza n = 443 Mean	Alcohol n = 177 Mean	Non-Carbonated Sugar-Sweetened Drinks n = 1443 Mean	Coffee n = 185 Mean
Total grains (oz. equivalents)	6.6 <sup>a,b</sup>	5.3	5.8	6.3
Whole grains (oz. equivalents)	0.2 <sup>a,b,c</sup>	0.1 <sup>d,e</sup>	0.3	0.4
Non-whole grains (oz. equivalents)	6.4 <sup>a,b</sup>	5.1	5.5	5.9
Total vegetables (cup equivalents)	1.1	1.1	1.1	1.2
Dark-green, leafy vegetables (cup equivalents)	0.0	0.0	0.0	0.0
Orange vegetables (cup equivalents)	0.0	0.0	0.0	0.0
White potatoes (cup equivalents)	0.4	0.3	0.4	0.4
Other starchy vegetables (cup equivalents)	0.0 <sup>b</sup>	0.0	0.1	0.1
Tomatoes (cup equivalents)	0.3	0.3	0.2	0.3
Other vegetables (cup equivalents)	0.4	0.4	0.3	0.3
Total fruit (cup equivalents)	0.3 <sup>b</sup>	0.4	0.5 <sup>f</sup>	0.3
Citrus fruit, melons, and berries (cup equivalents)	0.2 <sup>b</sup>	0.2	0.2 <sup>f</sup>	0.1
Other fruit (cup equivalents)	0.1 <sup>b</sup>	0.2	0.2	0.2
Total milk (cup equivalents)	1.3 <sup>a</sup>	0.9 <sup>d,e</sup>	1.3	1.4
Milk (cup equivalents)	0.5 <sup>a,b</sup>	0.3 <sup>d,e</sup>	0.7	0.8
Yogurt (cup equivalents)	0.0	0.0	0.0	0.0
Cheese (cup equivalents)	0.8	0.5	0.6	0.7
Meat, poultry, fish (oz. equivalents)	4.6	5.1 <sup>d,e</sup>	4.1	3.8
Red meat (oz. equivalents)	2.2	2.3	1.8	1.9
Organ meats (oz. equivalents)	0.0	0.0	0.0	0.0
Frankfurters, sausages, and luncheon meat (oz. equivalents)	1.0	0.9	0.9	1.0
Poultry (oz. equivalents)	1.2 <sup>c</sup>	1.5 <sup>e</sup>	1.1 <sup>f</sup>	0.6
Fish and shellfish high in Omega-3 fatty acids (oz. equivalents)	0.0	0.1	0.1	0.0
Fish and shellfish low in Omega-3 fatty acids (oz. equivalents)	0.1 <sup>b</sup>	0.3	0.3	0.2
Eggs (oz. equivalents)	0.4	0.5	0.5	0.5
Cooked dry beans and peas (oz. equivalents)	0.1	0.1	0.1	0.1
Soybean products (oz. equivalents)	0.0	0.0	0.0	0.0
Nuts and seeds (oz. equivalents)	0.2	0.3	0.2	0.2
Discretionary oil (Grams)	12.5	13.0	10.2	11.7
Discretionary solid fat (Grams)	54.2 <sup>a</sup>	42.8 <sup>e</sup>	49.7	55.9
Added sugars (tsp. equivalents)	47.6 <sup>a,b,c</sup>	17.9 <sup>e</sup>	21.0 <sup>f</sup>	24.7
Alcohol (Drinks of alcohol)	0.3 <sup>a</sup>	6.7 <sup>d,e</sup>	0.3	0.3

<sup>a</sup> Difference between Cluster 1 and Cluster 2 is statistically significant at the  $p < .05$  level.<sup>b</sup> Difference between Cluster 1 and Cluster 3 is statistically significant at the  $p < .05$  level.<sup>c</sup> Difference between Cluster 1 and Cluster 4 is statistically significant at the  $p < .05$  level.<sup>d</sup> Difference between Cluster 2 and Cluster 3 is statistically significant at the  $p < .05$  level.<sup>e</sup> Difference between Cluster 2 and Cluster 4 is statistically significant at the  $p < .05$  level.<sup>f</sup> Difference between Cluster 3 and Cluster 4 is statistically significant at the  $p < .05$  level.

Table IV.11. Mean Healthy Eating Index-2005 Scores Across the 4 Dietary Patterns Identified in Cluster Analysis of Adult Less-Healthy Eaters

	Mean Healthy Eating Index-2005 Scores			
	Cluster 1	Cluster 2	Cluster 3	Cluster 4
	Soda and Pizza n = 443 Mean	Alcohol n = 177 Mean	Non-Carbonated Sugar- Sweetened Drinks n = 1443 Mean	Coffee n = 185 Mean
<i>Healthy Eating Index (HEI)-2005 Score</i>				
HEI-2005 Score (Total)	36.6 <sup>b,c</sup>	36.8 <sup>d</sup>	39.5 <sup>f</sup>	38.2
HEI-2005 Component Scores				
Total Fruit	0.7 <sup>b</sup>	0.9	1.3 <sup>f</sup>	0.9
Whole Fruit	0.5 <sup>b</sup>	0.6	0.9	0.7
Total Vegetables	2.1 <sup>b,c</sup>	1.9 <sup>d,e</sup>	2.5	2.5
Dark Green and Orange Vegetables and Legumes	0.4 <sup>b</sup>	0.6	0.7	0.6
Total Grains	4.0 <sup>a,b</sup>	3.1 <sup>d,e</sup>	4.2	4.1
Whole Grains	0.3 <sup>a,b,c</sup>	0.1 <sup>d,e</sup>	0.5	0.7
Milk	3.9 <sup>a,b,c</sup>	2.4 <sup>d,e</sup>	4.5	4.7
Meat and Beans	7.4	7.6	8.0	7.4
Oils	4.1	3.9	3.9	4.4
Saturated Fat	6.6 <sup>a,b,c</sup>	8.2 <sup>d,e</sup>	4.3	4.0
Sodium	5.5 <sup>a,b,c</sup>	6.8 <sup>d,e</sup>	3.8	4.1
Calories from SoFAAS	1.1 <sup>a,b,c</sup>	0.7 <sup>d,e</sup>	4.9 <sup>f</sup>	4.1

<sup>a</sup> Difference between Cluster 1 and Cluster 2 is statistically significant at the  $p < .05$  level.

<sup>b</sup> Difference between Cluster 1 and Cluster 3 is statistically significant at the  $p < .05$  level.

<sup>c</sup> Difference between Cluster 1 and Cluster 4 is statistically significant at the  $p < .05$  level.

<sup>d</sup> Difference between Cluster 2 and Cluster 3 is statistically significant at the  $p < .05$  level.

<sup>e</sup> Difference between Cluster 2 and Cluster 4 is statistically significant at the  $p < .05$  level.

<sup>f</sup> Difference between Cluster 3 and Cluster 4 is statistically significant at the  $p < .05$  level.

for the meat and beans component. They had the second lowest mean score for the calories from SoFAAS component.

**Who followed the Soda and Pizza Pattern?** Adults who followed the Soda and Pizza pattern were generally younger and healthier than adults who followed the other less-healthy patterns. Fifty-one percent of them were ages 19 to 30, and 81 percent were in good or better health (Table IV.12). They were evenly split between male (52 percent) and female (48 percent), 89 percent of them were US-born, and they were second most likely to have low or very low food security at both the household (27 percent) and adult (26 percent) levels. About a quarter (24 percent) participated in SNAP and roughly the same proportion (26 percent) participated in WIC (measured at the household level).

### **The Alcohol Pattern**

Compared to other adult less-healthy eaters, adults in the Alcohol pattern had substantially higher mean intakes of alcoholic drinks, Mexican dishes, and fried meat, poultry, or fish (Table IV.8). They also had notably higher mean intakes than other adult less-healthy eaters of reduced-fat dairy desserts and beverages; mixed dishes that included grains and vegetables, but not meat; fresh citrus fruits; salads and other raw vegetables; and salad dressings. They had notably lower mean intakes than other adult less-healthy eaters of unsweetened milk; dairy products other than reduced-fat dairy desserts and beverages; almost all grain products; butter, margarine, and other added fats; and miscellaneous sugary foods.

Adult less-healthy eaters in the Alcohol pattern consumed more calories, on average, than other adult less-healthy eaters (Table IV.9). Compared to other adult less-healthy eaters, they had the lowest intakes of fat and saturated fat (in both grams and percentages of total energy) and the lowest percentage of total energy from carbohydrate. In terms of MyPyramid food groups, adult less-healthy eaters in the Alcohol pattern had the highest mean intakes of alcoholic drinks and of

Table IV.12. Sociodemographic Characteristics Across the 4 Dietary Patterns Identified in Cluster Analysis of Adult Less-Healthy Eaters

Characteristic	Proportion with Characteristic			
	Cluster 1	Cluster 2	Cluster 3	Cluster 4
	Soda and Pizza	Alcohol	Non-Carbonated Sugar-Sweetened Drinks	Coffee
	n = 443 Mean	n = 177 Mean	n = 1443 Mean	n = 185 Mean
SNAP Participation Status				
SNAP participant	24.3	23.5	26.8	18.2
Income-eligible nonparticipant	42.5	44.4	40.6	47.1
Other low-income nonparticipant	33.3	32.1	32.5	34.7
Household Participates in WIC	25.7 <sup>a,c</sup>	13.6	17.9	11.0
Sex				
Male	48.0 <sup>a,b</sup>	70.7 <sup>d,e</sup>	39.2	41.9
Female	52.0 <sup>a,b</sup>	29.3 <sup>d,e</sup>	60.8	58.1
Age				
19-30	50.8 <sup>b,c</sup>	38.8 <sup>e</sup>	33.1 <sup>f</sup>	12.4
31-40	25.2	22.1	19.1	22.6
41-50	13.5	23.8	13.8	22.5
51-60	5.3 <sup>b,c</sup>	7.6 <sup>e</sup>	10.4 <sup>f</sup>	19.0
>60	5.2 <sup>b,c</sup>	7.7 <sup>d,e</sup>	23.6	23.5
Race/Ethnicity				
Non-Hispanic, White	64.4 <sup>b,c</sup>	56.8 <sup>e</sup>	54.6 <sup>f</sup>	83.9
Non-Hispanic, Black	15.1 <sup>b,c</sup>	13.6 <sup>d,e</sup>	20.3 <sup>f</sup>	3.8
Hispanic	14.8	22.8 <sup>e</sup>	20.5 <sup>f</sup>	8.2
Other	5.7	6.8	4.6	4.2
US-Born	88.8	84.0	86.0	91.8
10 or More Years in USA	94.1 <sup>c</sup>	89.8 <sup>e</sup>	93.4 <sup>f</sup>	100.0
Education Level				
Less than high school	31.5	34.3	38.6	32.3
High-school/GED	31.5	38.5	29.8	35.1
More than HS	37.0	27.2	31.6	32.6
Married	40.2 <sup>a</sup>	25.9 <sup>d,e</sup>	39.1	42.0
Work Hours				
0	44.2 <sup>b</sup>	42.9 <sup>e</sup>	55.0	58.8
1 to 34	13.1	13.6	15.4	10.5
35 or more	42.7 <sup>b</sup>	43.6 <sup>d</sup>	29.6	30.7
Works at Least 20 Hours	52.9 <sup>b</sup>	53.8 <sup>d,e</sup>	40.5	37.8
Employed	55.8 <sup>b</sup>	57.1 <sup>e</sup>	45.0	41.2
Household Size				
1	10.7	15.6	16.4	17.7
2	16.6 <sup>b,c</sup>	24.6	25.1	32.5
3	26.0	25.9	18.2	16.3
4	21.1 <sup>a</sup>	6.9 <sup>d</sup>	18.9	13.3
5+	25.6	27.1	21.4	20.2
Household Food Security Level				
Full food security	60.3	57.8	67.6	68.7
Marginal food security	12.5	13.2	11.2	8.7
Low food security	18.6	15.6	14.0	11.5
Very low food security	8.5	13.4	7.2	11.1
Adult Food Security Level				
Full food security	61.7	58.8	68.2	70.5
Marginal food security	12.8	12.5	12.3	8.3
Low food security	15.5	14.5	12.1	9.2
Very low food security	10.1	14.2	7.4	12.0
Home Owned	45.9	60.2	60.0	57.1
Someone in Household smokes	41.1 <sup>a,b,c</sup>	64.2 <sup>d</sup>	30.3 <sup>f</sup>	59.1
Obese	33.9 <sup>a</sup>	19.2 <sup>d</sup>	35.6	28.1
Overweight or Obese	58.2	50.7 <sup>d</sup>	66.9	60.3
High Blood Pressure	18.6 <sup>b</sup>	16.7 <sup>d</sup>	31.4	24.3
High Cholesterol	14.1 <sup>b</sup>	8.4 <sup>d,e</sup>	22.1	24.7
Diabetes	3.1 <sup>a,b</sup>	0.3 <sup>d,e</sup>	8.0	7.4
Has Health Insurance	60.0 <sup>a</sup>	46.8 <sup>d,e</sup>	68.6	65.6
Health Condition Good or Better	80.6 <sup>b</sup>	68.3	71.6	67.0
Doctor said Overweight	26.0	22.0	29.4	29.5

Table IV.12 (continued)

Characteristic	Proportion with Characteristic			
	Cluster 1	Cluster 2	Cluster 3	Cluster 4
	Burgers n = 443	Alcohol n = 177	Non-Carbonated Sugar-Sweetened Drinks n = 1443	Coffee n = 185
	Mean	Mean	Mean	Mean
Ever Had Cancer	6.0	7.8	8.8	9.8
Walked/Bicycled in Past 30 days	24.0	29.4	23.3	22.0
Daily Physical Activity in Past 30 Days	32.4 <sup>b</sup>	32.1	21.2	30.3
Vigorous Activity in Past 30 Days	29.7 <sup>c</sup>	30.7 <sup>e</sup>	26.3	17.8
Moderate Activity in Past 30 Days	45.8 <sup>b</sup>	45.9	36.1	42.2
More Active than Peers	25.5	27.4	30.9	25.5
Has Work Limitations	16.4	20.2	20.9	28.0
Taken Prescriptions in Past Month	37.7 <sup>b,c</sup>	37.0 <sup>d,e</sup>	56.1	62.5
Now Smoking	38.4 <sup>a,b,c</sup>	56.1 <sup>d</sup>	25.0 <sup>f</sup>	61.3
Considers Self Overweight	54.7	41.2	53.6	51.1
Would Like to Weigh Less	61.5	46.2	59.1	57.4
Screen Time at Least 2 Hrs/Day	57.8	58.5	57.5	58.6

<sup>a</sup> Difference between Cluster 1 and Cluster 2 is statistically significant at the  $p < .05$  level.

<sup>b</sup> Difference between Cluster 1 and Cluster 3 is statistically significant at the  $p < .05$  level.

<sup>c</sup> Difference between Cluster 1 and Cluster 4 is statistically significant at the  $p < .05$  level.

<sup>d</sup> Difference between Cluster 2 and Cluster 3 is statistically significant at the  $p < .05$  level.

<sup>e</sup> Difference between Cluster 2 and Cluster 4 is statistically significant at the  $p < .05$  level.

<sup>f</sup> Difference between Cluster 3 and Cluster 4 is statistically significant at the  $p < .05$  level.

meat, poultry, and fish (Table IV.10). They had the lowest mean intakes of grains, milk, discretionary solid fat, and added sugars, compared to other less-healthy eaters.

Based on HEI-2005 scores, the Alcohol pattern was the second least healthy of the four patterns identified for adult less-healthy eaters. Adults in the Alcohol pattern had a mean HEI-2005 score of 36.8, compared to 36.6, 38.2, and 39.5 for the other three less-healthy patterns (Table IV.11). They had the lowest mean scores among adult less-healthy eaters for the total vegetables, total grains, whole grains, milk, and calories from SoFAAS components of the HEI-2005 and tied for the lowest mean score for the healthy oils component. At the same time, they had the highest mean scores among less-healthy eaters for the saturated fat and sodium components.

**Who followed the Alcohol pattern?** Only eight percent of adult less-healthy eaters followed the Alcohol pattern. Compared to other adult less-healthy eaters, adults in the Alcohol pattern were most likely to be male (71 percent) and most likely to be Hispanic (23 percent) (Table IV.12). Most were US-born (84 percent). They had the highest prevalence among adult less-healthy eaters of low or very low food security at both the household and adult levels (29 percent for each). Twenty-four percent of adults in the Alcohol pattern participated in SNAP.

### **The Non-Carbonated Sugar-Sweetened Drinks Pattern**

Compared to other less-healthy eaters, adults in the Non-Carbonated Sugar-Sweetened Drinks pattern had substantially higher mean intakes of non-carbonated sugar-sweetened drinks, diet soda, low-fat milks, fresh fruits other than citrus, and canned or frozen fruit (Table IV.8). They also had higher mean intakes than other adult less-healthy eaters of non-dairy desserts, vegetables prepared with added fat (other than fried potatoes), and non-whole grain cereals and notably lower mean intakes of non-diet soda.

On average, adult less-healthy eaters in the Non-Carbonated Sugar-Sweetened Drinks pattern consumed less calories than adult less-healthy eaters in the other patterns (Table IV.9). However, they had the second highest percentages among adult less-healthy eaters of total energy derived from



fat and saturated fat, and the latter exceeded the level recommended in the *Dietary Guidelines* (12.5 percent versus < 10 percent). In terms of MyPyramid food group intakes, adult less-healthy eaters in the Non-Carbonated Sugar-Sweetened Drinks pattern had the highest mean intake of total fruit, relative to the other patterns (Table IV.10).

Based on HEI-2005 scores, the Non-Carbonated Sugar-Sweetened Drinks pattern was the least unhealthy of the four patterns identified for adult less-healthy eaters. Adults in the Non-Carbonated Sugar-Sweetened Drinks pattern had a mean HEI-2005 score of 39.5, the highest of the four less-healthy patterns (Table IV.11). They also had the highest mean scores among adult less-healthy eaters for the total fruit, whole fruit, dark green and orange vegetables and legumes, total grains, meat and beans, and calories from SoFAAS components of the HEI-2005 and tied for the highest mean score for total vegetables. They had the lowest mean scores, compared to adults in the other three less-healthy patterns, for the healthy oils (tied) and sodium components.

**Who followed the Sugar-Sweetened Drinks pattern?** Adults in the Non-Carbonated Sugar-Sweetened Drinks pattern were generally older than adult less-healthy eaters who followed the Soda and Pizza and Alcohol patterns; 24 percent of them were age 60 or older, similar to adult less-healthy eaters in the Coffee pattern (Table IV.12). Most of them were US-born (86 percent). Compared to other adult less-healthy eaters, those in the Non-Carbonated Sugar-Sweetened Drinks pattern were most likely to be female (61 percent) and most likely to be black (20 percent). About a quarter of adults (27 percent) in this pattern were SNAP participants.

### **The Coffee Pattern**

Compared to other less-healthy eaters, adults in the Coffee pattern had substantially higher mean intakes of coffee or tea; unsweetened high-fat milk; other high-fat dairy products, desserts and beverages; white bread; and miscellaneous sugary foods (Table IV.8). They also had notably higher mean intakes than other adult less-healthy eaters of mixed dishes that included meat and notably

lower mean intakes of sweetened milks; poultry; Mexican dishes; rice, pasta and noodles; salad and other raw vegetables; and non-carbonated sugar-sweetened drinks.

Adult less-healthy eaters in the Coffee pattern had the second lowest intake of calories, on average, relative to the other less-healthy patterns (Table IV.9). They had the highest percentages of energy from fat and saturated fat, relative to the other less-healthy patterns, and the latter exceeded the level recommended in the *Dietary Guidelines* (13.0 percent versus < 10 percent). In terms of MyPyramid food group intakes, adult less-healthy eaters in the Coffee pattern had the highest mean intake of whole grains and the lowest mean intake of poultry among less-healthy eaters (Table IV.10). They also tied for the lowest mean intake of total fruit among adult less-healthy eaters.

Based on HEI-2005 scores, the Coffee pattern was the second least unhealthy of the four patterns identified for adult less-healthy eaters. Adults in the Coffee pattern had a mean HEI-2005 score of 38.2, compared to 36.6, 36.8, and 39.5 for the other three less-healthy patterns (Table IV.11). They had the highest mean scores among adult less-healthy eaters for the whole grains, milk, and healthy oils components of the HEI-2005 and tied for the highest mean score for the total vegetables component. They had the lowest mean scores among adult less-healthy eaters for the meat and beans (tied) and the saturated fat components.

**Who followed the Coffee pattern?** Similar to the Non-Carbonated Sugar-Sweetened Drinks pattern, adult less-healthy eaters in the Coffee pattern were generally older than adults who followed the Soda and Pizza and Alcohol patterns; 24 percent of them were age 60 or older (Table IV.12). Most of them were female (58 percent), and most were US-born (92 percent). Compared to other adult less-healthy eaters, those in the Coffee pattern were most likely to be non-Hispanic white (84 percent) and least likely to report that they were in good or better health (67 percent). The Coffee pattern had the lowest rate of SNAP participation (18 percent) among the patterns identified for adult less-healthy eaters.

### 3. Summary for Adult Healthy and Less-Healthy Eaters

The main goal of the cluster analysis was to determine whether we could identify meaningful dietary patterns among low-income adults who consume “healthy” or “less-healthy” diets, as defined by the HEI-2005. In other words, is there more than one meaningful “healthy” pattern? Is there more than one meaningful “unhealthy” pattern? Dietary quality indices such as the HEI-2005 are inherently designed to quantify a priori elements considered most healthful. Thus, the “healthy” and “less-healthy” diets will, by definition, have similarities with regard to overall composition and food-group intakes. However, because “points” that contribute to HEI-2005 scores can be accumulated in different ways, there is likely more than one meaningful variant of “healthy” and “less-healthy” dietary patterns.

Tables IV.13 and IV.14 provide a summary of the dietary patterns we identified for adult healthy and less-healthy eaters, along with mean HEI-2005 scores and key sociodemographic characteristics for the adults in each pattern. Although the separate analysis of healthy and less-healthy eaters is unique to this study, many of the dietary patterns we identified were consistent with those observed in other studies and data sets. For example, in a review of the literature that mainly included studies of adults, Newby and Tucker (2004) observed that the major dietary patterns derived using cluster and factors analysis were Traditional, Western/Meat-and-Potatoes, Sweets, Alcohol, and Healthy/Plant-Based. We identified four patterns among adult healthy eaters (Beverages, Plant-Based, Breakfast and Sweets, and Low-Fat Milk) and four patterns among adult less-healthy eaters (Soda and Pizza, Alcohol, Non-Carbonated Sugar-Sweetened Drinks, and Coffee). Many of these patterns share similarities to those described in the 2004 review. Notably, patterns similar to our Soda and Pizza, Alcohol, Plant-Based, Coffee, and Breakfast and Sweets patterns have been observed in other studies that covered a broad range of populations in the United States and elsewhere. Since 2004, many other studies have revealed similar core dietary

Table IV.13 Summary of Key Differences in the Four Dietary Patterns Identified for Adult Healthy Eaters

	Beverages n = 149	Plant-Based n = 136	Breakfast and Sweets n = 61	Low-Fat Milk n = 51
Percent of Adult Healthy Eaters <sup>a</sup>	38	34	18	11
Defining Food Groups				
Relative to other adult healthy eaters, adults in this pattern had higher mean intakes of:				
	Unsweetened high-fat milk	Soy milk and soy products	Coffee and tea	Unsweetened low-fat, reduced fat, and nonfat milk
	100% fruit juice	Fresh melons and berries	Whole-grain cereal	Diet drinks
	Sugar-sweetened drinks (other than soda)	Salads and other raw vegetables	Sweet breakfast foods	Eggs and egg dishes
	Non-diet sodas	Cooked, non-starchy vegetables with added fat	Miscellaneous sugary foods	
Calories	1,759	1,530	1,557	1,525
HEI-2005 Score (Max Score = 100)	74.5	75.9	75.4	77.1
HEI-2005 Component Scores				
Highest and lowest scores (as percent of maximum scores)				
Total Fruit			92	80
Whole Fruit			94	80
Total Vegetables	72	82		72
Dark Green and Orange Vegetables and Legumes		58		40
Total Grains	90	90	94	
Whole Grains	32		54	
Milk		43		85
Meat and Beans		95	87	
Oils	75			61
Saturated Fat	86			92
Sodium		53	42	
Calories from SoFAAS	92		92	95
Who Followed This Pattern?				
Percent SNAP participants	25.2	14.5	6.6	11.3
Percent household participates in WIC	25.0	4.7	1.2	3.9
Percent female	71.8	66.1	68.2	69.6
Percent 19-30 years	27.3	9.0	6.5	24.1
Percent > 60 years	23.1	59.9	72.2	51.0
Percent non-Hispanic White	40.4	67.1	79.9	69.0
Percent US-born	55.2	72.3	82.2	73.3
Percent low or very low food security (household)	23.5	16.1	6.4	17.8
Percent obese	40.8	38.8	27.3	21.9
Percent diabetes	13.6	20.6	30.2	12.3
Percent good or better health	66.9	71.1	67.2	67.4

<sup>a</sup> Prevalence rates for clusters are weighted using the six-year weights for dietary recall data in NHANES 1999-2004.

Table IV. 14 Summary of Key Differences in the Four Dietary Patterns Identified for Adult Less-Healthy Eaters

	Soda and Pizza n = 443	Alcohol n = 177	Non-Carbonated Sugar-Sweetened Drinks n = 1443	Coffee n = 185
Percent of Adult Less-Healthy Eaters <sup>a</sup>	23	8	58	12
Defining Food Groups				
Relative to other adult less-healthy eaters, adults in this pattern had higher mean intakes of:				
	Hamburgers and cheeseburgers	Alcoholic drinks	Sugar-sweetened drinks (other than soda)	Coffee or tea
	Pizza	Fried meat, poultry, fish	Diet drinks	Unsweetened high- fat milk
	Fried potatoes	Mexican dishes	Fresh fruit other than citrus; canned fruit	Other high-fat dairy products
	Non-diet sodas		Non-dairy desserts	White bread
Calories	2,406	2,530	1,839	2,004
HEI- 2005 Score (Max Score = 100)	36.6	36.8	39.5	38.2
HEI- 2005 Component Scores				
Highest and lowest scores (as percent of maximum scores)				
Total Fruit	14		26	
Whole Fruit	10		18	
Total Vegetables		38	50	50
Dark Green and Orange Vegetables and Legumes	8		14	
Total Grains		62	84	
Whole Grains		2		14
Milk		24		47
Meat and Beans	74		80	74
Oils		39	39	44
Saturated Fat		82		40
Sodium		68	38	
Calories from SoFAAS <sup>b</sup>		4	25	
Who Followed This Pattern?				
Percent SNAP participants	24.3	23.5	26.8	18.2
Percent household participates in WIC	25.7	13.6	17.9	11.0
Percent female	52.0	29.3	60.8	58.1
Percent 19-30 years	50.8	38.8	33.1	12.4
Percent > 60 years	5.2	7.7	23.6	23.5
Percent non-Hispanic White	64.4	56.8	54.6	83.9
Percent US-born	88.8	84.0	86.0	91.8
Percent low or very low food security (household)	27.1	29.0	21.2	22.6
Percent obese	33.9	19.2	35.6	28.1
Percent diabetese	3.1	0.3	8.0	7.4
Percent with good or better health	80.6	68.3	71.6	67.0

<sup>a</sup> Prevalence rates for clusters are weighted using the six-year weights for dietary recall data in NHANES 1999-2004.

<sup>b</sup> The Soda and Pizza pattern had a mean SoFAAS score equivalent to 5.5 percent of the maximum score.

patterns; an updated literature review has further shown these core patterns to be fairly reproducible (Newby, unpublished data).

We found a number of differences in HEI-2005 component scores across the four dietary patterns we identified for adult healthy eaters (Table IV.13). These differences illustrate how higher and lower scores on the various components can be combined to attain similar total scores. For example, adults in the “healthiest” (according to the total HEI-2005 score) Low-Fat Milk pattern had the highest (and healthiest) mean scores for the milk, saturated fat, and calories from SoFAAS components of the HEI-2005. However, these adults also had the lowest (and least-healthy) mean score for five of the other components. Adults in the “least-healthy” Beverages pattern had the highest mean score for only one component (oils) and the lowest mean score for five other components. Adult healthy eaters in the two other dietary patterns had the highest scores for four components and the lowest scores for two or three other components. Considering the foods and beverages that characterize some of the dietary patterns for adult healthy eaters, our results show that a healthful diet, as defined by the HEI-2005, can include foods high in sugar, fat, or saturated fat—as long as these foods are consumed in moderation and balanced with more healthful foods such as fruits, vegetables, whole grains, lean meats, poultry and fish, and low-fat/nonfat dairy foods.

A look at intakes of sugar-sweetened beverages (SSBs) is useful in illustrating this concept. The role of SSBs in contributing to excess energy intakes and poor diet quality has received considerable attention in the scientific literature (for example, Popkin 2010; Nielsen and Popkin 2004). Our analysis revealed diets that were high in SSBs among both healthy and less-healthy adult eaters. In the latter group, particularly high intakes of non-diet carbonated soda and other sugar-sweetened drinks characterized two of the four identified patterns (the Soda and Pizza pattern and the Non-Carbonated Sugar-Sweetened Drinks pattern). Consumption of non-diet soda was highest in the Soda and Pizza pattern—1,512 grams per day, equal to about 50 ounces or

4.2 12-ounce cans of soda. Intake of other (non-carbonated) sugar-sweetened drinks was highest in the Non-Carbonated Sugar-Sweetened drinks pattern—279 grams (about 9 ounces) per day.

Among adult healthy eaters, one pattern emerged that was relatively high in SSBs. The Beverages pattern (the most dominant pattern among healthy eaters, comprising 38 percent of the sample) included a total of 210 grams (7 ounces) of non-diet carbonated soda and sugar-sweetened, non-carbonated drinks. However, when we compared the HEI-2005 scores for the calories from SoFAAS component for the Soda and Pizza (less-healthy), Non-Carbonated Sugar-Sweetened Drinks (less-healthy), and Beverages (healthy) patterns, we found that SSBs played a relatively minor role in the overall diet of healthy eaters in the Beverages pattern. Despite a relatively high intake of SSBs, compared to other healthy eaters, adults in the Beverages pattern had an average score for the SoFAAS component that was equal to 92 percent of the maximum score (Table IV.13). In contrast, less-healthy eaters in the Soda and Pizza pattern and Non-Carbonated Sugar-Sweetened Drinks pattern had mean SoFAAS scores equal to 5.5 percent and 25 percent of the maximum score, respectively (Table IV.14).

### **Key Differences Between Healthy and Less-Healthy Dietary Patterns**

In comparing healthy and less-healthy eaters, we found several dietary differences:

- Healthy eaters consumed fewer calories, on average, than less-healthy eaters.
- Although dietary patterns for healthy eaters included some “unhealthy” foods, such foods were more frequent differentiators in the dietary patterns of less-healthy eaters.
- For most components of the HEI-2005, differences between healthy eaters and less-healthy eaters were dramatic. For example, scores for the food-based components other than total grains ranged from 32 percent to 95 percent for healthy eaters, compared to 2 percent to 62 percent for less-healthy eaters. Differences for the SoFAAS component were among the most dramatic—with a range of 92 to 95 percent for healthy eaters and a range of 4 to 25 percent for less-healthy eaters. These results illustrate that many of the calories consumed by adult less-healthy eaters came from discretionary solid fats, alcohol, and added sugars, rather than from recommended foods in their lowest-fat and lowest-sugar forms.

### **Variation in Sociodemographic Characteristics Across Dietary Patterns**

Besides studying variations in dietary patterns of adults with healthy and less-healthy diets, we also assessed whether sociodemographic characteristics (including health conditions) varied across dietary patterns. It is well-documented that general dietary behaviors vary by sex, income, race/ethnicity, and age (Newby and Tucker 2004). We took a more in-depth look at associations between sociodemographic characteristics and dietary behaviors by assessing variations across patterns separately for healthy and less-healthy eaters.

Overall, we found that females, older adults, and households with full or marginal food security accounted for higher proportions of the dietary patterns identified for adult healthy eaters, while males, younger adults, and households with low or very low food security accounted for higher proportions of the dietary patterns identified for adult less-healthy eaters. These results are consistent with what we expected, based on the findings presented in Chapter II.

Among adult healthy eaters, SNAP participants made up a larger proportion (25 percent) of the Beverages pattern than any of the other three patterns (the Breakfast and Sweets pattern had the smallest share of SNAP participants—7 percent). The Beverages pattern also had the highest percentages of non-Hispanic blacks (16 percent) and Hispanics (35 percent) as well as the lowest percentage of US-born individuals. This pattern had substantially more individuals ages 19 to 40 and significantly fewer individuals older than 60, compared to other healthy patterns. It also had the largest shares of WIC participants (25 percent), people working 35 hours or more per week (29 percent), and people with low or very low food security (23 percent). Together, these findings show that beverages (including 100% fruit juice) are more prevalent among young, working, adult healthy eaters than among other adult healthy eaters in the low-income population. One possible explanation for this trend is that beverages are convenient and are generally inexpensive for the amount of dietary energy they provide.



Among adult less-healthy eaters, SNAP participants accounted for roughly a quarter of the Soda and Pizza, Alcohol, and Non-Carbonated Sugar-Sweetened Drinks patterns. The Coffee pattern had the smallest share of SNAP participants (18 percent). In addition, the Soda and Pizza pattern had a significantly higher percentage of households participating in WIC (26 percent versus 11–18 percent in the other less-healthy patterns) and the highest proportion of people ages 18 to 30 (51 percent). Along with the Alcohol pattern, the Soda and Pizza pattern also had a significantly larger percentage of people who worked 35 hours or more per week (44 and 43 percent, respectively, versus 30 and 31 percent for the other two patterns). Finally, the Soda and Pizza pattern had the highest percentage of households with four or more members (47 percent). Thus, the Soda and Pizza pattern, characterized by particularly high consumption of fast foods, includes many younger individuals who work full time and are part of large households.

### **Variation in Health Characteristics Across Dietary Patterns**

Given the high prevalence of obesity in the U.S., we were interested in whether certain dietary patterns were associated with higher or lower prevalence of obesity. In general, the prevalence of obesity was not markedly different across the healthy and less-healthy patterns identified in our analysis.<sup>47</sup> Among adult healthy eaters, the prevalence of obesity ranged from 22 percent for the Low-Fat Milk pattern to 41 percent for the Beverages pattern, and there were no statistically significant differences across patterns. Among less-healthy eaters, the prevalence of obesity ranged from 19 percent for the Alcohol pattern to 36 percent for the Non-Carbonated Sugar-Sweetened Drinks pattern. The prevalence of obesity was significantly higher among adults in the Soda and Pizza and

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<sup>47</sup> This is consistent with the findings reported in Chapter II, which showed no statistically significant differences in the prevalence of obesity among healthy and less-healthy eaters, even after controlling for potential confounders. However, as noted in Chapter II and in the section on study limitations, our small sample sizes and use of a single 24-hour recall may have reduced our ability to detect differences in the prevalence of obesity among healthy and less-healthy eaters.

Non-carbonated Sugar-Sweetened Drinks patterns (34 and 36 percent, respectively), compared to adults in the Alcohol pattern (19 percent).

With regard to other health characteristics, we found that high blood pressure (31 percent) and diabetes (8 percent) were most common in the Non-Carbonated Sugar-Sweetened Drinks pattern. However, these health conditions were generally more prevalent among healthy eaters than among less-healthy eaters. This is probably due, at least in part, to the higher average age of adult healthy eaters as well as to reverse causality (that is, people with certain health problems choose to eat healthy as a way to manage their conditions). This finding, also seen in Chapter II, is consistent with Chen et al. (2011), who found that U.S. adults with diet-related chronic diseases have higher diet quality (based on the HEI-2005, as in our study) than those without these health conditions.

## C. Children

### 1. Healthy Eaters

Six distinct dietary patterns were identified for child healthy eaters. We note that some of the dietary patterns identified for child healthy eaters are defined by one or more foods or food groups that many would consider “unhealthy.” The presence of these foods in the dietary patterns of healthy eaters illustrates the fact that diet quality, as measured by the HEI-2005, is determined by the overall balance of healthy and less-healthy foods rather than by intakes of specific foods or food groups. We labeled the six patterns identified for child healthy eaters as (1) Sweetened milk, sweet drinks, beans/nuts/seeds, and cereal (hereafter “Sweet Milk”); (2) High-fat dairy desserts, fruit, and fries (hereafter “Dairy Desserts”); (3) Soda, mixed dishes, Mexican food, and salty snacks (hereafter “Soda”); (4) High-fat milk, refined grains, canned fruit, and coffee (hereafter “High-Fat Milk”); (5) Fruit juice and soy (hereafter “100% Fruit Juice”); and (6) Low-fat milk, poultry, soup, and sweets (hereafter “Low-Fat Milk”).

Table IV.15 shows the prevalence of these clusters among child healthy eaters, the main food groups that distinguish each cluster from the other five clusters, and the proportion in each cluster

Table IV.15. Dietary Patterns Identified for Child Healthy Eaters (HEI &lt; 49)

	Sweet Milk n = 50	Dairy Desserts n = 41	Soda n = 17	High-Fat Milk n = 25	100% Fruit Juice n = 27	Low-Fat Milk n = 15
Weighted Percent of Child Healthy Eaters <sup>a</sup>	25	24	4	16	22	7
Defining Food Groups						
<i>Relative to other child healthy eaters, children in this pattern had higher mean intakes of:</i>						
	Sweetened, high-fat milk	High-fat dairy desserts and beverages	Non-diet sodas	Unsweetened high-fat milk	100% fruit juice	Unsweetened low-fat, reduced fat, and nonfat milk
	Sugar- sweetened drinks	Fried potatoes	Mixed dishes with meat	Refined grains (white bread and non-whole grain rice and pasta)	Soy milk and soy products	Sweet breakfast foods
	Diet soda	Fresh fruit other than citrus, melons, and berries	Mexican dishes	Canned or frozen fruit		Poultry (not fried)
	Beans, nuts, and seeds		Salty Snacks	Coffee or tea		Soups
Percent SNAP participants	21	40	—	62	52	—

<sup>a</sup> Prevalence rates for clusters are weighted using the six-year weights for dietary recall data in NHANES 1999-2004.

HEI = Score on Healthy Eating Index-2005

— = Sample size too small to produce reliable estimate

who are SNAP participants. The Sweet Milk, Dairy Desserts, and 100% Fruit Juice patterns were the most prevalent among child healthy eaters, accounting for 25 percent, 24 percent, and 22 percent of child healthy eaters, respectively. Sixteen percent of child healthy eaters were included in the High-Fat Milk pattern, 7 percent were included in the Low-Fat Milk pattern, and another 4 percent were included in the Soda pattern.

Differences across dietary patterns in the defining food groups are discussed below. In most cases, we also provide information on variations across dietary patterns in other measures of dietary intake (intake of nutrients, MyPyramid food groups and subgroups), measures of diet quality (HEI-2005 scores), and sociodemographic characteristics. We were unable to include the Soda and Low-Fat Milk patterns in these additional analyses because the number of individuals included in these patterns was too small ( $n=17$  and  $15$ , respectively) to support meaningful results. For this reason, Tables IV.16–IV.20 and Table IV.27 are limited to the four most common dietary patterns among child healthy eaters (Sweet Milk, Dairy Desserts, High-Fat Milk, and 100% Fruit Juice).

### **The Sweet Milk Pattern**

Table IV.16 shows the mean intakes of selected food groups (grams consumed per day) for individuals in each of the six dietary patterns identified for child healthy eaters. For each food group, the highest intake across patterns is highlighted in bold, and the lowest intake is underlined. These data show that, compared to other healthy eaters, children in the Sweet Milk pattern had substantially higher mean intakes of sweetened high-fat milk; sugar-sweetened non-carbonated drinks; beans, nuts, and seeds; and cereal. They also had notably higher mean intakes than other child healthy eaters of processed meat, mixed dishes that included fish and shellfish, salad and other raw vegetables, and diet drinks and notably lower mean intakes of 100% fruit juice.

On average, child healthy eaters in the Sweet Milk pattern had the second lowest intake of calories, relative to the other healthy patterns (Table IV.17). They had the second highest mean sodium intake and the lowest mean calcium intake, compared to other child healthy eaters. They also

Table IV.16. Mean Grams Per Day from Selected Food Groups Across the 6 Dietary Patterns Identified in Cluster Analysis of Child Healthy Eaters

Food or Food Group	Mean Grams Consumed Per Day					
	Cluster 1	Cluster 2	Cluster 3	Cluster 4	Cluster 5	Cluster 6
	Sweet Milk n = 50 Mean	Dairy Desserts n = 41 Mean	Soda n = 17 Mean	High-Fat Milk n = 25 Mean	100% Fruit Juice n = 27 Mean	Low-Fat Milk n = 15 Mean
Milk, high fat, not sweetened	64.3	396.6	328.0	564.5	258.6	<u>6.5</u>
Milk, high fat, sweetened	38.5	0.7	25.9	0.0	29.7	0.0
Milk, low-fat, reduced fat, nonfat, not sweetened	43.7	0.0	0.0	0.0	41.0	757.4
Milk, low-fat, reduced fat, nonfat, sweetened	21.3	2.7	5.6	2.4	<u>0.0</u>	32.6
Dairy products (not milk), high fat	14.3	5.9	16.9	2.3	<u>1.8</u>	4.1
Dairy products (not milk), low-fat, reduced fat, nonfat	9.7	2.6	<u>0.8</u>	1.5	17.6	2.8
Dairy desserts and beverages, high fat	<u>7.7</u>	27.0	10.4	8.1	12.9	13.7
Dairy desserts and beverages, reduced-fat	1.0	1.0	14.0	4.3	1.0	<u>0.0</u>
Red meats, not fried	16.1	13.2	9.7	20.2	3.3	<u>1.7</u>
Chicken and turkey, not fried	<u>8.6</u>	19.1	15.4	14.4	13.4	78.8
Processed meat	19.8	5.2	3.5	1.8	8.4	<u>0.2</u>
Fish and shellfish, not fried	0.5	0.0	0.0	0.0	4.5	1.9
Fried meat, poultry, or fish	4.2	9.2	4.1	7.6	7.1	<u>4.0</u>
Mixed dishes with meat (including organ meats and processed meat)	33.6	18.7	127.7	103.3	29.3	<u>3.5</u>
Mixed dishes with fish and shellfish	47.6	27.6	27.5	0.0	1.8	0.0
Mixed dishes with chicken and turkey	45.8	32.8	141.4	70.3	142.8	<u>22.5</u>
Mixed dishes, grain and vegetable (no meat)	42.5	15.6	20.5	<u>11.6</u>	29.5	197.9
Hamburgers and cheeseburgers	0.3	7.2	0.0	2.9	0.0	0.0
Pizza	12.2	0.9	9.8	4.0	29.0	<u>0.0</u>
Mexican dishes	22.3	15.4	49.7	37.6	<u>4.5</u>	13.2
Soups	10.8	63.6	30.2	38.6	<u>10.6</u>	130.2
Eggs and egg dishes	8.7	5.5	5.7	28.9	19.2	<u>2.8</u>
Beans and legumes, soy milk and soy products	3.2	31.8	3.0	0.2	49.9	<u>0.0</u>
Beans and legumes, beans, nuts, and seeds	66.7	49.1	40.9	25.6	<u>19.7</u>	28.7
White/non-whole-grain bread	49.3	29.7	23.9	80.1	30.1	<u>18.7</u>
Whole grain bread	0.0	2.4	0.8	0.0	0.2	0.0
Rice, pasta, noodles, dumplings, similar grain products, non-whole grain	68.4	38.0	21.9	126.6	14.5	<u>7.0</u>
Rice, pasta, noodles, dumplings, similar grain products whole grain	1.1	0.0	3.6	0.0	0.0	0.0
Other grains, whole grain	0.5	1.1	0.5	<u>0.0</u>	0.7	9.6
<b>Cereal, non-whole grain</b>	<b>35.0</b>	<b>11.2</b>	<b>22.4</b>	<b>9.1</b>	<b>9.3</b>	<b>13.4</b>
Cereal, whole grain	26.4	23.1	4.0	28.5	32.0	<u>3.1</u>
Sweet breakfast foods/breads	7.8	6.5	3.2	13.1	<u>3.0</u>	37.0
Desserts (non-dairy)	9.7	18.7	19.3	<u>1.8</u>	6.2	9.3
Salty snacks	9.6	<u>6.3</u>	28.7	7.5	8.1	14.2
Fruit, fresh, citrus	29.0	26.9	14.9	13.7	<u>1.0</u>	3.5
Fruit, fresh, melons and berries	14.5	9.9	<u>0.0</u>	48.1	57.4	31.5
Fruit, fresh, other	111.6	199.6	106.9	<u>19.3</u>	48.0	117.1
Fruit, canned or frozen	6.8	1.6	0.0	93.3	40.2	0.0
100% fruit juice	<u>76.1</u>	207.1	327.1	220.4	727.8	143.8
Vegetables, raw and salad	33.0	28.0	16.4	<u>2.0</u>	11.7	8.9
Vegetables, cooked, not starchy, fried, creamed, w/cheese, or stuffed	32.5	<u>5.3</u>	16.3	17.7	47.3	32.2
Vegetables, cooked, starchy (not fried)	5.4	2.7	10.5	23.4	9.6	<u>2.1</u>
Fried potatoes	2.2	17.5	1.6	4.5	6.6	<u>0.7</u>
Butter, margarine, and other added fats	3.6	<u>0.2</u>	0.6	3.8	0.4	0.6
Salad Dressings and mayo, regular, and added oils	4.4	3.4	1.9	<u>0.5</u>	1.2	0.9
Miscellaneous sugary foods	14.3	8.3	<u>1.8</u>	16.6	18.8	38.9
Coffee or tea (not sweetened)	14.1	<u>0.0</u>	13.3	99.2	32.9	8.5
Sugar-sweetened drinks (with calories), other than carbonated sodas	95.9	39.6	66.4	11.0	27.9	<u>5.6</u>
Sweetened drinks without calories (no calories or art. sweetener)	17.9	2.1	<u>0.0</u>	7.9	9.9	2.2
Carbonated soda (not diet)	32.2	<u>8.7</u>	507.8	133.6	126.9	59.8
Alcoholic drinks	0.7	0.0	0.0	0.0	0.0	0.0

Note: For each food or food group, the highest intake across clusters is in boldface and the lowest intake is underlined. The table excludes food groups that do not contribute to interpretation of the differences between clusters. A version of this table, including all food groups used in the cluster analysis, is provided in Appendix G.

Table IV.17. Mean Energy and Nutrient Intakes Across the 4 Main Dietary Patterns Identified in Cluster Analysis of Child Healthy Eaters

	Mean Intake Over 24 Hours			
	Cluster 1	Cluster 2	Cluster 4	Cluster 5
	Sweet Milk	Dairy Desserts	High-Fat Milk	100% Fruit Juice
	n = 50 Mean	n = 41 Mean	n = 25 Mean	n = 27 Mean
<i>Energy/Nutrient</i>				
Energy (kcal)	1,553.6	1,465.8 <sup>d</sup>	1,885.1	1,686.9
Fat (g)	51.0	44.7	51.8	43.4
Percent of Total Energy from Fat	29.0	26.8	24.6	22.7
Sodium (mg)	2,181.2 <sup>b</sup>	1,846.4 <sup>d</sup>	2,943.4 <sup>f</sup>	1,989.7
Calcium (mg)	637.4 <sup>a,b,c</sup>	899.7	1,069.1	888.8
Folate (mcg FE)	777.6	655.7	709.4	579.6
Cholesterol (mg)	144.0 <sup>b</sup>	136.4 <sup>d</sup>	236.5	208.6
Fiber (gm)	18.9	18.2	16.1	14.2
Protein (g)	58.8 <sup>c</sup>	57.5 <sup>d</sup>	77.0	65.7
Percent of Total Energy from Protein	15.5	15.9	16.6	15.6
Carbohydrate (g)	220.8	217.1 <sup>d,e</sup>	282.6	265.3
Percent of Total Energy from Carbohydrate	57.0	59.7	59.8	63.4
Saturated Fat (g)	14.9	15.3	17.8	14.0
Percent of Total Energy from Saturated Fat	8.3	9.4 <sup>i</sup>	8.5	7.4

<sup>a</sup> Difference between Cluster 1 and Cluster 2 is statistically significant at the  $p < .05$  level.

<sup>b</sup> Difference between Cluster 1 and Cluster 4 is statistically significant at the  $p < .05$  level.

<sup>c</sup> Difference between Cluster 1 and Cluster 5 is statistically significant at the  $p < .05$  level.

<sup>d</sup> Difference between Cluster 2 and Cluster 4 is statistically significant at the  $p < .05$  level.

<sup>e</sup> Difference between Cluster 2 and Cluster 5 is statistically significant at the  $p < .05$  level.

<sup>f</sup> Difference between Cluster 4 and Cluster 5 is statistically significant at the  $p < .05$  level.

had the second lowest intakes among child healthy eaters of cholesterol, protein (in grams), and carbohydrate (in grams). In terms of MyPyramid food group intakes, child healthy eaters in the Sweet Milk pattern had the highest mean intake of discretionary oil and the lowest mean intakes of total fruit and milk (Table IV.18).

Based on HEI-2005 scores, the Sweet Milk pattern was the third healthiest of the four main patterns identified for child healthy eaters. Children in the Sweet Milk pattern had a mean HEI-2005 score of 75.1, compared to 77.1 for the 100% Fruit Juice pattern, 75.5 for the Dairy Desserts pattern, and 72.6 for the High-Fat Milk pattern (Table IV.19). They had the highest mean scores among child healthy eaters for the total vegetables, dark green and orange vegetables and legumes, milk and oils components of the HEI-2005 and lowest mean score for the total fruit, whole fruit (tied), whole grains (tied), milk, and calories from SoFAAS components.

**Who followed the Sweet Milk pattern?** Compared to other child healthy eaters, those in the Sweet Milk pattern were relatively evenly split between male (45 percent) and female (55 percent); between the three age groups—ages 2 to 5 (35 percent), ages 6 to 11 (34 percent), and ages 12 to 18 (31 percent); and between non-Hispanic white (49 percent) and other race/ethnicity groups (51 percent) (Table IV.20). Most of them lived in large households (five or more household members) (60 percent). In addition, the Sweet Milk pattern had the highest proportion living in an owned home (65 percent), relative to the other healthy patterns, and the second highest rates of full food security, measured at both the household (73 percent) and child (79 percent) levels. The Sweet Milk pattern had the second lowest rate among child healthy eaters of both SNAP participation (21 percent) and WIC participation (measured at the household level) (24 percent).

### **The Dairy Desserts Pattern**

Compared to other healthy eaters, children in the Dairy Desserts pattern had substantially higher mean intakes of high-fat dairy desserts and beverages; fresh fruit other than citrus, melons, or berries; and fried potatoes (Table II.16). They also had notably higher mean intakes of hamburgers

Table IV.18. Mean Intake of MyPyramid Food Groups and Subgroups Across the 4 Main Dietary Patterns Identified in Cluster Analysis of Child Healthy Eaters

MyPyramid Food Group/Subgroup	Mean Intake of MyPyramid Food Groups and Subgroups Over 24 Hours			
	Cluster 1	Cluster 2	Cluster 4	Cluster 5
	Sweet Milk n = 50 Mean	Dairy Desserts n = 41 Mean	High-Fat Milk n = 25 Mean	100% Fruit Juice n = 27 Mean
Total grains (oz. equivalents)	6.4	4.4 <sup>d</sup>	8.7	4.1
Whole grains (oz. equivalents)	0.5	0.8	0.5	0.7
Non-whole grains (oz. equivalents)	5.9 <sup>c</sup>	3.6	8.2	3.4
Total vegetables (cup equivalents)	1.2	1.2	1.0	1.1
Dark-green, leafy vegetables (cup equivalents)	0.1	0.0	0.1	0.1
Orange vegetables (cup equivalents)	0.2	0.1	0.1	0.1
White potatoes (cup equivalents)	0.2	0.4	0.2	0.2
Other starchy vegetables (cup equivalents)	0.1	0.0	0.1	0.0
Tomatoes (cup equivalents)	0.1 <sup>b</sup>	0.2	0.3	0.2
Other vegetables (cup equivalents)	0.5	0.4	0.2	0.4
Total fruit (cup equivalents)	1.6 <sup>a,c</sup>	2.6 <sup>d,e</sup>	1.9 <sup>f</sup>	3.9
Citrus fruit, melons, and berries (cup equivalents)	0.4 <sup>a,c</sup>	0.8	0.6	1.3
Other fruit (cup equivalents)	1.2 <sup>c</sup>	1.8	1.2 <sup>f</sup>	2.7
Total milk (cup equivalents)	1.1 <sup>a,b,c</sup>	2.0	2.5	2.0
Milk (cup equivalents)	0.8 <sup>a,b,c</sup>	1.7 <sup>d</sup>	2.4 <sup>f</sup>	1.4
Yogurt (cup equivalents)	0.1	0.0	0.0	0.1
Cheese (cup equivalents)	0.3	0.1	0.1	0.3
Meat, poultry, fish (oz. equivalents)	2.9	2.4	3.0	3.4
Red meat (oz. equivalents)	0.8	0.9	1.3	0.7
Organ meats (oz. equivalents)	0.0	0.0	0.0	0.0
Frankfurters, sausages, and luncheon meat (oz. equivalents)	0.7	0.2	0.1	0.3
Poultry (oz. equivalents)	0.9	1.1	1.6	2.3
Fish and shellfish high in Omega-3 fatty acids (oz. equivalents)	0.1	0.0	0.0	0.1
Fish and shellfish low in Omega-3 fatty acids (oz. equivalents)	0.5 <sup>c</sup>	0.2	0.1	0.0
Eggs (oz. equivalents)	0.2	0.1 <sup>d</sup>	0.5	0.4
Cooked dry beans and peas (oz. equivalents)	0.4	0.2	0.1	0.1
Soybean products (oz. equivalents)	0.1	0.0	0.0	0.0
Nuts and seeds (oz. equivalents)	0.6	0.5	0.2	0.7
Discretionary oil (Grams)	17.5	13.4	12.3	11.2
Discretionary solid fat (Grams)	21.4	21.4	25.6	18.8
Added sugars (tsp. equivalents)	8.9	5.5 <sup>d,e</sup>	9.3	9.5

<sup>a</sup> Difference between Cluster 1 and Cluster 2 is statistically significant at the p < .05 level.<sup>b</sup> Difference between Cluster 1 and Cluster 4 is statistically significant at the p < .05 level.<sup>c</sup> Difference between Cluster 1 and Cluster 5 is statistically significant at the p < .05 level.<sup>d</sup> Difference between Cluster 2 and Cluster 4 is statistically significant at the p < .05 level.<sup>e</sup> Difference between Cluster 2 and Cluster 5 is statistically significant at the p < .05 level.<sup>f</sup> Difference between Cluster 4 and Cluster 5 is statistically significant at the p < .05 level.



**Table IV.19. Mean Healthy Eating Index-2005 Scores Across the 4 Main Dietary Patterns Identified in Cluster Analysis of Child Healthy Eaters**

	Mean Healthy Eating Index-2005 Scores			
	Cluster 1	Cluster 2	Cluster 4	Cluster 5
	Sweet Milk n = 50 Mean	Dairy Desserts n = 41 Mean	High-Fat Milk n = 25 Mean	100% Fruit Juice n = 27 Mean
<i>Healthy Eating Index (HEI)-2005 Score</i>				
HEI-2005 Score (Total)	75.1	75.5	72.6	77.1
HEI-2005 Component Scores				
Total Fruit	4.5	4.9	4.7	5.0
Whole Fruit	4.4	4.4	4.8	3.7
Total Vegetables	3.7 <sup>c</sup>	3.2	2.5	2.7
Dark Green and Orange Vegetables and Legumes	2.7	1.5	1.5	2.4
Total Grains	4.6	4.3	4.8	3.8
Whole Grains	1.0	1.7	1.0	1.5
Milk	5.6 <sup>a,b,c</sup>	9.0	9.1	8.7
Meat and Beans	9.1	8.3	8.2	9.0
Oils	8.1 <sup>a,c</sup>	5.3	4.9	4.3
Saturated Fat	8.4	7.6 <sup>e</sup>	8.5	9.5
Sodium	4.9	6.5 <sup>d</sup>	3.7 <sup>f</sup>	7.3
Calories from SoFAAS	18.0	18.9	18.8	19.4

<sup>a</sup> Difference between Cluster 1 and Cluster 2 is statistically significant at the  $p < .05$  level.

<sup>b</sup> Difference between Cluster 1 and Cluster 4 is statistically significant at the  $p < .05$  level.

<sup>c</sup> Difference between Cluster 1 and Cluster 5 is statistically significant at the  $p < .05$  level.

<sup>d</sup> Difference between Cluster 2 and Cluster 4 is statistically significant at the  $p < .05$  level.

<sup>e</sup> Difference between Cluster 2 and Cluster 5 is statistically significant at the  $p < .05$  level.

<sup>f</sup> Difference between Cluster 4 and Cluster 5 is statistically significant at the  $p < .05$  level.

Table IV.20. Sociodemographic Characteristics Across the 4 Main Dietary Patterns Identified in Cluster Analysis of Child Healthy Eaters

Characteristic	Proportion with Characteristic			
	Cluster 1	Cluster 2	Cluster 4	Cluster 5
	Sweet Milk n = 50 Mean	Dairy Desserts n = 41 Mean	High-Fat Milk n = 25 Mean	100% Fruit Juice n = 27 Mean
SNAP Participation Status				
SNAP participant	20.9	39.8	62.1	51.9
Income-eligible nonparticipant	32.6	43.3	23.2	24.7
Other low-income nonparticipant	46.5	16.9	14.7	23.4
Household Participates in WIC	24.1	57.5	25.1	22.4
Sex				
Male	45.3	30.1	76.9	61.9
Female	54.7	69.9	23.1	38.1
Age				
2-5	34.9	68.5	20.3	34.6
6-11	33.7	25.7	71.8	39.0
12-18	31.4	5.8	8.0	26.4
Race/Ethnicity				
Non-Hispanic, White	49.2	36.2	60.3	72.4
Non-Hispanic, Black	12.0	4.1	12.7	8.8
Hispanic	28.7	47.4	23.6	18.8
Other	10.1	12.3	3.5	0.0
US-Born	83.4	77.4	97.0	93.3
Household Size				
1	0.0	0.0	0.0	0.0
2	1.0	0.0	2.9	4.5
3	20.3	9.4	3.7	5.5
4	18.4	21.3	66.6	51.3
5+	60.3	69.3	26.7	38.7
Gender of HH Ref Person*				
Male	42.1	44.1	21.0	33.9
Female	57.9	55.9	79.0	66.1
Age of HH Ref Person*				
19-30	36.5	18.5 <sup>d</sup>	71.7	56.2
31-40	28.7	65.6 <sup>d</sup>	17.8	25.0
41-50	21.7	15.0	4.8	18.0
51-60	5.5	1.0	0.0	0.0
>60	7.7	0.0	5.7	0.8
HH Ref Person US-Born*	56.6	27.2 <sup>e</sup>	77.5	86.9
HH Ref Person Married*	71.5	68.6	87.2	75.7
Education Level of HH Ref Person*				
Less than high school	42.2	33.6	20.6	23.2
High-school/GED	25.4	40.7	65.7	46.1
More than HS	32.4	25.8	13.8	30.7
Household Food Security Level				
Full food security	72.7 <sup>c</sup>	36.7	20.6	34.7
Marginal food security	5.0	4.5	5.8	16.9
Low food security	7.1 <sup>a</sup>	51.1	19.3	11.6
Very low food security	15.2	7.7	54.4	36.8
Child Food Security Level				
Full food security	78.9	49.0	30.0	52.8
Marginal food security	2.7	2.5	6.1	0.0
Low food security	17.3	47.8	63.9	47.2
Very low food security	1.1	0.7	0.0	0.0
Home is Owned	64.8 <sup>b,c</sup>	50.7	19.4	20.5
Someone in Household Smokes	18.3	19.5	60.5	62.5
Obese	15.2	18.9	5.9	47.8
Overweight or Obese	35.8	23.0	17.9	64.4
Has Health Insurance	75.5	82.2	90.3	92.3
Health Condition Good or Better	95.0 <sup>b</sup>	97.6 <sup>d</sup>	37.2	100
Doctor said Overweight	2.0	9.0	2.2	44.4
Taken Prescriptions in Past Month	30.5	6.2	6.0	3.0
Screen Time at Least 2 Hrs/Day	76.9	27.9	81.3	89.6

\*The household reference (HH Ref) person is defined as the first household member 18 years of age or older listed on the NHANES screener household member roster who owns or rents the residence where members of the household reside.

<sup>a</sup> Difference between Cluster 1 and Cluster 2 is statistically significant at the  $p < .05$  level.

<sup>b</sup> Difference between Cluster 1 and Cluster 4 is statistically significant at the  $p < .05$  level.

<sup>c</sup> Difference between Cluster 1 and Cluster 5 is statistically significant at the  $p < .05$  level.

<sup>d</sup> Difference between Cluster 2 and Cluster 4 is statistically significant at the  $p < .05$  level.

<sup>e</sup> Difference between Cluster 2 and Cluster 5 is statistically significant at the  $p < .05$  level.

<sup>f</sup> Difference between Cluster 4 and Cluster 5 is statistically significant at the  $p < .05$  level.

and cheeseburgers. They had notably lower mean intakes than other child healthy eaters of salty snacks; non-starchy vegetables that were prepared with added fat (fried, creamed, stuffed, or with cheese); and butter, margarine, and other added fats.

Children in the Dairy Desserts pattern consumed less calories, on average, than child healthy eaters in the other dietary patterns (Table II.17). The relatively young age of children in this pattern (nearly 70 percent were ages 2 to 5, as we note below) is likely the main reason for the low caloric intake, which is not adjusted for age differences between the patterns. Compared to other child healthy eaters, they had the second highest intake of calcium and the highest percentage of energy derived from saturated fat (saturated fat intake was consistent with the level recommended in the *Dietary Guidelines* [9.4 percent versus < 10 percent]). Children in the Dairy Desserts pattern also had the lowest intake of sodium among healthy eaters. In terms of MyPyramid food group intakes, child healthy eaters in the Dairy Desserts pattern had the highest mean intake of total vegetables (tied) and lowest mean intake of added sugars (Table IV.18).

Based on HEI-2005 scores, the Dairy Desserts pattern was the second most healthy of the four main dietary patterns identified for child healthy eaters. Children in the Dairy Desserts pattern had a mean HEI-2005 score of 75.5, second only to a mean score of 77.1 for the 100% Fruit Juice pattern (Table IV.19). They had the highest mean score among child healthy eaters for the whole grains component of the HEI-2005 and the lowest mean scores for the whole fruit (tied), dark green and orange vegetables and legumes (tied), and saturated fat components.

**Who followed the Dairy Desserts pattern?** Children who followed the Dairy Desserts pattern were generally younger than children who followed the other healthy patterns; most (69 percent) were ages 2 to 5 (Table IV.20). Compared to children in the other healthy patterns, those in the Dairy Desserts pattern were most likely to live in large households (five or more household members) (69 percent). In addition, the Dairy Desserts pattern had the highest proportion among the four main patterns identified for child healthy eaters of females (70 percent) and the second

highest rates of low or very low food security, measured at both the household (59 percent) and child (49 percent) levels. Forty percent of children in the Dairy Desserts pattern participated in SNAP. More than half (58 percent) participated in WIC (measured at the household level)—more than in any of the other patterns identified for child healthy eaters. This is likely due to the high concentration of young children in this pattern; children older than five years are not eligible to participate in WIC.

### **The Soda Pattern<sup>48</sup>**

Compared to other healthy eaters, children in the Soda pattern had substantially higher mean intakes of non-diet soda, mixed dishes that included meat, Mexican food, and salty snacks (Table IV.16). They also had notably higher mean intakes than other child healthy eaters of high-fat dairy products other than milk and reduced fat dairy desserts and beverages. They had notably lower mean intakes of fresh melons and berries, miscellaneous sugary foods, and diet drinks.

### **The High-Fat Milk Pattern**

Compared to other healthy eaters, children in the High-Fat Milk pattern had substantially higher mean intakes of unsweetened high-fat milk; white bread; rice, pasta, and similar non-whole grain products; canned or frozen fruit; and coffee or tea (Table IV.16). They also had notably higher mean intakes than other child healthy eaters of red meats (not fried), eggs and egg dishes, and cooked starchy vegetables (also not fried) and notably lower mean intakes of mixed dishes that included grains and vegetables, but no meat; non-dairy desserts; fresh fruit other than citrus, melons, or berries; salad and other raw vegetables; and salad dressings.

On average, child healthy eaters in the High-Fat Milk pattern had the highest intake of calories, relative to the other healthy patterns (Table IV.17). They also had the highest intakes of sodium,

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<sup>48</sup> Because of its small sample size (n=17), the Soda pattern was not included in the additional analyses that examined differences across clusters in nutrient intake, MyPyramid food groups and subgroups, HEI-2005 scores, and sociodemographic characteristics.

calcium, and fiber. In terms of MyPyramid food group intakes, child healthy eaters in the High-Fat Milk pattern had the highest mean intakes of total grains, non-whole grains, milk, and discretionary solid fat (Table IV.13). They had the lowest mean intake of total vegetables among child healthy eaters.

Based on HEI-2005 scores, the High-Fat Milk pattern was the least healthy of the four main dietary patterns identified for child healthy eaters. Children in this pattern had a mean HEI-2005 score of 72.6, the lowest of the four patterns (Table IV.19). Nonetheless, children in the High-Fat Milk pattern had the highest mean score, relative to the three other patterns identified for child healthy eaters, for the whole fruit, total grains, and milk components of the HEI-2005. They also had the lowest mean score for the total vegetables, dark green and orange and legumes (tied), whole grains, meat and beans, and sodium components.

**Who followed the High-Fat Milk pattern?** Compared to other child healthy eaters, those in the High-Fat Milk pattern were most likely to be male (77 percent), ages 6 to 11 (72 percent), and US-born (97 percent) (Table IV.20). In addition, children in the High-Fat Milk pattern were the most likely to live in a four person household (67 percent); to have low or very low food security, measured at both the household (74 percent) and child (64 percent) levels; and to participate in SNAP (62 percent).

### **The 100% Fruit Juice Pattern**

Compared to other healthy eaters, children in the 100% Fruit Juice pattern had substantially higher mean intakes of 100% fruit juice and soy and soy products (Table IV.16). They also had notably higher mean intakes than other child healthy eaters of low-fat, reduced fat, and nonfat milk products; mixed dishes that included fish and shellfish; pizza; fresh melons and berries; and non-starchy vegetables that were prepared with added fat (fried, creamed, stuffed, or with cheese). They had notably lower intakes than other child healthy eaters of Mexican dishes; beans, nuts, and seeds; sweet breakfast foods; and fresh citrus.

On average, children in the 100% Fruit Juice pattern had the second highest intake of calories, relative to children in the other healthy patterns (Table IV.17). They had the second lowest mean intakes among child healthy eaters of sodium and calcium. In terms of MyPyramid group intakes, child healthy eaters in the 100% Fruit Juice pattern had the highest mean intakes of fruit and meat, poultry and fish, and added sugars and the lowest mean intakes of total grains, discretionary oil, and discretionary solid fat (Table IV.18).

With a mean score of 77.1 on the HEI-2005, the 100% Fruit Juice pattern was the healthiest of the four main dietary patterns identified for child healthy eaters (Table IV.19). Children in this pattern had the highest mean scores among healthy eaters for the total fruit, saturated fat, sodium, and calories from SoFAAS components of the HEI-2005. At the same time, they had the lowest mean scores among child healthy eaters for the total grains and oils components.

**Who followed the 100% Fruit Juice pattern?** Most children who followed the 100% Fruit Juice pattern were female (62 percent); they were divided about evenly between the three age groups—ages 2 to 5 (35 percent), ages 6 to 11 (39 percent), and ages 12 to 18 (26 percent) (Table IV.20). Compared to other child healthy eaters, those in the 100% Fruit Juice pattern were most likely to be non-Hispanic white (72 percent). In addition, about half of them participated in SNAP (52 percent), and about half had low or very low food security, measured at both the household (48 percent) and child (47 percent) levels.

### **The Low-Fat Milk Pattern**<sup>49</sup>

Compared to other healthy eaters, children in the Low-Fat Milk pattern had substantially higher mean intakes of unsweetened and sweetened low-fat, reduced fat, and nonfat milks; poultry (not fried); soups; sweet breakfast foods; and miscellaneous sugary foods (Table II.16). They also had

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<sup>49</sup> Because of its small sample size (n=15), the Low-Fat Milk pattern was not included in the additional analyses that examined differences across clusters in nutrient intake, MyPyramid food groups and subgroups, HEI-2005 scores, and sociodemographic characteristics.

notably higher mean intakes than other child healthy eaters of mixed dishes that included grains and vegetables, but no meat; and whole grain other than rice, pasta, and similar grain products. They had notably lower mean intakes than other child healthy eaters of unsweetened high-fat milk; processed meat; mixed dishes that included meat; eggs and egg dishes; rice, pasta, and similar grain products; and sugary non-carbonated drinks.

## 2. Less-Healthy Eaters

Five distinct dietary patterns were identified for child less-healthy eaters. We labeled them as (1) Soda, pizza, and salty snacks (hereafter “Soda and Pizza”); (2) Sweets; (3) High-fat dairy, cereal, and vegetables (hereafter “High-Fat Dairy”); (4) Sweet drinks, sugary foods, and soups (hereafter “Non-Carbonated Sugar-Sweetened Drinks”); and (5) Alcohol, burgers, fries, poultry, Mexican food, and diet drinks (hereafter “Alcohol and Burgers”).<sup>50</sup> Table IV.21 shows the prevalence of these clusters among child healthy eaters, the main food groups that distinguish each cluster from the other four clusters, and the proportion in each cluster who are SNAP participants. The Sweets pattern was the most prevalent, accounting for 46 percent of child less-healthy eaters, followed by the Soda and Pizza pattern which accounted for another 23 percent. Seventeen percent of child less-healthy eaters were included in the High-Fat Dairy pattern and another 14 percent were included in the Non-Carbonated Sugar-Sweetened Drinks pattern. The Alcohol and Burgers pattern was the least prevalent, accounting for less than 0.5 percent of child less-healthy eaters.

Differences across dietary patterns in the defining food groups are discussed below. In most cases, we also provide information on variations across dietary patterns in other measures of dietary intake (intake of nutrients, MyPyramid food groups and subgroups), measures of diet quality (HEI-2005 scores), and sociodemographic characteristics. We were unable to include the Alcohol and Burgers pattern in these additional analyses because the number of individuals included in this

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<sup>50</sup> All 12 individuals included in the Alcohol and Burgers pattern were ages 16 to 18.

patterns was too small (n=12) to support meaningful results. For this reason, Tables IV.22–IV.26 and Table IV.28 are limited to the four most common dietary patterns among child less-healthy eaters (Soda and Pizza, Sweets, High-Fat Dairy, and Non-Carbonated Sugar-Sweetened Drinks).

Table IV.21. Dietary Patterns Identified for Child Less-Healthy Eaters (HEI &lt; 49)

	Soda and Pizza n = 559	Sweets n = 1295	High-Fat Dairy n = 348	Non-Carbonated Sugar-Sweetened Drinks n = 395	Alcohol and Burgers <sup>a</sup> n = 12
Weighted Percent of Child Less-Healthy Eaters <sup>b</sup>	n = 23	n = 46	n = 17	n = 14	n = 0.4
Defining Food Groups					
<i>Relative to other child less-healthy eaters, children in this pattern had higher mean intakes of:</i>					
	Non-diet soda	Sweetened milks	High-fat, unsweetened milk	Sugar-sweetened drinks (other than soda)	Alcoholic drinks
	Pizza	Sweet breakfast foods	High-fat dairy desserts and beverages	Miscellaneous sugary foods	Poultry
	Salty snacks	100% fruit juice	Cereals	Soups	Hamburgers and cheeseburgers
			Vegetables other than fried potatoes		Fried potatoes
Percent SNAP participants	25	36	41	30	—

<sup>a</sup>All 12 individuals in the Alcohol and Burgers pattern were ages 16 to 18.

<sup>b</sup>Prevalence rates for clusters are weighted using the six-year weights for dietary recall data in NHANES 1999–2004.

HEI = Score on Healthy Eating Index–2005

— = Sample size too small to produce reliable estimate

### The Soda and Pizza Pattern

Table IV.22 shows the mean intakes of selected food groups (grams consumed per day) for individuals in each of the five dietary patterns identified for child less-healthy eaters. For each food group, the highest intake across patterns is highlighted in bold and the lowest intake is underlined. These data show that, compared to other less-healthy eaters, children in the Soda and Pizza pattern had substantially higher mean intakes of non-diet soda, pizza, and salty snacks. They also had notably higher mean intakes of hamburgers and cheeseburgers and fried potatoes than children in all other less-healthy patterns but the Alcohol and Burgers pattern. They had notably lower mean



**Table IV.22. Mean Grams Per Day from Selected Food Groups Across the 5 Dietary Patterns Identified in Cluster Analysis of Child Less-Healthy Eaters**

Food or Food Group	Mean Grams Consumed Per Day				
	Cluster 1	Cluster 2	Cluster 3	Cluster 4	Cluster 5
	Soda and Pizza n = 559 Mean	Sweets n = 1295 Mean	High-Fat Dairy n = 348 Mean	Non-Carbonated Sugar-Sweetened Drinks n = 395 Mean	Alcohol and Burgers n = 12 Mean
Milk, high fat, not sweetened	131.6	111.3	<b>711.4</b>	161.5	<u>92.5</u>
Milk, high fat, sweetened	18.2	<b>52.0</b>	31.5	25.6	<u>0.0</u>
Milk, low-fat, reduced fat, nonfat, not sweetened	8.1	<b>23.3</b>	<u>0.6</u>	5.6	4.5
Milk, low-fat, reduced fat, nonfat, sweetened	10.7	<b>23.1</b>	13.2	10.1	<u>0.0</u>
Dairy products (not milk), high fat	<u>16.2</u>	16.3	16.9	17.9	17.9
Dairy products (not milk), low-fat, reduced fat, nonfat	<b>4.8</b>	4.4	4.1	1.3	<u>0.0</u>
Dairy desserts and beverages, high fat	27.6	26.3	<b>37.7</b>	27.1	<u>0.1</u>
Dairy desserts and beverages, reduced-fat	5.0	3.8	<b>6.2</b>	5.5	<u>0.0</u>
Red meats, not fried	21.6	17.6	14.9	<b>23.8</b>	<u>10.1</u>
Chicken and turkey, not fried	14.6	9.3	<u>7.6</u>	11.5	<b>50.2</b>
Processed meat	24.2	26.0	<u>20.6</u>	25.2	<b>26.6</b>
Fish and shellfish, not fried	0.9	<b>1.9</b>	0.9	1.0	<u>0.0</u>
Fried meat, poultry, or fish	11.4	<b>11.6</b>	8.4	10.4	<u>1.0</u>
Mixed dishes with meat (including organ meats and processed meat)	46.7	42.7	<b>49.1</b>	47.6	<u>3.1</u>
Mixed dishes with fish and shellfish	1.7	<b>8.2</b>	1.8	5.5	<u>0.0</u>
Mixed dishes with chicken and turkey	9.5	11.7	<b>16.6</b>	13.0	<u>0.0</u>
Mixed dishes, grain and vegetable (no meat)	17.0	<b>36.3</b>	34.6	29.5	<u>0.0</u>
Hamburgers and cheeseburgers	24.6	11.4	<u>11.2</u>	14.2	<b>64.9</b>
Pizza	<b>64.5</b>	<u>33.7</u>	50.6	36.1	51.4
Mexican dishes	18.4	18.1	<u>11.9</u>	24.1	<b>26.4</b>
Soups	<u>28.3</u>	41.0	45.9	<b>59.2</b>	30.4
Eggs and egg dishes	<u>11.8</u>	13.9	12.3	17.0	<b>63.7</b>
Beans and legumes, soy milk and soy products	0.2	<b>0.5</b>	0.3	0.2	<u>0.0</u>
Beans and legumes, beans, nuts, and seeds	6.5	8.1	<b>12.2</b>	8.8	<u>5.6</u>
White/non-whole-grain bread	<u>33.4</u>	39.3	35.5	40.8	<b>86.7</b>
Whole grain bread	0.1	<b>0.3</b>	0.1	<u>0.0</u>	0.0
Rice, pasta, noodles, dumplings, similar grain products, non-whole grain	15.9	<b>20.0</b>	18.3	12.5	<u>0.6</u>
Rice, pasta, noodles, dumplings, similar grain products whole grain	0.1	0.1	0.2	<b>0.4</b>	<u>0.0</u>
Other grains, whole grain	1.4	1.5	<b>4.6</b>	1.9	<u>0.0</u>
Cereal, non-whole grain	12.7	13.6	<b>29.0</b>	17.3	<u>0.0</u>
Cereal, whole grain	5.8	7.5	<b>10.6</b>	7.7	<u>0.0</u>
Sweet breakfast foods/breads	16.8	<b>22.3</b>	11.8	12.9	<u>5.4</u>
Desserts (non-dairy)	26.7	29.4	24.8	<b>29.4</b>	<u>9.0</u>
Salty snacks	<b>17.6</b>	11.8	10.7	16.7	<u>6.8</u>
Fruit, fresh, citrus	2.2	<b>5.4</b>	2.4	4.9	<u>0.0</u>
Fruit, fresh, melons and berries	<u>1.8</u>	3.4	3.4	1.9	<b>9.9</b>
Fruit, fresh, other	6.2	13.1	14.8	<b>16.3</b>	<u>2.3</u>
Fruit, canned or frozen	3.2	<b>6.3</b>	6.0	4.1	<u>0.0</u>
100% fruit juice	49.1	<b>89.5</b>	71.1	<u>27.6</u>	64.5
Vegetables, raw and salad	12.6	9.0	<b>14.0</b>	9.8	<u>8.4</u>
Vegetables, cooked, not starchy, fried, creamed, w/cheese, or stuffed	9.3	13.3	<b>14.5</b>	7.7	<u>6.4</u>
Vegetables, cooked, starchy (not fried)	15.5	18.7	<b>31.1</b>	21.7	<u>0.6</u>
Fried potatoes	31.8	<u>14.6</u>	15.3	21.4	<b>60.3</b>
Butter, margarine, and other added fats	<u>1.6</u>	2.7	1.8	<b>3.5</b>	2.2
Salad Dressings and mayo, regular, and added oils	<b>2.9</b>	<u>1.9</u>	2.1	2.7	5.1
Miscellaneous sugary foods	22.5	27.8	20.5	<b>42.2</b>	<u>5.3</u>
Coffee or tea (not sweetened)	12.0	<b>16.0</b>	10.9	4.2	<u>0.0</u>
Sugar-sweetened drinks (with calories), other than carbonated sodas	<u>86.3</u>	133.6	151.1	<b>955.1</b>	194.6
Sweetened drinks without calories (no calories or art. sweetener)	12.9	27.2	15.9	<u>5.9</u>	<b>276.9</b>
Carbonated soda (not diet)	<b>974.3</b>	<u>168.3</u>	200.4	179.1	399.8
Alcoholic drinks	10.1	4.0	<u>0.2</u>	1.9	<b>2204.4</b>

Note: For each food or food group, the highest intake across clusters is in boldface and the lowest intake is underlined. The table excludes food groups that do not contribute to interpretation of the differences between clusters. A version of this table, including all food groups used in the cluster analysis, is provided in Appendix G.

intakes than other child less-healthy eaters of sweetened high-fat milk; mixed dishes with grains and vegetables, but no meat; fresh fruit; and non-carbonated sugar-sweetened drinks.

Children in the Soda and Pizza pattern consumed more calories, on average, than child less-healthy eaters in the Sweets and High-Fat Dairy patterns (Table IV.23); they were virtually tied with children in the Non-Carbonated Sugar-Sweetened Drinks pattern. They had the lowest percentages among child less-healthy eaters of energy from saturated fat (above the 10 percent threshold recommended in the *Dietary Guidelines*, however) and protein and the lowest intake of calcium. In terms of MyPyramid food group intakes, child less-healthy eaters in the Soda and Pizza pattern had the highest mean intakes of red meat (tied), discretionary oil, and added sugars (Table IV.24). They had the lowest mean intakes of total fruit and milk.

Based on HEI-2005 scores, the Soda and Pizza pattern was the least healthy of the four main patterns identified for child less-healthy eaters. Children in the Soda and Pizza pattern had a mean HEI-2005 score of 37.4, the lowest of the four patterns (Table IV.25). They had the lowest mean scores among child less-healthy eaters for the total fruit, whole fruit, whole grains, milk, and calories from SoFAAS components of the HEI-2005 and tied for the lowest mean score for the total grains component. At the same time, they had the highest mean scores among child less-healthy eaters for the total vegetables, healthy oils, saturated fat, and sodium components.

**Who followed the Soda and Pizza pattern?** Children who followed the Soda and Pizza pattern were generally older than children who followed the other less-healthy patterns; most (61 percent) were ages 12 to 18 (Table IV.26). Compared to other child less-healthy eaters, those in the Soda and Pizza pattern were least likely to be black (13 percent) and most likely to live in a small household (three or less household members) (31 percent). In addition, the Soda and Pizza pattern had the lowest rates of SNAP participation (25 percent) and WIC Participation (measured at the household level) (16 percent), compared to other patterns identified for child less-healthy eaters. It had the second highest rate of low or very low food security at the child level (22 percent).

Table IV.23. Mean Energy and Nutrient Intakes Across the 4 Main Dietary Patterns Identified in Cluster Analysis of Child Less-Healthy Eaters

Energy/Nutrient	Mean Intake Over 24 Hours			
	Cluster 1	Cluster 2	Cluster 3	Cluster 4
	Soda and Pizza n = 559 Mean	Sweets n = 1295 Mean	High-Fat Dairy n = 348 Mean	Non-Carbonated Sugar-Sweetened Drinks n = 395 Mean
Energy (kcal)	2,042.3 <sup>a,b</sup>	1,667.5 <sup>h,i</sup>	2,003.1	2,038.1
Fat (g)	73.5 <sup>b</sup>	66.0 <sup>h</sup>	78.9	72.4
Percent of Total Energy from Fat	31.7 <sup>a,b</sup>	35.4 <sup>e</sup>	35.3 <sup>f</sup>	31.4
Sodium (mg)	2,883.0	2,728.2 <sup>d,e</sup>	3,047.3	3,044.6
Calcium (mg)	747.5 <sup>b</sup>	750.7 <sup>d</sup>	1,402.1 <sup>f</sup>	818.3
Folate (mcg FE)	439.6 <sup>b</sup>	420.3 <sup>d</sup>	584.9 <sup>f</sup>	455.5
Cholesterol (mg)	199.6	200.9 <sup>d</sup>	232.4	213.4
Fiber (gm)	9.5	9.3	10.1	10.0
Protein (g)	59.3 <sup>b</sup>	55.3 <sup>d</sup>	72.2 <sup>f</sup>	59.8
Percent of Total Energy from Protein	11.5 <sup>a,b</sup>	13.4 <sup>d,e</sup>	14.7 <sup>f</sup>	11.6
Carbohydrate (g)	287.9 <sup>a,b</sup>	216.8 <sup>d,e</sup>	255.7 <sup>f</sup>	292.8
Percent of Total Energy from Carbohydrate	57.4 <sup>a,b</sup>	52.0 <sup>e</sup>	50.9 <sup>f</sup>	58.2
Saturated Fat (g)	26.4 <sup>b</sup>	24.3 <sup>d</sup>	33.0 <sup>f</sup>	26.6
Percent of Total Energy from Saturated Fat	11.4 <sup>a,b</sup>	13.1 <sup>d,e</sup>	15.0 <sup>f</sup>	11.6

<sup>a</sup> Difference between Cluster 1 and Cluster 2 is statistically significant at the  $p < .05$  level.

<sup>b</sup> Difference between Cluster 1 and Cluster 3 is statistically significant at the  $p < .05$  level.

<sup>c</sup> Difference between Cluster 1 and Cluster 4 is statistically significant at the  $p < .05$  level.

<sup>d</sup> Difference between Cluster 2 and Cluster 3 is statistically significant at the  $p < .05$  level.

<sup>e</sup> Difference between Cluster 2 and Cluster 4 is statistically significant at the  $p < .05$  level.

<sup>f</sup> Difference between Cluster 3 and Cluster 4 is statistically significant at the  $p < .05$  level.

Table IV.24. Mean Intake of MyPyramid Food Groups and Subgroups Across the 4 Main Dietary Patterns Identified in Cluster Analysis of Child Less-Healthy Eaters

MyPyramid Food Group/Subgroup	Mean Intake of MyPyramid Food Groups and Subgroups Over 24 Hours			
	Cluster 1	Cluster 2	Cluster 3	Cluster 4
	Soda and Pizza n = 559 Mean	Sweets n = 1295 Mean	High-Fat Dairy n = 348 Mean	Non-Carbonated Sugar-Sweetened Drinks n = 395 Mean
Total grains (oz. equivalents)	6.1	6.0	6.2	6.2
Whole grains (oz. equivalents)	0.2	0.3	0.4	0.3
Non-whole grains (oz. equivalents)	5.9	5.7	5.8	5.9
Total vegetables (cup equivalents)	1.0 <sup>a</sup>	0.7	0.9	0.9
Dark-green, leafy vegetables (cup equivalents)	0.0	0.0	0.0	0.0
Orange vegetables (cup equivalents)	0.0	0.0	0.0	0.0
White potatoes (cup equivalents)	0.4 <sup>a</sup>	0.2	0.3	0.4
Other starchy vegetables (cup equivalents)	0.0	0.0	0.1	0.1
Tomatoes (cup equivalents)	0.3	0.2	0.2	0.2
Other vegetables (cup equivalents)	0.2	0.2	0.2	0.2
Total fruit (cup equivalents)	0.3 <sup>a,b,c</sup>	0.6	0.6	0.5
Citrus fruit, melons, and berries (cup equivalents)	0.2	0.3	0.2	0.2
Other fruit (cup equivalents)	0.2 <sup>a,b,c</sup>	0.4	0.3	0.3
Total milk (cup equivalents)	1.6 <sup>b</sup>	1.7 <sup>d</sup>	4.0 <sup>f</sup>	1.7
Milk (cup equivalents)	0.8 <sup>b</sup>	1.0 <sup>d</sup>	3.3 <sup>f</sup>	1.0
Yogurt (cup equivalents)	0.0	0.0	0.0	0.0
Cheese (cup equivalents)	0.8	0.6	0.7	0.7
Meat, poultry, fish (oz. equivalents)	3.1 <sup>b</sup>	2.8	2.4 <sup>f</sup>	3.2
Red meat (oz. equivalents)	1.4	1.1	1.1	1.4
Organ meats (oz. equivalents)	0.0	0.0	0.0	0.0
Frankfurters, sausages, and luncheon meat (oz. equivalents)	0.9	0.9	0.7	0.9
Poultry (oz. equivalents)	0.8	0.6	0.5	0.8
Fish and shellfish high in Omega-3 fatty acids (oz. equivalents)	0.0	0.0	0.0	0.0
Fish and shellfish low in Omega-3 fatty acids (oz. equivalents)	0.1	0.1	0.0	0.1
Eggs (oz. equivalents)	0.2	0.3	0.2	0.3
Cooked dry beans and peas (oz. equivalents)	0.0	0.0	0.1	0.0
Soybean products (oz. equivalents)	0.0	0.0	0.0	0.0
Nuts and seeds (oz. equivalents)	0.2	0.1	0.1	0.2
Discretionary oil (Grams)	13.0 <sup>a,b</sup>	8.4 <sup>e</sup>	9.0	11.7
Discretionary solid fat (Grams)	49.2 <sup>b</sup>	47.7 <sup>d</sup>	60.3 <sup>f</sup>	49.5
Added sugars (tsp. equivalents)	35.0 <sup>a,b</sup>	18.1 <sup>e</sup>	18.8 <sup>f</sup>	34.2

<sup>a</sup> Difference between Cluster 1 and Cluster 2 is statistically significant at the p < .05 level.<sup>b</sup> Difference between Cluster 1 and Cluster 3 is statistically significant at the p < .05 level.<sup>c</sup> Difference between Cluster 1 and Cluster 4 is statistically significant at the p < .05 level.<sup>d</sup> Difference between Cluster 2 and Cluster 3 is statistically significant at the p < .05 level.<sup>e</sup> Difference between Cluster 2 and Cluster 4 is statistically significant at the p < .05 level.<sup>f</sup> Difference between Cluster 3 and Cluster 4 is statistically significant at the p < .05 level.

Table IV.25. Mean Healthy Eating Index-2005 Scores Across the 4 Main Dietary Patterns Identified in Cluster Analysis of Child Less-Healthy Eaters

	Mean Healthy Eating Index-2005 Scores			
	Cluster 1	Cluster 2	Cluster 3	Cluster 4
	Soda and Pizza n = 559 Mean	Sweets n = 1295 Mean	High-Fat Dairy n = 348 Mean	Non-Carbonated Sugar-Sweetened Drinks n = 395 Mean
<i>Healthy Eating Index (HEI)-2005 Score</i>				
HEI-2005 Score (Total)	37.3 <sup>a,b</sup>	39.8	40.1	38.1
HEI-2005 Component Scores				
Total Fruit	0.9 <sup>a,b,c</sup>	1.9 <sup>d,e</sup>	1.5	1.5
Whole Fruit	0.5 <sup>a</sup>	1.0	0.8	0.8
Total Vegetables	2.1	1.9	2.0	2.0
Dark Green and Orange Vegetables and Legumes	0.3	0.4 <sup>e</sup>	0.4	0.2
Total Grains	4.2 <sup>a</sup>	4.6 <sup>d,e</sup>	4.2	4.3
Whole Grains	0.4	0.5	0.7	0.5
Milk	5.5 <sup>a,b</sup>	6.3 <sup>d</sup>	9.8 <sup>f</sup>	5.7
Meat and Beans	6.1	6.6 <sup>d</sup>	5.3 <sup>f</sup>	6.4
Oils	4.5 <sup>b</sup>	3.8	3.4	4.3
Saturated Fat	5.5 <sup>a,b</sup>	3.8 <sup>d,e</sup>	1.8 <sup>f</sup>	5.3
Sodium	5.4 <sup>a,b</sup>	3.6 <sup>d,e</sup>	4.5	4.7
Calories from SoFAAS	2.0 <sup>a,b</sup>	5.3 <sup>e</sup>	5.7 <sup>f</sup>	2.3

<sup>a</sup> Difference between Cluster 1 and Cluster 2 is statistically significant at the  $p < .05$  level.

<sup>b</sup> Difference between Cluster 1 and Cluster 3 is statistically significant at the  $p < .05$  level.

<sup>c</sup> Difference between Cluster 1 and Cluster 4 is statistically significant at the  $p < .05$  level.

<sup>d</sup> Difference between Cluster 2 and Cluster 3 is statistically significant at the  $p < .05$  level.

<sup>e</sup> Difference between Cluster 2 and Cluster 4 is statistically significant at the  $p < .05$  level.

<sup>f</sup> Difference between Cluster 3 and Cluster 4 is statistically significant at the  $p < .05$  level.

Table IV.26. Sociodemographic Characteristics Across the 4 Dietary Patterns Identified in Cluster Analysis of Child Less-Healthy Eaters

Characteristic	Proportion with Characteristic			
	Cluster 1	Cluster 2	Cluster 3	Cluster 4
	Soda and Pizza n = 559 Mean	Sweets n = 1295 Mean	High-Fat Dairy n = 348 Mean	Non-Carbonated Sugar- Sweetened Drinks n = 395 Mean
SNAP Participation Status				
SNAP participant	24.7 <sup>a</sup>	35.7	40.6	30.1
Income-eligible nonparticipant	41.7	37.5	35.5	44.8
Other low-income nonparticipant	33.6 <sup>a</sup>	26.8	23.9	25.1
Household Participates in WIC	15.7 <sup>b,c</sup>	31.1	26.6	22.3
Sex				
Male	52.9	44.9 <sup>d</sup>	60.6	54.1
Female	47.1	55.1 <sup>d</sup>	39.4	45.9
Age				
2-5	5.1 <sup>a,b</sup>	29.8	35.3	27.0
6-11	34.3 <sup>a</sup>	39.9	39.7	28.8
12-18	60.6 <sup>a,b</sup>	30.4 <sup>e</sup>	25.0 <sup>f</sup>	44.3
Race/Ethnicity				
Non-Hispanic, White	55.4 <sup>a</sup>	42.2 <sup>d</sup>	60.2	49.1
Non-Hispanic, Black	12.9 <sup>a,c</sup>	29.2 <sup>d</sup>	14.8 <sup>f</sup>	26.6
Hispanic	21.9	21.9	19.7	16.3
Other	9.8	6.7	5.3	8.0
US-Born	94.6	94.0	96.6	97.0
Household Size				
1	2.1	0.1	0.0	0.3
2	6.2	6.1	5.3	5.7
3	22.2	16.5	17.9	16.6
4	26.3	26.8	32.7	27.9
5+	43.3	50.5	44.1	49.5
Gender of HH Ref Person*				
Male	44.2	41.5	38.2	33.8
Female	55.8	58.5	61.8	66.2
Age of HH Ref Person*				
19-30	11.5 <sup>a,b</sup>	31	37.1	35.9
31-40	48.9	38.3	42.9	38.8
41-50	24.6 <sup>b</sup>	20.7 <sup>d</sup>	13.3	14.5
51-60	9.8	6.4	3.7	5.8
>60	5.2	3.6	2.9	5.0
HH Ref Person US-Born*	82.7	82.1	83.2	85.8
HH Ref Person Married*	46.5	46.4	46.8	48.6
Education Level of HH Ref Person*				
Less than high school	35.4	40.8	39.9	40.5
High-school/GED	30.2	28.6	34.2	32.9
More than HS	34.4	30.6	25.9	26.6
Household Food Security Level				
Full food security	55.4	56.1	57.0	50.9
Marginal food security	13.9	15.3	13.3	10.5
Low food security	22.1	18.3	14.6	20.5
Very low food security	8.6	10.3	15.1	18.1
Child Food Security Level				
Full food security	70.8	71.3	67.8	62.7
Marginal food security	6.8 <sup>b</sup>	11.3	16.7	10.7
Low food security	20.0	14.7	12.3	21.1
Very low food security	2.4	2.6	3.3	5.6
Home is Owned	46.3	43.1	41.6	41.7
Someone in Household smokes	43.0	33.9	43.5	44.2
Obese	18.7	16.9	18.1	16.5
Overweight or Obese	33.3 <sup>a</sup>	30.5	33.5	35.4
Has Health Insurance	84.3 <sup>a</sup>	81.5	84.6	80.8
Health Condition Good or Better	89.4	93.0	93.9	94.9
Doctor said Overweight	7.4	8.8	9.4	13.0
Taken Prescriptions in Past Month	25.3	21.0	21.9	25.9
Screen Time at Least 2 Hrs/Day	58.9	65.3	64.2	62.2

\*The household reference (HH Ref) person is defined as the first household member 18 years of age or older listed on the NHANES screener household member roster who owns or rents the residence where members of the household reside.

<sup>a</sup> Difference between Cluster 1 and Cluster 2 is statistically significant at the  $p < .05$  level.

<sup>b</sup> Difference between Cluster 1 and Cluster 3 is statistically significant at the  $p < .05$  level.

<sup>c</sup> Difference between Cluster 1 and Cluster 4 is statistically significant at the  $p < .05$  level.

<sup>d</sup> Difference between Cluster 2 and Cluster 3 is statistically significant at the  $p < .05$  level.

<sup>e</sup> Difference between Cluster 2 and Cluster 4 is statistically significant at the  $p < .05$  level.

<sup>f</sup> Difference between Cluster 3 and Cluster 4 is statistically significant at the  $p < .05$  level.

## The Sweets Pattern

Compared to other less-healthy eaters, children in the Sweets pattern had substantially higher mean intakes of sweetened milks, sweet breakfast foods, and 100% fruit juice (Table II.22). They also had notably higher mean intakes than other child less-healthy eaters of unsweetened low-fat, reduced fat, and nonfat milks, and mixed dishes with fish and shellfish. They had notably lower mean intakes of fried potatoes and non-diet soda.

Children in the Sweets pattern consumed less calories, on average, than child less-healthy eaters in the other patterns (Table IV.23). They also had the lowest intakes among child less-healthy eaters of sodium, folate, and carbohydrate (in grams). They had the second highest percentage of energy from saturated fat. In terms of MyPyramid food group intakes, child less-healthy eaters in the Sweets pattern had the lowest mean intakes of total vegetables and discretionary oil (Table IV.24).

Based on HEI-2005 scores, the Sweets pattern was the second least unhealthy of the four main patterns identified for child less-healthy eaters. Children in the Sweets pattern had a mean HEI-2005 score of 39.8, compared to 37.3, 38.1, and 40.1 for the other three patterns (Table IV.25). They had the highest mean scores among child less-healthy eaters for the total fruit, whole fruit, total grains, and meat and beans components of the HEI-2005 and tied for the highest mean score for the dark green and orange vegetables and legumes component. They had the lowest mean scores among child less-healthy eaters for the total vegetables and sodium components.

**Who followed the Sweets pattern?** Compared to other child less-healthy eaters, those in the Sweets pattern were the most likely to be female (55 percent) and black (29 percent) (Table IV.26). They were divided relatively evenly between the three age groups—ages 2 to 5 (30 percent), ages 6 to 11 (40 percent), and ages 12 to 18 (30 percent). About half of them lived in large households (five or more household members) (51 percent). In addition, the Sweets pattern had the second highest rate of SNAP participation (36 percent) among child less-healthy eaters and the highest rate of WIC participation (measured at the household level) (31 percent).

### **The High-Fat Dairy Pattern**

Compared to other less-healthy eaters, children in the High-Fat Dairy pattern had substantially higher mean intakes of unsweetened high-fat milk, dairy desserts and beverages, cereals, and vegetables other than fried potatoes (Table IV.22). They also had notably higher mean intakes than other child less-healthy eaters of mixed dishes that included meat or poultry; beans, nuts, and seeds; and whole grains other than rice, pasta, and similar products. They had notably lower mean intakes of low-fat, reduced fat and nonfat milks and of Mexican dishes.

On average, children in the High-Fat Dairy pattern had the second lowest intake of calories, relative to child less-healthy eaters in the other patterns (Table II.23). Compared to other child less-healthy eaters, they had the highest intakes of fat (in grams) and of saturated fat and protein (in grams and as percentage of total energy) and the highest intakes of calcium, folate, and cholesterol. They had the lowest percentage among child less-healthy eaters of energy from carbohydrate. In terms of MyPyramid food group intakes, child less-healthy eaters in the High-Fat Dairy pattern had the highest mean intakes of milk and discretionary solid fat (Table IV.24). They had the lowest mean intake of meat, poultry, and fish.

Based on HEI-2005 scores, the High-Fat Dairy pattern was the least unhealthy of the four main patterns identified for child less-healthy eaters. Children in the High-Fat dairy pattern had a mean HEI-2005 score of 40.1, the highest of the four patterns (Table IV.25). They had the highest mean scores among child less-healthy eaters for the whole grains, milk, and calories from SoFAAS components of the HEI-2005 and tied for the highest mean score for the dark green and orange vegetables and legumes. At the same time, they had the lowest mean scores among child less-healthy eaters for the meat and beans, healthy oils, and saturated fat components.

**Who followed the High-Fat Dairy pattern?** Compared to other child less-healthy eaters, those in the High-Fat Dairy pattern were most likely to be male (61 percent), ages 2 to 5 (35 percent) and non-Hispanic white (61 percent) (Table IV.26). In addition, the High-Fat Dairy pattern had the



highest rate of SNAP participation (41 percent) and the second highest rate of WIC participation (measured at the household level) (27 percent) among child less-healthy eaters.

### **The Non-Carbonated Sugar-Sweetened Drinks Pattern**

Compared to other less-healthy eaters, children in the Non-Carbonated Sugar-Sweetened Drinks pattern had substantially higher mean intakes of non-carbonated sugar-sweetened drinks, miscellaneous sugary foods, soups, and butter, margarine, and other added fats (Table II.22). They also had a notably higher mean intake than children in all other less-healthy patterns but the Alcohol and Burgers of Mexican dishes. They had notably lower mean intakes than other child less-healthy eaters of rice, pasta, and similar grain products; 100% fruit juice; and diet drinks.

On average, child less-healthy eaters in the Non-Carbonated Sugar-Sweetened Drinks pattern had the second highest intake of calories, relative to the other less-healthy patterns; they were virtually tied with the Soda and Pizza pattern, however (Table IV.23). They had the highest intake among child less-healthy eaters of carbohydrate and the second lowest percentage of energy from saturated fat (above the 10 percent threshold recommended in the *Dietary Guidelines*, however). In terms of MyPyramid food group intakes, child less-healthy eaters in the Non-Carbonated Sugar-Sweetened Drinks Pattern had the second highest intakes of meat, poultry, and fish; discretionary oil; and added sugars (Table IV.24).

Based on HEI-2005 scores, the Non-Carbonated Sugar-Sweetened Drinks pattern was the second least healthy of the four main patterns identified for child less-healthy eaters. Children in the Non-Carbonated Sugar-Sweetened Drinks pattern had a mean HEI-2005 score of 38.1, compared to 37.3, 39.8, and 40.1 for the other three patterns (Table IV.25). They had the lowest mean score among child less-healthy eaters for the dark green and orange vegetables and legumes component of the HEI-2005 and the second lowest mean scores for the milk and calories from SoFAAS components.

**Who followed the Non-Carbonated Sugar-Sweetened Drinks Pattern?** Compared to other dietary patterns identified for child less-healthy eaters, the Non-Carbonated Sugar-Sweetened Drinks pattern had the second highest proportion of children ages 12 to 18 (44 percent) and the second highest proportion of blacks (27 percent) (Table IV.26). Fifty percent of the children in the Non-Carbonated Sugar-Sweetened Drinks pattern lived in large households (five or more household members), 30 percent of them participated in SNAP, and 22 percent participated in WIC (measured at the household level). In addition, the Non-Carbonated Sugar-Sweetened Drinks pattern had the highest rates of low or very low food security, as measured at both the household (39 percent) and child (27 percent) levels, relative to the other patterns identified for child less-healthy eaters.

#### **The Alcohol and Burgers Pattern<sup>51</sup>**

Compared to other less-healthy eaters, children in the Alcohol and Burgers pattern had substantially higher mean intakes of alcoholic drinks, diet drinks, poultry (not fried), hamburgers and cheeseburgers, Mexican dishes, eggs and egg dishes, non-whole grain bread, and fried potatoes (Table IV.22). They had notably lower (and often zero) mean intakes of a large number of foods including, for example, dairy desserts and beverages, fish and shellfish, mixed dishes of any kind, cereal, and vegetables other than fried potatoes.

### **3. Summary for Child Healthy and Less-Healthy Eaters**

The main goal of the cluster analysis was to determine whether we could identify meaningful patterns among low-income children who consume “healthy” or “less-healthy” diets. Given that we defined “healthy” and “less-healthy” diets based on the HEI-2005, dietary patterns in each group will, by definition, have similarities with regard to overall composition and food-group intakes.

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<sup>51</sup> Because of its small sample size (n=12) the Alcohol and Burgers pattern was not included in the additional analyses that examined differences across clusters in nutrient intake, MyPyramid food groups and subgroups, HEI-2005 scores, and sociodemographic characteristics. All 12 individuals included in the Alcohol and Burgers pattern were ages 16 to 18.

However, because “points” that contribute to HEI-2005 scores can be accumulated in different ways, there is likely more than one meaningful variant of “healthy” and “less-healthy” dietary patterns.

Tables IV.27 and IV.28 show the main dietary patterns identified for child healthy eaters (Sweet Milk, Dairy Desserts, Soda, High-Fat Milk, 100% Fruit Juice, and Low-Fat Milk) and less-healthy eaters (Soda and Pizza, Sweets, High-Fat Dairy, Non-Carbonated Sugar-Sweetened Drinks, and Alcohol and Burgers), along with mean HEI-2005 scores and key sociodemographic characteristics for the children included in each pattern.<sup>52</sup>

These dietary patterns share some similarities with those identified in other studies of children in the U.S. and elsewhere. For example, Ritchie et al. (2007) identified dietary patterns for black and white girls ages 9 to 10 in the National Heart, Lung, and Blood Institute’s (NHLBI’s) Growth and Health Study cohort. They found four patterns among white girls (Convenience, Sweets and Snack-Type Foods, Fast Food, and Healthy) and four among black girls (Customary, Snack-Type Foods, Meal-Type Foods, and Sweets and Cheese). Although the sample of children in our analysis is considerably more heterogeneous with regard to age, sex, and race/ethnicity, several of the patterns we identified are similar to the patterns identified by Ritchie et al (2007).

Likewise, LaRowe et al. (2007) used cluster analysis to identify a meaningful set of beverage patterns among U.S. children, including a High-Fat Milk pattern and a 100% Fruit Juice pattern, similar to those identified in this analysis. The dietary patterns revealed in our analysis also share similarities, as well as some differences, with those reported by Knol et al. (2005), whose analysis also focused on low-income children. Knol et al. used data from the Continuing Survey of Food

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<sup>52</sup> Two of the patterns identified for child healthy eaters (the Soda and Low-Fat Milk patterns) and one pattern identified for child less-healthy eaters (Alcohol and Burgers) do not appear in the summary tables because they were excluded, due to their small size, from the analysis of differences across patterns in nutrient intake, MyPyramid food groups and subgroups, HEI-2005 scores, and sociodemographic characteristics.

Table IV.27 Summary of Key Differences in the Four Main Dietary Patterns Identified for Child Healthy Eaters<sup>a</sup>

	Sweet Milk n = 50	Dairy Desserts n = 41	High-Fat Milk n = 25	100% Fruit Juice n = 27
Percent of Child Healthy Eaters <sup>b</sup>	25	24	16	22
Defining Food Groups				
Relative to other child healthy eaters, children in this pattern had higher mean intakes of:				
	Sweetened, high-fat milk	High-fat dairy desserts and beverages	Unsweetened high-fat milk	100% fruit juice
	Sugar-sweetened drinks	Fried potatoes	Refined grains (white bread and non-whole grain rice and pasta)	Soy milk and soy products
	Diet soda	Fresh fruit other than citrus, melons, and berries	Canned or frozen fruit	
	Beans, nuts, and seeds		Coffee or tea	
Calories	1,554	1,466	1,885	1,687
HEI-2005 Score (Max Score = 100)	75.1	75.5	72.6	77.1
HEI-2005 Component Scores				
Highest and lowest scores (as percent of maximum scores)				
Total Fruit	90			100
Whole Fruit	88	88	96	
Total Vegetables	74		50	
Dark Green and Orange Vegetables and Legumes	54	30	30	
Total Grains			96	76
Whole Grains	20	34	20	
Milk	56		91	
Meat and Beans	91		82	
Oils	81			43
Saturated Fat		76		95
Sodium			37	73
Calories from SoFAAS	90			97
Who Followed This Pattern?				
Percent SNAP participants	20.9	39.8	62.1	51.9
Percent household participates in WIC	24.1	57.5	25.1	22.4
Percent female	54.7	69.9	23.1	38.1
Percent 2-5 years	34.9	68.5	20.3	34.6
Percent 12-18 years	31.4	5.8	8.0	26.4
Percent non-Hispanic White	49.2	36.2	60.3	72.4
Percent US-born household reference person <sup>c</sup>	56.6	27.2	77.5	86.9
Percent low or very low food security (household)	22.3	58.8	73.7	48.4
Percent obese	15.2	18.9	5.9	47.8

<sup>a</sup> Two of the patterns identified for child healthy eaters (the Soda and Low-Fat Milk patterns) are not included in the summary table because they were excluded, due to their small size, from the analyses that examined differences across clusters in nutrient intake, MyPyramid food groups and subgroups, HEI-2005 scores, and sociodemographic characteristics.

<sup>b</sup> Prevalence rates for clusters are weighted using the six-year weights for dietary recall data in NHANES 1999-2004.

<sup>c</sup> The household reference person is defined as the first household member 18 years of age or older listed on the NHANES screener household member roster who owns or rents the residence where members of the household reside.

Table IV.28 Summary of Key Differences in the Four Main Dietary Patterns Identified for Child Less-Healthy Eaters<sup>a</sup>

	Soda and Pizza n = 559	Sweets n = 1295	High-Fat Dairy n = 348	Non-Carbonated Sugar-Sweetened Drinks n = 395
Percent of Child Less-Healthy Eaters <sup>b</sup>	23	46	17	14
Defining Food Groups				
Relative to other child less-healthy eaters, children in this pattern had higher mean intakes of:				
	Non-diet soda	Sweetened milks	High-fat, unsweetened milk	Sugar-sweetened drinks
	Pizza	Sweet breakfast foods	High-fat dairy desserts and beverages	Miscellaneous sugary foods
	Salty snacks	100% fruit juice	Cereals than fried potatoes	Eggs and egg dishes
Calories	2,042	1,668	2,003	2,038
HEI-2005 Score (Max Score = 100)	37.3	39.5	40.1	38.1
HEI-2005 Component Scores				
Highest and lowest scores (as percent of maximum scores)				
Total Fruit	18	38		
Whole Fruit	10	20		
Total Vegetables		38	40	40
Dark Green and Orange Vegetables and Legumes		8	8	4
Total Grains	84	92	84	
Whole Grains	8		14	
Milk	55		98	
Meat and Beans		66	53	
Oils	45		34	
Saturated Fat	55		18	
Sodium	54	36		
Calories from SoFAAS	10		29	
Who Followed This Pattern?				
Percent SNAP participants	24.7	35.7	40.6	30.1
Percent households participating in WIC	15.7	31.1	26.6	22.3
Percent female	47.1	55.1	39.4	45.9
Percent 2-5 years	5.1	29.8	35.3	27.0
Percent 12-18 years	60.6	30.4	25.0	44.3
Percent non-Hispanic White	55.4	42.2	60.2	49.1
Percent US-born household reference person <sup>c</sup>	82.7	82.1	83.2	85.8
Percent Low or very low food security (household)	30.7	28.6	29.7	38.6
Percent obese	18.7	16.9	18.1	16.5

<sup>a</sup> One of the patterns identified for child less-healthy eaters (Alcohol and Burgers) is not included in the summary table because it was excluded, due to its small size, from the analyses that examined differences across clusters in nutrient intake, MyPyramid food groups and subgroups, HEI-2005 scores, and sociodemographic characteristics.

<sup>b</sup> Prevalence rates for clusters are weighted using the six-year weights for dietary recall data in NHANES 1999-2004.

<sup>c</sup> The household reference person is defined as the first household member 18 years of age or older listed on the NHANES screener household member roster who owns or rents the residence where members of the household reside.

Intakes by Individuals (CSFII) 1994–1996, 1998 to assess dietary patterns in two subsamples of low-income children ages 2 to 3 and ages 4 to 8. Despite differences in food-classification schemes and the food subgroups used as input variables, both our analysis and the Knol et al. analysis revealed that children had relatively high intakes of added sugar. Knol et al. reported added sugar intakes that ranged from 11 to 16 teaspoons per day among younger children and 12 to 26 teaspoons per day among older children. Our results show mean intakes of 18 to 35 teaspoons per day among less-healthy eaters and 6 to 10 teaspoons per day among healthy eaters. Our sample includes older children (through age 18), so we would expect our estimates of maximum added-sugar intakes to be higher.

Indeed, we found that many of the calories consumed by child less-healthy eaters came from added sugars, ranging from about 18 teaspoons per day for the Sweets and High-Fat Dairy patterns to about 35 teaspoons per day for the Soda and Pizza and Non-Carbonated Sugar-Sweetened Drinks patterns. Notably, less-healthy eaters in these last two patterns (in which SSBs figure prominently) consumed almost twice as much added sugar as less-healthy eaters in the Sweets pattern, even though that pattern was relatively higher in sweet breakfast foods and sweetened milk. These results show that added sugars in general and SSBs in particular contribute significantly to sugar intake in children. This is consistent with findings from other recent research (for example, Reedy et al. 2010 and Popkin 2010).

The differences in HEI-2005 component scores across the four main dietary patterns for child healthy eaters (Table IV.27) illustrate how higher and lower scores on the various HEI-2005 components can be combined to attain similar total scores. For example, children in the “most healthy” 100% Fruit Juice pattern (based on a total HEI-2005 score of 77.1) had the highest (and healthiest) mean score for the total fruit, saturated fat, sodium, and calories from SoFAAS components of the HEI-2005. However, this group also had the lowest (and least-healthy) mean score for the total grains and oils components. Children in the “least healthy” High-Fat Milk pattern

(total HEI-2005 score of 72.1) had the highest mean score for three components (whole fruit, total grains, and milk), the lowest mean score for three components (total vegetables, meat and beans, and sodium), and tied for the lowest mean score for two components (dark green and orange vegetables and legumes and whole grains). Not counting tied scores, child healthy eaters in the two other patterns (Sweet Milk and Dairy Desserts) had the highest scores for five components and the lowest scores for four components. As seen with the diets of adult healthy eaters, these results show that a healthful diet, as defined by the HEI-2005, can include foods high in sugar, fat, or saturated fat—as long as these foods are consumed moderately alongside high intakes of fruits, vegetables, whole grains, lean meats, poultry and fish, and low-fat/nonfat dairy foods.

### **Key Differences Between Healthy and Less-Healthy Dietary Patterns**

In comparing healthy and less-healthy eaters, we found several dietary differences:

- Healthy eaters consumed fewer calories, on average, than less-healthy eaters.
- Although dietary patterns for healthy eaters were differentiated by some “unhealthy” foods, such foods were generally more frequent differentiators in the dietary patterns of less-healthy eaters.
- For most components of the HEI-2005, differences between child healthy eaters and less-healthy eaters were dramatic. For example, among healthy eaters, scores for the food-based components other than total grains and milk ranged from 20 to 100 percent of the maximum possible score. In contrast, among less-healthy eaters, scores for these components ranged from 4 to 55 percent. Differences for the SoFAAS component were among the most dramatic—with a range of 90 to 97 percent for healthy eaters and 10 to 29 percent for less-healthy eaters. These results illustrate that many of the calories consumed by child less-healthy eaters came from discretionary solid fat and added sugars, rather than from recommended foods in their lowest-fat and lowest-sugar forms.

### **Variation in Sociodemographic Characteristics Across Dietary Patterns**

Among child healthy eaters, SNAP participants made up a larger share (62 percent) of the High-Fat Milk pattern than any of the other three patterns. The Sweet Milk pattern had the lowest proportion of SNAP participants (21 percent). Among less-healthy eaters, SNAP participants accounted for a third or more of the Sweets, High-Fat Dairy, and Non-Carbonated Sugar-Sweetened Drinks patterns. The Soda and Pizza pattern had the lowest proportion of SNAP participants (25

percent), perhaps in part because SNAP benefits cannot be used to purchase food at restaurants, including fast-food outlets where burgers and pizza are commonly served. The percentage of child healthy eaters who lived in households with low or very low food security was highest in the High-Fat Milk pattern (64 percent) which, as mentioned above, also had the highest proportion of SNAP participants. The percentage of child healthy eaters with full food security was highest in the Sweet Milk pattern (79 percent), which also had the lowest prevalence of both SNAP participants and income-eligible nonparticipants.

Among child healthy eaters, the two dairy-based patterns were dominated by younger children: 69 percent of children in the Dairy Desserts pattern were ages 2 to 5, and 26 percent were ages 6 to 11; 20 percent of children in the High-Fat Milk pattern were ages 2 to 5, and 72 percent were ages 6 to 11. With its high percentage of children ages 2 to 5, it is not surprising that the Dairy Desserts pattern also has the highest percentage of children in WIC-participating households (58 percent, compared to 22–25 percent across the other three patterns). Notably, the Dairy Desserts pattern also has the highest percentage of Hispanic children (47 percent) and the lowest percentage of children whose household reference person is US-born (27 percent). Furthermore, 69 percent of children in the Dairy Desserts pattern were living in large households with five or more members, and 59 percent of the children were from households with low or very low food security. Together, these results suggest that the Dairy Desserts pattern is dominated by second-generation immigrants whose families moved to the U.S. and still live in large, traditional households.

In terms of sociodemographic characteristics, we saw more differences across dietary patterns among child healthy eaters than among less-healthy eaters. Males and females were roughly evenly divided in most patterns, with the highest percentage of males in the High-Fat Dairy pattern (60 percent). Adolescents ages 12 to 18 predominated in the Soda and Pizza pattern (61 percent), which included only a small percentage of children ages 2 to 5 (5 percent). In contrast, children ages 2 to 5 and 6 to 11 comprised the majority of the High-Fat Dairy pattern (75 percent combined).



These differences in age distribution across patterns may explain why the Soda and Pizza pattern has the lowest percentage of individuals from WIC-participating households (16 percent), as it includes fewer children young enough to be eligible for WIC. Children in the High-Fat Dairy Pattern also consumed more cereals and cooked vegetables, consistent perhaps with the diets of younger children.

Our findings regarding differences in age composition across dietary patterns appear consistent with the observed differences in dietary and eating behaviors that occur during growth and development. For example, young children are more likely than older children and adolescents to consume diets high in dairy foods and milk. As children age, they consume less milk and more soda and sweetened beverages (Demory-Luce et al. 2004). Likewise, as adolescents develop greater autonomy and begin making some independent food choices, they are more likely to buy fast food such as pizza, burgers, and fries. Notably, the Soda and Pizza and the Non-Carbonated Sugar-Sweetened Beverages patterns had the highest percentages of children ages 12 to 18, for both healthy and less-healthy eaters. The percentage of non-Hispanic blacks in the latter pattern was 27 percent—more than double that in the Soda and Pizza pattern (13 percent). This difference might reflect the fact that there are many choices of sugar-sweetened beverages, and adolescents of different races/ethnicities may prefer different beverages due to sociocultural factors. It is important to note, however, that all sugar-sweetened beverages contribute sugar and energy to the diet, regardless of source.

### **Variation in the Prevalence of Obesity Across Dietary Patterns**

Given the amount of attention being paid to the problem of childhood obesity, we wanted to assess whether certain dietary patterns were associated with a higher or lower prevalence of obesity. Among child healthy eaters, we found a notable level of variation across dietary patterns. Children in the 100% Fruit Juice pattern had the highest prevalence of obesity (48 percent), while those in the High-Fat Milk pattern had the lowest prevalence (6 percent). There was less variation in the

prevalence of obesity across patterns among child less-healthy eaters, ranging from 17 percent for the Non-Carbonated Sugar-Sweetened Drinks pattern to 19 percent for the Dairy Desserts pattern. None of these differences were statistically significant for either healthy or less-healthy eaters.<sup>53</sup>

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<sup>53</sup> However, as noted in Chapter II and in the section on study limitations, our ability to detect differences in the prevalence of obesity was potentially limited by small sample sizes and the use of a single 24-hour recall.

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## V. CONCLUSIONS

This report presents two types of information about healthy eaters and less-healthy eaters in the low-income population: (1) descriptive information about the sociodemographic and dietary characteristics of individuals in each group and (2) a description of distinct dietary patterns followed by individuals in each group, as identified through a cluster analysis of their dietary intake. We defined low-income individuals as those from households with income below 200 percent of the federal poverty level. We defined healthy eaters and less-healthy eaters based on scores on the HEI-2005. Individuals with HEI-2005 scores of 70 (the 90th percentile in the general population) or greater were defined as healthy eaters and individuals with scores below 49 (the population median) were defined as less-healthy eaters.

Separate analyses were conducted for healthy eaters and less-healthy eaters in two age groups: adult (age 19 and above) and children (age 2-18). In addition, the descriptive analysis of sociodemographic and dietary characteristics includes separate tabulations for the low-income population overall and for subgroups of SNAP participants and two groups of nonparticipants—individuals that were income-eligible for SNAP but were not participating (income-eligible nonparticipants), and other low-income nonparticipants.<sup>54</sup>

The first line of analysis addresses the following two research questions:

- Within the SNAP and low-income populations, what household and personal characteristics are associated with high diet quality, as reflected in a high overall score on the HEI-2005?
- Are there specific dietary characteristics that are associated with high diet quality?

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<sup>54</sup> Sample sizes of the SNAP participant and nonparticipant subgroups were too small to support separate cluster analysis. However, secondary analysis of the cluster analysis results does examine how SNAP participants and nonparticipants are represented in the dietary patterns identified for each of the major analysis groups (adult healthy eaters, adult less-healthy eaters, child healthy eaters, and child less-healthy eaters).

The second line of analysis addresses the following three research questions:

- What are the predominant dietary patterns of low-income healthy eaters (children and adults), and how do they compare to the dietary patterns of less-healthy eaters?
- How do dietary intakes and overall diet quality differ across healthy and less-healthy dietary patterns?
- How do sociodemographic characteristics (including SNAP participation, WIC participation, and food security status) of low-income individuals differ across the different healthy and less-healthy dietary patterns?

This chapter presents key findings from the two lines of analysis and discusses potential implications for nutrition education for low-income populations. In addition to SNAP, the low-income populations examined in this report may receive nutrition education through WIC (pregnant women and mothers/caregivers of infants and children ages 0 to 5), or through the school-based nutrition programs. The chapter ends with a discussion of study limitations.

#### A. Sociodemographic Characteristics of Healthy and Less-Healthy Eaters

Table V.1 summarizes the key differences observed in the sociodemographic characteristics of adult healthy and less-healthy eaters in the low-income population. Among adults, healthy eaters were more likely than less-healthy eaters to be female, older than 60, foreign-born, not working, living in a one-person household, and to have high blood pressure, have high cholesterol, and have diabetes. Adult less-healthy eaters, on the other hand, were more likely to be male, ages 19 to 40, black, working at least 20 hours per week, and to have very low household food security, and have more than 2 hours of screen time per day. We did not find a difference between adult healthy eaters and less-healthy eaters in the proportion who were obese. Most of the differences observed in the sociodemographic characteristics of adult healthy eaters and less-healthy eaters overall were also observed in subgroups of SNAP participants, income-eligible nonparticipants, and other low-income nonparticipants.

Table V.1. Summary of Key Differences in Sociodemographic Characteristics of Adult Healthy and Less-Healthy Eaters.

Healthy eaters (HEI $\geq$ 70) were more likely to:	Less-healthy eaters (HEI<49) were more likely to:
<ul style="list-style-type: none"> <li>• Be female</li> <li>• Be older than 60</li> <li>• Be foreign-born</li> <li>• Not be working</li> <li>• Live in a one-person household</li> <li>• Have high blood pressure</li> <li>• Have High cholesterol</li> <li>• Have diabetes</li> </ul>	<ul style="list-style-type: none"> <li>• Be male</li> <li>• Be age 19 to 40</li> <li>• Be black</li> <li>• Work at least 20 hours per week</li> <li>• Have very low household food security</li> <li>• Smoke</li> <li>• Have more than 2 hrs of screen time a day</li> </ul>

HEI = Score on Healthy Eating Index-2005

Table V.2 summarizes key differences in the sociodemographic characteristics of child healthy and less-healthy eaters in the low-income population. Among children, healthy eaters were more likely than less-healthy eaters to be ages 2 to 5, have a foreign-born household reference person, and have a married household reference person; less-healthy eaters were more likely to be ages 12 to 18, be black, and to have very low child food security. As with adults, we did not find an overall difference between child healthy and less-healthy eaters in the proportion who were obese; in fact, among income-eligible nonparticipants, healthy eaters were more likely than less-healthy eaters to be obese. Few additional differences between child healthy eaters and child less-healthy eaters were found across SNAP participants, income-eligible nonparticipants, and other low-income nonparticipants.

Table V.2. Summary of Key Differences in Sociodemographic Characteristics of Child Healthy and Less-Healthy Eaters.

Healthy eaters (HEI $\geq$ 70) were more likely to:	Less-healthy eaters (HEI<49) were more likely to:
<ul style="list-style-type: none"> <li>• Be age 2 to 5</li> <li>• Have a foreign-born HH reference person<sup>a</sup></li> <li>• Have a married HH reference person<sup>a</sup></li> </ul>	<ul style="list-style-type: none"> <li>• Be age 12 to 18</li> <li>• Be black</li> <li>• Have very low child food security</li> </ul>

<sup>a</sup> The household (HH) reference person is defined as the first household member 18 years of age or older listed on the NHANES screener household member roster who owns or rents the residence where members of the household reside.

HEI = Score on Healthy Eating Index-2005

There were some notable similarities in findings from the separate analyses completed for adults and children. For example:

- Being foreign-born was associated with being a healthy eater among adults, while having a foreign-born household reference person was associated with being a healthy eater among children. This is consistent with research that shows that individuals in immigrant households who consume culturally traditional diets rather than Westernized diets tend to have healthier diets overall (Ayala et al. 2008; Montez and Eschbach 2008).
- Being black was associated with being a less-healthy eater among both adults and children. This could reflect differences in food preferences, nutrition knowledge, and access to healthful foods among blacks, relative to other racial/ethnic groups.
- Having very low household food security was associated with being a less-healthy eater among adults, while having very low child food security was associated with being a less-healthy eater among children. The fact that very low household food security was not associated with being a less-healthy eater among children suggests that adults in households with very low food security may give priority to their children's diets.

We used multivariate analysis to further explore several findings from the descriptive analysis that were counterintuitive. This included, for both adults and children (overall), the lack of an association between being a healthy eater and the likelihood of being obese and, for adults, the positive association between being a healthy eater and having a chronic health condition. After accounting for possible confounders such as age, sex and race/ethnicity, we found that, among adults, having diabetes was still positively associated with being a healthy eater, while having high blood pressure or cholesterol were not. The multivariate analyses did not detect any association between being a healthy eater and the likelihood of being obese, either for adults or for children.

### **Key Implications for Nutrition Education**

- Based on findings from this analysis, nutrition education efforts focusing on low-income populations should target individuals with one or more of the following characteristics: male, US-born adult, teenager or young adult, black, and very low household or individual food security.
- Adults with known health conditions, particularly diabetes, may be more likely than other adults to improve their eating habits as a way of managing their disease. Thus, individuals who have a disease diagnosis comprise another meaningful subgroup for nutrition education—they may be particularly motivated to change dietary behaviors.
- Our results regarding healthy eating and obesity should not be over-interpreted, given the descriptive nature of our study and several data limitations. Reviews by Newby and Tucker (2004) and Togo et al. (2001) have also shown inconsistent findings between

dietary patterns and weight status. However, a number of more recent reports have found such association in both adults (e.g., Newby et al. 2003; Schulze et al. 2006) and children (e.g., Larowe et al. 2007; Ritchie et al. 2007).

## B. Dietary Characteristics of Healthy Eaters and Less-Healthy Eaters

Key dietary characteristics that distinguish adult healthy and less-healthy eaters in the low-income population are presented in Table V.3. Among adults, healthy eaters were more likely than less-healthy eaters to eat breakfast; eat three meals daily; use dietary supplements; consume milk of any type; consume fruit, fresh fruit, and fruit juice; consume vegetables and whole grains; consume nuts and seeds; have higher mean scores on all HEI-2005 components; obtain smaller shares of their total daily calories from foods suggested for occasional consumption; and consume diets with high levels of nutrient density. Adult less-healthy eaters were more likely to eat in restaurants three or more times per week; consume alcoholic beverages three or more times per week; consume sugar-sweetened beverages; obtain larger shares of calories from snacks, mixed dishes, added sugars, and discretionary solid fats; and consume diets that had high levels of energy density. Most of these differences were consistent for SNAP participants and the two groups of nonparticipants included in the analysis.

Table V.3. Summary of Key Differences in Dietary Characteristics of Adult Healthy and Less-Healthy Eaters.

Healthy eaters (HEI $\geq$ 70) were more likely to:	Less-healthy eaters (HEI<49) were more likely to:
<ul style="list-style-type: none"> <li>• Eat breakfast</li> <li>• Eat three meals daily</li> <li>• Use dietary supplements</li> <li>• Consume milk of any type</li> <li>• Consume fruit, fresh fruit, and fruit juice</li> <li>• Consume vegetables and whole grains</li> <li>• Consume nuts and seeds</li> <li>• Have higher mean scores on all HEI -2005 components</li> <li>• Obtain smaller shares of their total daily calories from foods suggested for occasional consumption</li> <li>• Consume diets high in nutrient density</li> </ul>	<ul style="list-style-type: none"> <li>• Eat in a restaurant 3+ times per week</li> <li>• Consume alcoholic beverages 3+ times per week</li> <li>• Consume sweetened beverages of any type</li> <li>• Obtain larger shares of calories from: snacks, mixed dishes, added sugars, and discretionary solid fats</li> <li>• Consume diets high in energy density</li> </ul>

HEI = Score on Healthy Eating Index-2005



Key differences in the dietary characteristics of child healthy and less-healthy eaters in the low-income population are presented in Table V.4. Findings for children were, for the most part, consistent with those reported for adults. More often than in adults, however, no statistically significant differences were found between healthy eaters and less-healthy eaters among SNAP participants, even though differences between healthy eaters and less-healthy eaters were noted for one or both groups of SNAP nonparticipants.

Table V.4. Summary of Key Differences in Dietary Characteristics of Child Healthy and Less-Healthy Eaters.

Healthy eaters (HEI $\geq$ 70) were more likely to:	Less-healthy eaters (HEI<49) were more likely to:
<ul style="list-style-type: none"> <li>• Eat breakfast</li> <li>• Eat three meals daily</li> <li>• Consume milk of any type</li> <li>• Consume fruit, fresh fruit, and fruit juice</li> <li>• Consume vegetables and whole grains</li> <li>• Have higher mean scores on all HEI-2005 components except total grains</li> <li>• Obtain smaller shares of their total daily calories from foods suggested for occasional consumption</li> <li>• Consume high nutrient density diets</li> </ul>	<ul style="list-style-type: none"> <li>• Eat in a restaurant 1+ times per week</li> <li>• Consume sweetened beverages of any type</li> <li>• Obtain larger shares of calories from: snacks, mixed dishes, added sugars, and discretionary solid fats</li> <li>• Consume high energy density diets</li> </ul>

HEI = Score on Healthy Eating Index-2005

### Key Implications for Nutrition Education

Not surprisingly, given that healthy eaters were defined based on HEI-2005 scores, the analysis found that increased consumption of foods encouraged in the 2005 *Dietary Guidelines* (fruits, vegetables, and whole grains, for example) and decreased consumption of foods that contribute to calories from solid fat, alcoholic beverages, and added sugar (sugar-sweetened beverages, for example) were associated with being a healthy eater. Thus, encouraging consumption of recommended foods and avoidance or moderation of foods that contribute substantial amounts of calories from discretionary solid fat, alcohol, or added sugars is a solid foundation for nutrition education efforts. In addition, results of our analysis suggest that nutrition educators working with

low-income populations may wish to promote specific dietary behaviors, in addition to encouraging food choices that are consistent with the *Dietary Guidelines*. For example, we found that eating breakfast, eating three meals daily, and limiting the number of meals eaten at restaurants were all significantly associated with being a healthy eater.

### C. Dietary Patterns of Healthy and Less-Healthy Eaters

We used cluster analysis to examine empirically whether meaningful dietary patterns could be identified for healthy and less-healthy eaters in the low-income population. As in the descriptive analyses of sociodemographic and dietary characteristics, healthy and less-healthy eaters were defined based on HEI-2005 scores (same definition used in the previous analysis) and separate analyses were conducted for adults and children.

The cluster analysis revealed eight dietary patterns for adults (four for healthy eaters and four for less-healthy eaters) and eleven dietary patterns for children (six for healthy eaters and five for less-healthy eaters). The dietary patterns identified for each group are listed below:

- **Adult healthy eaters:** Beverages, Plant-Based, Breakfast and Sweets, and Low-Fat Milk.
- **Adult less-healthy eaters:** Soda and Pizza, Alcohol, Non-Carbonated Sugar-Sweetened Drinks, and Coffee.
- **Child healthy eaters:** Sweet Milk, Dairy Desserts, Soda, High-Fat Milk, 100% Fruit Juice, and Low-Fat Milk.<sup>55</sup>
- **Child less-healthy eaters:** Soda and Pizza, Sweets, High-Fat Dairy, Non-Carbonated Sugar-Sweetened Drinks, and Alcohol and Burgers.<sup>56</sup>

The name chosen for each dietary pattern reflects the food groups that differentiated the patterns within a given analysis group. Clearly, adult and child healthy eaters did not consume *perfect*

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<sup>55</sup> Because of very small sample sizes, the Soda (n=17) and Low-Fat Milk (n=15) patterns were not included in subsequent analyses that examined differences across clusters in nutrient intake, MyPyramid food groups and subgroups, HEI-2005 scores, and sociodemographic characteristics.

<sup>56</sup> Because of a very small sample size, the Alcohol and Burgers (n=12) pattern was not included in subsequent analyses that examined differences across clusters in nutrient intake, MyPyramid food groups and subgroups, HEI-2005 scores, and sociodemographic characteristics. All 12 individuals included in the Alcohol and Burgers pattern were ages 16 to 18.

diets, as some of the dietary patterns identified for healthy eaters are defined by one or more foods that many would consider “unhealthy” (for example, sugar-sweetened drinks or salty snacks). The presence of these foods in the dietary patterns of healthy eaters illustrates the fact that diet quality, as measured by the HEI-2005, is determined by the overall balance of healthy and less-healthy foods and the associated effects on intakes of saturated fat, sodium, discretionary calories from fats and sugars, and MyPyramid food groups, rather than by intakes of specific foods or food groups.

Table V.5 provides a summary of the patterns, including the food group intakes that distinguished the patterns, the overall prevalence of the pattern within the analysis group (for example, adult less-healthy eaters), and the percentage of SNAP participants in the pattern.

### **Key Findings for Adults**

Within each of our key analysis groups (adult healthy eaters, adults less-healthy eaters, child healthy eaters, and child less-healthy eaters), we compared dietary and sociodemographic characteristics of individuals in each dietary pattern. Key findings for adults include the following:

- Adult healthy eaters consumed fewer calories, on average, than adult less-healthy eaters.
- Although dietary patterns for adult healthy eaters were characterized by some “unhealthy” foods, such foods were more frequent differentiators in the dietary patterns of less-healthy eaters.
- Patterns high in sugar-sweetened beverages were observed for both healthy eaters and less-healthy eaters.
- Variation in the prevalence of obesity across dietary patterns was observed for both adult healthy eaters (where prevalence ranged from 22 percent to 41 percent) and adult less-healthy eaters (19 percent to 36 percent). However, few of the differences were statistically significant. Among less-healthy eaters, the prevalence of obesity was significantly higher among adults in the Soda and Pizza and Non-carbonated Sugar-Sweetened Drinks patterns (34 and 36 percent, respectively), compared to adults in the Alcohol pattern (19 percent).
- Among adult healthy eaters, the Beverages pattern had the highest percentage of SNAP participants, while the Breakfast and Sweets pattern had the lowest percentage. The Beverages pattern also had the highest percentages of non-Hispanic blacks and Hispanics, the lowest percentage of US-born individuals, and the highest percentage of WIC participants.

Table V.5. Summary of Dietary Patterns Identified for Healthy and Less-Healthy Eaters

Analysis Group/Dietary Pattern	Percent of Analysis Group	Percent of SNAP Participants	Defining Food Groups
<b>Adult Healthy Eaters (HEI <math>\geq</math> 70)</b>			
Beverages	38	25	Unsweetened high-fat milk, 100% fruit juice, non-carbonated sugar-sweetened drinks, non-diet sodas
Plant-Based	34	15	Soy milk and soy products, fresh melons and berries, salads and other raw vegetables, cooked non-starchy vegetables with added fat
Breakfast and Sweets	18	7	Coffee and tea, whole grain cereal, sweet breakfast foods, miscellaneous sugary foods
Low-Fat Milk	11	11	Unsweetened low-fat, reduced fat, and nonfat milk; diet drinks, eggs and eggs dishes
<b>Adult Less-Healthy Eaters (HEI &lt; 49)</b>			
Soda and Pizza	23	24	Non-diet sodas, pizza, hamburgers and cheeseburgers, fried potatoes
Alcohol	8	24	Alcoholic drinks; fried meat, poultry, and fish; Mexican dishes
Non-Carbonated Sugar-Sweetened Drinks	58	27	Non-carbonated sugar-sweetened drinks, diet drinks, fresh fruit other than citrus, canned fruit, non-dairy desserts
Coffee	12	18	Coffee or tea, unsweetened high-fat milk, other high-fat dairy products, white bread
<b>Child Healthy Eaters (HEI <math>\geq</math> 70)</b>			
Sweet Milk	24	21	Sweetened high-fat milk, sugar-sweetened drinks, diet soda, beans, nuts, and seeds
Dairy Desserts	24	40	High-fat dairy desserts and beverages; fresh fruit other than citrus, melons, and berries; fried potatoes
Soda <sup>a</sup>	4	—	Non-diet sodas, mixed dishes with meat, mexican dishes, salty Snacks
High-Fat Milk	16	62	Unsweetened high-fat milk, refined grains (white bread and non-whole grain rice and pasta), canned or frozen fruit, coffee or tea
100% Fruit Juice	22	52	100% fruit juice, soy milk and soy products
Low-Fat Milk <sup>a</sup>	7	—	Unsweetened low-fat, reduced fat, and nonfat milk; sweet breakfast foods, poultry (not fried), soups
<b>Child Less-Healthy Eaters (HEI &lt; 49)</b>			
Soda and Pizza	23	25	Non-diet soda, pizza, salty snacks
Sweets	46	36	Sweetened milks, sweet breakfast foods, 100% fruit juice
High-Fat Dairy	17	41	High-fat unsweetened milk, high-fat dairy desserts and beverages, cereals, vegetables other than fried potatoes
Non-Carb. Sugar-Sweetened Drinks	14	30	Non-carbonated sugar-sweetened drinks, miscellaneous sugary foods, soups
Alcohol and Burgers <sup>a</sup>	0.4	—	Alcoholic drinks, poultry, hamburgers and cheeseburgers, fried potatoes

<sup>a</sup> Because of small sample sizes, the Soda and Low-Fat Milk patterns (n=17 and 15, respectively) for child healthy eaters, and the Alcohol and Burgers pattern (n=12) for child less-healthy eaters were not included in analyses that examined differences across dietary patterns in nutrient intake, MyPyramid food groups and subgroups, HEI-2005 scores, and sociodemographic characteristics. All 12 individuals included in the Alcohol and Burgers pattern were ages 16 to 18.

HEI = Score on Healthy Eating Index-2005

— = Sample size too small to produce reliable estimate

- Among adult less-healthy eaters, SNAP participants accounted for roughly a quarter of the Soda and Pizza, Alcohol, and Non-Carbonated Sugar-Sweetened Drinks patterns. The Coffee pattern had the lowest proportion of SNAP participants.
- Among adult less-healthy eaters, the Soda and Pizza pattern was characterized by particularly high consumption of fast foods and includes many younger adults who work full time and are part of large households.

### Key Findings for Children

- As with adults, child healthy eaters consumed fewer calories, on average, than child less-healthy eaters. Calorie consumption was not adjusted for age, however.
- As with adults, although dietary patterns for child healthy eaters were differentiated by some “unhealthy” foods, such foods were generally more frequent differentiators in the dietary patterns of child less-healthy eaters.
- Both healthy and less-healthy eaters had patterns with high intakes of sugar-sweetened beverages; milk (low-fat, high-fat, and sweetened); yogurt; dairy desserts such as ice cream; 100% fruit juice; and french fries.
- Large variation in the prevalence of obesity was observed across dietary patterns for child healthy eaters (where prevalence ranged from 6 percent to 48 percent). There was less variation across dietary patterns for child less-healthy eaters (17 percent to 19 percent). None of the differences in obesity prevalence were statistically significant.
- Among child healthy eaters, the High-Fat Milk pattern had the highest percentage of SNAP participants, while the Sweet Milk pattern had the lowest percentage. The High-Fat Milk pattern also had the highest percentage of children with low or very-low food security, while the Sweet Milk pattern had the highest percentage of children with full food security.
- Among child less-healthy eaters, SNAP participants accounted for a third or more of the Sweets, High-Fat Dairy, and Non-Carbonated Sugar-Sweetened Drinks patterns. The Soda and Pizza pattern had the lowest percentage of SNAP participants
- Among child healthy eaters, the Dairy Desserts and High-Fat Milk patterns were dominated by younger children ages 2 to 5 and 6 to 11.
- Among child less-healthy eaters, adolescents ages 12 to 18 predominated in the Soda and Pizza pattern and the Non-Carbonated Sugar-Sweetened drinks pattern.

### Key Implications for Nutrition Education

- A healthy diet, as defined by the HEI-2005, can take different forms and shapes depending on dietary preferences, which are in turn shaped by sociodemographic factors including age, sex, and culture. Some of the healthy diet patterns were more prevalent among Hispanics, while others were more prevalent among non-Hispanic whites; some were more prevalent among women (or girls), while others were more prevalent among men (or boys). This suggests that nutrition education should be tailored to specific population subgroups whenever possible, and should take into consideration the relevant food culture. For example, while certain foods such as vegetables and whole grains

should be encouraged across the board, preferences for particular vegetables and grains are likely to be culturally defined.

- Dietary patterns identified for healthy eaters could still use improvement. Healthy eaters had scores on the HEI-2005 that, while substantially higher than most of the population, were still roughly 25 percent below the maximum possible score. In general, recommendations for improvement are the same for healthy and less-healthy eaters.
- Key targets for nutrition education efforts include high intakes of sugar-sweetened beverages, high-fat dairy, and desserts. Nutrition educators should encourage decreased intake of these foods and use of healthier alternatives, such as water, skim or low-fat milk and 100% fruit juice (in moderation) for beverages and fruits or low-fat/low-calorie options for dessert.

#### D. Study Limitations

Readers of this report should take several factors into consideration when interpreting our results. A main limitation of our study is its cross-sectional design, which is inherently constrained by the potential for reverse causality. For example, those who are obese may change their diet in order to lose weight, rather than choosing a certain diet that happens to cause obesity. In the comparison between the sociodemographic and dietary characteristics of healthy and less-healthy eaters, the cross-sectional nature of our data likely impeded our ability to see direct associations between healthy eating and obesity or other health conditions. Likewise, in the cluster analysis, the cross-sectional design likely prevented us from seeing clear associations between the different patterns observed for each analytic group and obesity or other health conditions. Thus, our results regarding health outcomes such as obesity, high blood pressure, and high cholesterol should not be over-interpreted, as the study design was not well suited to detecting such relations.

Data from single 24-hour dietary recalls, like those used in this report, do not adequately represent usual dietary intakes because they are subject to high within-person variability, which leads to extraneous variability (that is, error) in estimates (Willett 2004).<sup>57</sup> This intra-individual variability

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<sup>57</sup> There are ways to estimate usual dietary intakes using a second 24-hour recall for a subsample of the population under study. However, these techniques are not suitable for cluster or other multivariate analyses because they estimate usual intakes at the population level rather than at the individual level.

may have affected both the descriptive analyses presented in Chapter II and Chapter III, as well as the cluster analysis presented in Chapter IV. In the descriptive analyses, the intra-individual variability inherent in 24-hour recall data may have led to misclassification of individuals as either “healthy” or “less-healthy”, based on HEI-2005 scores (that is, individuals may have ended up in the wrong analytic group because their one-day intake was not representative of their usual intake). Similarly, in the cluster analysis, the intra-individual variability may have led to misclassification of individuals within a cluster or misspecification of the clusters themselves (that is, large variability in individual intakes resulted in clusters different from those we would have otherwise identified).

Cluster analysis is an empirical data-reduction procedure that involves a number of subjective decisions, including whether to further collapse the primary dietary data into a smaller number of items for entry into the analysis, how to group the data, how to quantify the input variables, how to decide on the number of patterns to be retained in the final solution, how the patterns should be named, and which patterns should be reported or analyzed (Newby and Tucker 2004). To address this concern, we took great care in structuring our analysis to minimize subjective decisions and to document our approach. For example, we used a food-grouping scheme that is consistent with extant literature and with the 2005 *Dietary Guidelines*. We went through several iterations to hone our food groupings to ensure that they were detailed enough to discriminate between different dietary patterns while, at the same time, avoiding overspecification. We also explored a number of different strategies for quantifying our input variables and selected the approach that provided the most meaningful cluster solutions. We used accepted practices for selecting final cluster solutions (see further details in the Data and Methods appendix). Finally, we named our patterns based on the food and beverage groups that most significantly differentiated each pattern from other patterns, and we focused our attention in this report on those differentiators that were most dominant.

An additional important limitation of our study is the small sample sizes of our groups of adult healthy eaters and child healthy eaters. The high HEI-2005 cutoff point in the definition of “healthy

eating” (HEI-2005 scores of 70 or above, corresponding to the 90th percentile in the general population) resulted in initial samples sizes of  $n=506$  for adult healthy eaters and  $n=246$  for child healthy eaters. These sample sizes were even smaller in the cluster analysis, due to the exclusion of extreme outliers. Sample sizes of the adult and child healthy eater groups were further reduced in the separate analyses of SNAP participants and the two groups of nonparticipants included in Chapters II and III, as well in comparisons across the different dietary patterns identified in Chapter IV. Thus, in some of the analyses presented in this report, the lack of statistical significance between key groups of interest may be due to small sample sizes (and, therefore, less statistical power to detect differences).

Finally, because of issues related to the identification of SNAP participants in NHANES data (discussed in more detail in the Data and Methods appendix), some people classified in this study as SNAP participants are likely former SNAP participants, while some of those classified as nonparticipants are actually non-reporting participants. This misclassification of sample persons as either SNAP participants or nonparticipants may have blurred any differences there might be between healthy and less-healthy eaters among SNAP participants and in the two groups of nonparticipants. For example, if SNAP benefits influence dietary decisions only contemporaneously, the inclusion of former SNAP participants in the group of SNAP participants likely results in biased estimates of the differences between healthy eaters and less-healthy eaters in this group.



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APPENDIX A

DATA AND METHODS

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## DATA AND METHODS

All tabulations in this report are based on National Health and Nutrition Examination Survey (NHANES) data, analyzed alone or in conjunction with data from the MyPyramid Equivalents Database. In this appendix, we describe the data, variable construction, and statistical methods.

### A. NHANES Data

The NHANES is conducted by the National Center for Health Statistics (NCHS), part of the Centers for Disease Control and Prevention (CDC). NHANES has been conducted on a periodic basis since 1971.<sup>1</sup> Beginning in 1999, NHANES became a continuous annual survey with data released in public data files every two years (1999-2000, 2001-02, 2003-04, and so on).

NCHS recommends combining two or more two-year cycles of the continuous NHANES to increase sample size and produce estimates with greater statistical reliability. All of the tabulations in this report are based on three two-year cycles of NHANES data (1999-2004), used in conjunction with the MyPyramid Database (described below).<sup>2</sup>

NHANES includes a “household interview” conducted in respondents’ homes, and a physical examination conducted in Mobile Exam Centers (MEC). Additional interview data were collected at the time of the MEC exam, including a dietary recall interview.

The NHANES data components used in this study are listed in Table A.1. Our sample for all analyses included persons with complete dietary recalls, excluding pregnant and breastfeeding women and infants from birth to 2 years old (dietary standards for these groups differ from the standards used in the Healthy Eating Index-2005, which plays a major role in the analyses included in this report).

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<sup>1</sup> NHANES-I was conducted 1971-1975; NHANES-II 1976-1980; and NHANES-III 1988-1994.

<sup>2</sup> NHANES 2005-2006 was not used because the MyPyramid Equivalents Database, needed to estimate HEI-2005 scores, has not been updated to include foods reported in NHANES 2005-2006.



Table A.1. NHANES Components Used in Study

Alcohol Use (ACQ)	Physical Activity (PAQ)
Blood pressure (BPQ)	Physical Functioning (PFQ)
Body Measures (BMX)	Prescription Medications (RXQ_RX)
Diabetes (DIQ)	Demographics (DEMO)
Dietary Interview: Individual Foods (DRXIFF)	Diet Behavior and Nutrition (DBQ)
Dietary Interview: Total Nutrient Intakes (DRXTOT)	Dietary Supplement Use (DSQ)
Health Insurance (HIQ)	Family Smoking (SMQFAM)
Hospital Utilization (HUQ)	Food Security (FSQ)
Housing Characteristics (HOQ)	Reproductive Health (RHQ)
Medical Conditions (MCQ)	Smoking and Tobacco Use (SMQ)
Occupation (OCQ)	Weight History (WHQ)

## B. MyPyramid Equivalents Database for USDA Food Choices

The MyPyramid Food Guidance System (USDA/CNPP 2005), which replaced the Food Guide Pyramid introduced in 1992, provides estimates of the types and quantities of foods individuals should eat from the different food groups, tailored to age, sex, and activity level.

In contrast to the earlier Food Pyramid, which provided recommended numbers of servings from each food group, MyPyramid recommendations are in cup or ounce “equivalents.” Recommendations for vegetable, fruit, and milk consumption are measured in cups or “cup equivalents;” recommendations for grain and meat and bean consumption are measured in ounces or “ounce equivalents.”

The MyPyramid Equivalents Database contains records corresponding to NHANES dietary recalls, with NHANES food intakes measured in MyPyramid equivalents (Friday and Bowman 2006).<sup>3</sup> Measures are provided for major food groups (grains, vegetables, fruits, milk, meat and beans) and subgroups, plus discretionary oils, discretionary solid fats, added sugar, and alcohol. Each individual food may contain components from multiple MyPyramid food groups.

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<sup>3</sup> MyPyramid Equivalents Database version 1.0 contains data corresponding to NHANES 1999-2000 and 2001-2002, and CSFII 1994-1996, 1998. MyPyramid Equivalents Database version 2.0 contains data corresponding to NHANES 2003-2004.

The MyPyramid database contains files corresponding to the NHANES individual food files (one record per food) and NHANES total nutrient files (one record per person, with total daily intake). We merged MyPyramid data to NHANES data for survey years 1999-2004.

### C. Subgroups for Tabulation

We tabulated NHANES data to provide estimates for all healthy eaters and less-healthy eaters in low-income households (below 200 percent of the federal poverty level), and for subgroups defined by program participation and income, and by age group.

#### 1. Healthy Eaters and Less-Healthy Eaters

We used the Healthy Eating Index-2005 (HEI-2005, described below) to define healthy eaters and less-healthy eaters. Individuals with HEI-2005 scores of 70 or above (corresponding to the 90th percentile in the general population) were defined as “healthy eaters” and individuals with HEI-2005 scores below 49 (the population median) were defined as “less-healthy eaters.”

#### 2. Program Participation and Income

SNAP participation was measured at the household level based on reported participation in the last 12 months. Nonparticipants were further subdivided into those who were income-eligible for SNAP benefits and those whose income exceeded the eligibility standard. SNAP participants and the two groups of nonparticipants (all restricted to be below 200 percent of the federal poverty line) were identified using NHANES data items FSD170N (the number of persons in a household authorized to receive food stamps in the last 12 months) and INDFMPIR (family poverty income ratio). The three groups were defined as follows:

SNAP participant	<i>if</i>	$FSD170N > 0 \text{ AND } INDFMPIR \leq 2.00$
Income-eligible nonparticipant	<i>if</i>	$FSD170N = 0 \text{ AND } 0 \leq INDFMPIR \leq 1.30$
Other low-income nonparticipant	<i>if</i>	$FSD170N = 0 \text{ AND } 1.30 < INDFMPIR \leq 2.00$

The NHANES survey includes questions about food stamp participation by individuals and household members, currently and in the past 12 months. We used FSD170N, which asks about

participation in the past 12 months, to identify SNAP participants because of problems with the data item for current participation (FSD200). The NCHS documentation for the Food Security Questionnaire (FSQ) for 1999-2000, 2001-2002, and 2003-2004 states, “Computer programming errors resulted in some missing data on how many months each person was authorized to receive food stamps, and whether the person was currently authorized. These data could not be imputed and remain missing.” We compared the weighted count of NHANES 1999-2004 respondents reporting “current food stamp participation” with administrative data and found that NHANES identified only 65 percent of current SNAP participants during this period.

Because we defined SNAP participation based on participation of a household member in the last 12 months, instead of current participation by the individual, some sample persons we classified as SNAP participants may not have had access to SNAP benefits at the time of the dietary recall. However, all persons classified as SNAP participants received SNAP benefits (including dollar benefits and nutrition education) in the past year. In addition, some current or former SNAP beneficiaries may have failed to report their participation status. Thus, our group of SNAP participants likely includes some former participants who are not currently receiving benefits and excludes some current participants who are, and our groups of nonparticipants likely include some current participants.

This misclassification of sample persons as either SNAP participants or nonparticipants may have blurred any differences there might be between healthy and less-healthy eaters among SNAP participants and in the two groups of nonparticipants. For example, if SNAP benefits influence dietary decisions only contemporaneously, the inclusion of former SNAP participants in the group of SNAP participants likely results in biased estimates of the differences between healthy eaters and less-healthy eaters in this group.

Despite these issues, the fact that the associations we observed were generally consistent for the overall low-income population and the groups of SNAP participants, income-eligible

nonparticipants, and other low-income nonparticipants, gives us confidence in our main findings. Further, these issues do not affect the primary goal of this analysis, which was to look at the low-income population overall.

### 3. Age Groups

Tabulations in this report show data for two age groups:

- Children, ages 2 to 18
- Adults, ages 19 and older

Individuals who were age 18 at screening were included as children because most 18-year-olds are still in school. All individuals younger than age 84 according to the NHANES data item RIDAGEYR (age at screening) were assigned to age groups according to the NHANES data item RIDAGEEX (exam age in months). Individuals ages 84 and older according to RIDAGEYR, whose age was coded as missing in RIDAGEEX, were also assigned to the group of adults.

## D. Variable Construction

For several analyses, we constructed new variables from the original NHANES data elements, as described in this section.

### 1. Healthy Eating Index-2005 (HEI-2005)

To estimate scores for most HEI-2005 components, we needed data on MyPyramid equivalents, which were not included in the NHANES 24-hour recall data set. To obtain these data, we linked each food reported in the NHANES 24-hour recalls to the MPED (described above). The MPED provided data for the following MyPyramid food groups included in the HEI-2005: total fruit, total vegetables, dark green vegetables, orange vegetables, legumes, total grains, whole grains, milk, meat and beans, oils, solid fat, and added sugar. Units were consistent with those used in MyPyramid and included cup equivalents (fruits, vegetables, and milk), ounce equivalents (grains and meat and beans), grams (discretionary oils and solid fats), teaspoons (added sugar), and drinks

(alcoholic beverages). Data for the sodium and saturated fat components of the HEI-2005 came directly from the NHANES data files.

In the MPED, single-ingredient foods that are in their lowest-fat, lowest-sugar form, such as a fresh peach, skim milk, or fresh carrots, are assigned to single MyPyramid food groups. Food versions that have added fat and/or sugar (for example, peaches canned in heavy syrup, or whole milk) have MPED entries for both the relevant food group and for added sugars and/or discretionary solid fat. Food mixtures that have ingredients from more than one MyPyramid food group (pizza, for example) are disaggregated, and individual ingredients are assigned to appropriate MyPyramid food groups and subgroups and values for added fats and sugars are assigned as needed. Some ingredients that have few or no calories or nutrients (such as plain water, salt, spices, and non-caloric beverages) are not assigned values in the MPED. To obtain data for the whole fruit component of the HEI-2005, we linked NHANES foods to the Center for Nutrition Policy and Promotion (CNPP) 01-02 Fruit Database.<sup>4</sup> This database separates the “Total Fruit” group found in the MPED into two subgroups: whole fruit and fruit juice. If a food item included both whole fruit and juice, the entire amount was assigned to either whole fruit or fruit juice, based on whichever amount was greater. After all foods were linked to the MPED and the “Whole Fruit” database, we used publicly available SAS code (obtained from the CNPP website) to estimate HEI-2005 scores (the total score as well as scores for each component) for all sample members.

## 2. Meals and Snacks

To analyze meal patterns and nutrient characteristics of meals, we classified all foods in the NHANES food files as part of breakfast lunch, dinner, or snacks. NHANES 1999-2000 and 2001-2002 contained 16 codes corresponding to English and Spanish meal names, with two additional

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<sup>4</sup> The CNPP fruit database is available at: <http://www.cnpp.usda.gov/HealthyEatingIndexSupportFiles0102.htm>

codes added for NHANES 2003-2004. The codes were mapped into four categories as shown in Table A.2.

Table A.2 NHANES Meal and Snack Codes

Meal Category/ Meal Name	NHANES Meal Codes		
	1990-2000	2001-2002	2003-2004
1. Breakfast			
Breakfast	1	1	1
Desayuno	9	10	10
Almuerzo	10	11	11
2. Lunch			
Brunch	2	5	5
Lunch	3	2	2
Comida	11	12	12
3. Dinner			
Dinner	5	3	3
Supper	NA	NA	4
Cena	13	14	14
4. Snacks			
Snack/beverage	4	6	6/7
Extended consumption	7	9	9
Merienda	12	13	13
Entre comida	14	15	15/18
Bebida/tentempié			18
Bocadillo	15	17	17
Botana	16	16	16
Other	8	91	91
<b>Don't know</b>	99	99	99

Foods reported as meals were coded as breakfast, lunch, and dinner without regard to mealtime. Thus, persons were observed to consume from zero to three meals. Snack foods were categorized into “snack periods” according to meal time so the number of “snacks” is equal to the number of times a person consumed food and beverages outside of meals, not the number of individual foods consumed as snacks.

### 3. Energy Density

We calculated energy density as the ratio of kilocalories per gram of food. Foods were defined as specified by Ledikwe et al. (2005) as solid and liquid items that are typically consumed as foods.

This definition excludes all beverages. Included are soft and liquid foods, such as ice cream and soup. Excluded are items typically consumed as beverages, such as milkshakes and liquid meal replacements.<sup>5</sup>

The rationale provided by Ledikwe et al. (2005) for including solid foods and not beverages is that “intake of foods, as compared with beverages, is more influenced by hunger and less influenced by fluid balance. Beverages may disproportionately affect energy density values.”

We implemented this definition by excluding foods at the food group level, after categorizing foods into three-digit food groups. The following food groups were excluded:

- Milk (white, flavored, soymilk, dry, and evaporated milk)
- Protein/meal enhancement drinks
- Non-citrus and citrus juice (juice bars were not excluded)
- Vegetable juice
- Coffee, tea
- Beer, wine, liquor
- Drinking water (identified in NHANES 2003-2004 only)
- Soft drinks; sweetened, low calorie, and sugar-free beverages

In addition, all ingredients of “combination beverages” were excluded. These were identified by the NHANES variable for “combination type.”

Total calories and total grams were summed on a per-person basis for all foods not excluded, to obtain estimates of the average energy density of daily intake.

#### 4. Nutrient Rich (NR) Score

A nutrient rich score is a ratio that measures the nutrient contribution of a food relative to its energy contribution. We calculated NR scores based on the naturally nutrient rich (NNR) score

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<sup>5</sup> Liquid meal replacements include instant breakfast, protein supplements and powder, and meal replacement drinks. Meal replacement bars are included in the definition of solid foods.

developed by Drewnowski (2005). The NNR score excludes fortified foods; our NR score does not make that exclusion.

We calculated an NR score based on the 16 nutrients shown in Table A.3. For a single food, the NR score is obtained by calculating a score for each nutrient (equation 1 below), and averaging across the 16 nutrients (equation 2):

$$(1) \%DV_x = \frac{\text{amount per 2000 kcal}_x}{DV_x},$$

where  $x = \text{nutrient 1 to 16}$

$$(2) NR = \sum_{x=1}^{16} \%DV_x / 16$$

The NR scores for total daily intakes are obtained by applying equations (1) and (2) to the total nutrients consumed per person each day. Thus, nutrients are summed across the day; total nutrients are normalized to a “nutrient per 2,000 kcal” measure; the percent DV is calculated for each nutrient; and the NR score is the average of “% DV” across all nutrients. Nutrients are weighted equally. Consistent with Drewnowski, the % DV value is truncated at 2000% DV when implementing equation (1), before the average across nutrients is taken, thus limiting the influence of large concentrations of one nutrient.

## 5. Body Mass Index

NHANES examinations included measurement of body weight and stature (or recumbent length).<sup>6</sup> The NHANES public data files include Body Mass Index (BMI), defined as:

$$BMI = \text{weight in kilograms} / [\text{height in meters}]^2$$

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<sup>6</sup> Recumbent length was measured for infants and children up to age 3; stature was measured for persons age 2 and older. Both length and height were measured for children ages 24 to 36 months.



Table A.3 Nutrients and Recommended Daily Values (DVs) used to Calculate Nutrient Rich Scores<sup>a</sup>

Nutrient	Value
Calcium	1300 mg
Folate	400 µg
Iron	18 mg
Magnesium	420 mg
Potassium	4.7 g
Riboflavin	13. mg
Thiamin	1.2 mg
Vitamin A (RAE)	900 mg
Vitamin B <sub>12</sub>	2.4 µg
Vitamin C	90 mg
Vitamin E	15 mg
Zinc	11 mg
Dietary Fiber	38 g
Linolenic Acid	17 g
α-Linolenic Acid	1.6 g
Protein	56 g

<sup>a</sup> Daily values are based on maximum RDAs or AIs (calcium, magnesium, potassium, dietary fiber, linolenic acid, and α-linolenic acid), excluding pregnant or lactating women.

We classified adult weight status relative to BMI cutoffs specified by the National Institutes of Health:

- Overweight:  $25 \leq \text{BMI} < 30$
- Obese:  $\text{BMI} \geq 30$

We classified children's weight status based on comparison of BMI-for-age with the percentiles of the CDC BMI-for-age growth chart using the SAS program provided by the CDC at: <http://www.cdc.gov/nccdphp/dnpao/growthcharts/resources/sas.htm>.

The CDC SAS program includes transformation parameters lambda, mu, and sigma (LMS) of the smoothed growth curve for each age in months, by sex. The LMS parameters are the median (M), the generalized coefficient of variation (S), and the power in the Box-Cox transformation (L) of the growth curve. Documentation of LMS calculations is available at: [http://www.cdc.gov/growthcharts/percentile\\_data\\_files.htm](http://www.cdc.gov/growthcharts/percentile_data_files.htm).

## 6. Foods Suggested for Frequent, Selective, and Occasional Consumption

We used the food categorization scheme developed by Cole and Fox (2008) for a previous Food and Nutrition Service (FNS) study. The categorization assigned all foods reported in NHANES 1999-2002 to one of three groups according to the radiant pyramid/power calories concept, as described by Zelman and Kennedy (2005).<sup>7</sup> This concept recommends that, within food group, the most nutrient-dense choices be consumed most frequently (to obtain recommended levels of nutrients while maintaining energy balance) and choices that are lowest in nutrient density should be consumed only occasionally. Categorization of foods was implemented through an iterative approach. First, within each of the 10 broad food groups, foods were sorted by Nutrient Rich (NR) score and the percentage of calories from SoFAAS. Decision rules based on the combination of NR score and SoFAAS were applied to each broad food group to provide an initial “break” of foods into three categories, thus reducing the need to manually code all foods. Foods were then sorted by three-digit food subgroup and we reviewed food descriptions, percentage of calories from SoFAAS, and total fat per 100 grams. We divided foods within a food subgroup so that foods with the lowest proportion of calories from SoFAAS/total fat content were included in the “consume frequently” category and foods with the highest proportion of calories from SoFAAS/total fat content were included in the “consume occasionally” category.

The rules used in assigning foods to the three categories are presented in Table A.4. These decision rules were informed by general recommendations made in MyPyramid guidance and/or in the 2005 *Dietary Guidelines for Americans* (U.S. Department of Health and Human Services and USDA 2005).

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<sup>7</sup> This categorization was applied only to foods in NHANES 1999-2002 because information about SoFAAS comes from the MyPyramid database, available only for 1999-2002 at the time the Cole and Fox study was conducted.

Table A.4 Categorization of Foods Suggested for Frequent, Selective, and Occasional Consumption

Food Group	Consume Frequently	Consume Selectively	Consume Occasionally
Grains	All breads, rolls, bagels, etc. with 100% wheat, other "wheat," oatmeal, oat bran, or multi-grain description (USDA food code series 512, 513, 515, and 516); other 100% whole wheat/high-fiber breads; whole wheat, high-fiber pancakes and waffles; whole wheat pasta and noodles cooked without added fat; brown rice cooked without added fat; cold cereals with SoFAAS < 20; wheat bran, raw oats, wheat bran; oatmeal, whole wheat, and bran hot cereals cooked without added fat	Other breads, rolls, bagels, tortillas, crackers, etc., unless fat per 100 gm > 8.0; whole wheat pasta or noodles cooked with added fat; brown rice cooked with added fat; other pasta, noodles, and rice cooked without added fat; cold cereals <b>with SoFAAS <math>\geq</math> 20</b> but < 35; oatmeal, whole wheat, and bran hot cereals cooked with added fat; other hot cereals cooked without added fat	Stuffing, bread sticks, croutons, croissants, biscuits (unless low-fat); other breads, rolls, etc. with fat per 100 gm > 8.0; other pasta, noodles, and rice cooked with added fat; chow mein noodles; cold cereals <b>with SoFAAS <math>\geq</math> 35; other hot cereals</b> cooked with added fat
Vegetables	All raw and cooked vegetables without added fat, except potatoes and other starchy vegetables; spaghetti sauce without meat	Cooked vegetables with added fat, except fried; mashed potatoes; other cooked starchy vegetables without added fat; spaghetti sauce without meat	All fried vegetables; cooked starchy vegetables with added fat (other than mashed potatoes); vegetable salads with cream dressing; vegetables with cheese or cheese sauce; creamed vegetables; glazed vegetables
Fruit and 100% fruit juice	All fresh fruits without added sugar; other types of fruits and juice: fruits canned in water or juice with no added sugar; frozen fruits without added sugar; dried papaya; unsweetened citrus juices (including blends); other unsweetened juices with added vitamin C; fruits and juices with NS as to sweetener and SoFAAS = 0	Fresh fruits with added sugar; other types of fruits and juice: fruits canned in light or medium syrup; unsweetened dried fruit other than papaya; fruits with NS as to sweetener/syrup and SoFAAS > 0; unsweetened (SoFAAS = 0) non-citrus juices without added vitamin C	Fruits canned in heavy syrup; fruits with dressing, cream, marshmallows, chocolate, or caramel; guacamole; all pickled or fried fruits; maraschino cherries; pie filling; fruit soups; frozen juice bars; fruit smoothies; sweetened (SoFAAS > 0) juices; fruit nectars
Milk and milk products	Unflavored nonfat, skim, 1%, or low-fat fluid/dry milks; NFS unflavored fluid/dry <b>milks with SoFAAS <math>\leq</math></b> unflavored 1% milk (21.1)  All plain yogurt, except from whole milk; fruited or flavored nonfat or low-fat yogurt with low-cal sweetener  No-fat and low-fat cheeses that meet gm fat criteria; cottage cheese except with added fruit/gelatin	Flavored/malted nonfat, skim, 1%, or low-fat fluid milks; unflavored 2% or reduced-fat fluid milks; NFS fluid/dry milks and other milk-based beverages/mixtures with SoFAAS > unflavored 1% milk <b>but <math>\leq</math> unflavored 2% milk.</b>  Fruited or flavored nonfat and low-fat yogurts with <b>added sugars, with SoFAAS <math>\leq</math> 48.9.</b>  Low-fat cheeses that meet gm fat criteria; cottage cheese with added fruit/gelatin	Flavored/malted 2% or reduced-fat fluid/dry milks; all types of whole fluid/dry milks; NFS fluid/dry milks and other milk-based beverages/mixtures with SoFAAS > unflavored whole milk (33.3)  All whole milk yogurts; other yogurt with SoFAAS > 48.9.  All regular cheeses; cheese sauces, dips, fondues

Table A.4 (continued)

Food Group	Consume Frequently	Consume Selectively	Consume Occasionally
Meat and meat alternates	Meat and poultry with fat per <b>100 gm <math>\leq</math> 9.28 unless fried</b> and (for chicken) skin eaten; fish with fat per 100 gm $>$ 9.28 and SoFAAS = 0 unless fried; egg whites; legumes cooked without added fat	Meat and poultry with fat per <b>100 gm <math>&gt;</math> 9.28 but <math>\leq</math> 18.56</b> unless fried and (for chicken) skin eaten; fish that meet gm fat criteria and SoFAAS $>$ 0 unless fried  Cooked whole eggs or egg substitutes with no added fat, cheese, or bacon/sausage; other egg/egg substitute mixtures with total fat $<$ 11.21 (max for whole egg cooked without fat)  Legumes cooked with added fat; peanut butter; nuts and seeds; soy-based meat substitutes	All fried meat, fish, and poultry with skin; meat and poultry with fat per 100 gm $>$ 18.56; fish that meets gm fat criteria and SoFAAS $>$ 0  Cooked whole eggs with added fat, cheese, or bacon/sausage; egg yolks only; other egg/egg substitute mixtures with <b>total fat <math>\geq</math> 11.21 (max. for whole egg cooked without fat)</b>  Soy-based meal replacements, supplements; legumes with cheese or meat; peanut butter with jelly; nuts with dried fruits; soy-based desserts
Mixed dishes	Mixed dishes with gm fat/ <b>100 gm <math>\leq</math> 4.64 or gm fat <math>\leq</math> 9.28</b> and SoFAAS = 0	Unless SoFAAS = 0, mixed dishes with fat per 100 gm $>$ <b>4.64 but <math>\leq</math> 9.28</b>	All mixed dishes with fat per 100 gm $>$ 9.28
Beverages, excl. milk and 100% fruit juice	Sugar-free and low-calorie beverages		Sweetened beverages, alcoholic beverages
Sweets and desserts		Pudding, frozen yogurt, light/nonfat ice cream (excluding novelties), sugar-free candy, sugar-free gelatin	All else
Salty snacks		Low-fat/nonfat/baked chips, unflavored pretzels, air-popped popcorn without butter	All else

## E. Cluster Analysis

Preliminary analyses were performed to determine the optimal number of clusters for each group and to assess how well the food-grouping scheme was working. The preliminary analyses are described below.

To determine the number of clusters for each group, we ran multiple iterations of the k-means method (described in Chapter IV), starting with two clusters ( $k=2$ ) and ending with eight clusters ( $k=8$ ). Each of the resulting cluster solutions was then examined to see which set of clusters provided the most meaningfully distinct dietary patterns for the group (the “interpretability” criterion). We supplemented the interpretability criterion by examining the percent of variation explained by each cluster solution.<sup>8</sup> At the conclusion of this phase, we made several important observations about the cluster solutions and the food group data: (1) cluster solutions on the smaller (fewer than four clusters) and larger (more than seven clusters) ends were not as interpretable as other cluster solutions or included clusters with very few individuals ( $n \leq 3$ ); (2) some specific food groups did not provide additional meaningful information; and (3) extreme outliers in some food groups had a large influence on the results.<sup>9</sup>

In the second phase of the analysis, we combined some of the less meaningful food groups<sup>10</sup> and excluded observations with extreme (very high and very low) energy intakes.<sup>11</sup> The cluster

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<sup>8</sup> We also performed reliability checks in which cluster analyses were run separately on split samples of each analytic group. The cluster solutions from the split samples were then compared to the cluster solution from the complete sample to determine the proportion of individuals remaining in the same cluster across the different solutions.

<sup>9</sup> The single-day 24-hour dietary recall data used in this analysis is especially prone to having outliers for specific food groups, because it cannot distinguish foods that are consumed frequently from those consumed infrequently. (See, for example, Carriquiry [2003]).

<sup>10</sup> The food groups that were combined included: mixed dishes with meat and mixed dishes with processed meat, fried vegetables (other than potatoes) and creamed vegetables, beans with nuts and seeds, high-fat red meat and lean red meat, and soup-cream and soup-broth.

<sup>11</sup> Specifically, we excluded the following observations from the analysis: adult males with energy intake less than 800 kcal and more than 4,500 kcal; adult females with less than 700 kcal and more than 4,000 kcal; and children with less than 800 kcal and more than 3,500 kcal.

analysis was then repeated by running the k-means method with solutions limited to four to six clusters per analytic group, and the new solutions were examined for interpretability. Because extreme outliers in some food groups still had a large influence, resulting in some clusters of very small size, we decided to further exclude from the analysis individuals with food group intakes equal to or greater than the 99th percentile (considering only positive intakes) for a given food group. This left us with 397 adult healthy eaters, 2,248 adult less-healthy eaters, 176 child healthy eaters, and 2,609 child less-healthy eaters. Final cluster solutions were based on these analytic samples and the k-means method with four to six clusters for each analytic group. After applying the interpretability criteria, we chose four-cluster solutions for adult healthy and less-healthy eaters, a six-cluster solution for child healthy eaters, and a five-cluster solution for child less-healthy eaters.

## F. Statistical Methods

For descriptive statistics, we used SAS 9.1 (SAS Institute Inc., Cary, North Carolina) and SUDAAN 10.0.0 (Research Triangle Institute, Research Triangle Park, North Carolina) to perform calculations and account for the complex survey design of NHANES. We used the DESCRIPT procedure in SUDAAN, specifying a “with replacement” design, to calculate appropriate variance estimates using Taylor linearization procedures. Six-year sample weights were used to obtain unbiased national estimates, and NHANES-supplied variables for strata (SDMVSTRA) and primary sampling units (SDMVPSU) were used to specify survey stratification. The estimates presented in the report were not standardized or adjusted for age, sex, or any other individual characteristic.

### 1. Sampling Weights

All report tables are based on NHANES 1999-2004. Therefore, six-year weights were used. NHANES 1999-2002 public files include two sets of sampling weights: Interview weights and MEC exam weights (MEC weights account for the additional nonresponse to the MEC exam). NHANES 2003-2004 also include dietary intake weights. All weights sum to the total U.S. civilian non-institutionalized population in year 2000.

Our sample for analyses includes only persons with complete dietary recalls. We followed the documentation provided in What We Eat in America (WWEIA) (Moshfegh et al. 2005) to construct dietary intake sampling weights for NHANES 1999-2002, consistent with the intake weights released with NHANES 2003-2004. Dietary intake weights are constructed from the MEC exam weights to (1) account for additional nonresponse to the dietary recall and (2) provide proportionate weighting of weekday and weekend recalls. The second adjustment is needed because proportionately more dietary recalls occurred on weekends than on weekdays. Since food intake varies by day of week, use of MEC weights would disproportionately represent intakes on weekends. Sample weights for persons with weekday versus weekend recalls were recalibrated, within demographic group, so that weekday recalls account for 4/7 of the total sample weight.

## **2. Tests of Statistical Significance (The Benjamini-Hochberg approach)**

We tested the statistical significance of differences in means and proportions between healthy eaters and less-healthy eaters (or between clusters, in the cluster analysis) using the Benjamini-Hochberg (B-H) approach (Benjamini and Hochberg 1995), to account for the large number of tests conducted simultaneously. Significance tests at the 1 and 5 percent level were conducted separately by age group (adults, children) and subgroup (SNAP participants, income-eligible nonparticipants, other low-income nonparticipants).

The B-H method adjusts for multiple comparisons by controlling the false discovery rate instead of the familywise error rate, which is used in the traditional Bonferroni method. The B-H method is less conservative than the Bonferroni method, and, therefore, yields much greater power, while still providing adequate protection against false discoveries in a wide range of applications.

We implemented the B-H method as follows for each domain of analysis (groups of related variables presented in same table):<sup>12</sup>

1. Identify comparisons (t-tests) that are statistically significant at the 5 percent level, without adjustment for multiple comparisons.
2. Rank order statistically significant findings in ascending order of the p-values, such that:  $p_1 < p_2 < p_3 < \dots < p_m$ , with  $m$  being the number of significant findings within the domain.
3. For each p-value ( $p_i$ ), compute:  $p_i^* = i * (0.05/M)$  where  $i$  is the rank for  $p_i$ , with  $i = 1, 2, \dots, m$  and  $M$  is the total number of comparisons (both significant and insignificant).

Identify the largest p-value, denoted  $p_k$ , that satisfies the condition:  $p_i \leq p_i^*$ . This establishes the cut-off point, and allows us to conclude that all findings with p-values smaller than or equal to  $p_k$  are statistically significant, and findings with p-values greater than  $p_k$  are not significant at the 5 percent level after correction for multiple comparisons.

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<sup>12</sup> The same method, using .01 instead of .05, was implemented to determine statistical significance at the 1 percent level.



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## APPENDIX B

### SOCIODEMOGRAPHIC CHARACTERISTICS: TABLES WITH MEANS

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Table B.1 Associations Between Person-Level Sociodemographic Characteristics and Healthy Eating Index-2005 Scores: Adults Ages 19+ (Entries in each column are the percentage of individuals who met row criteria)

	All Low-Income Individuals		SNAP Participants		Income-Eligible Nonparticipants		Other Low-Income Nonparticipants	
	Healthy Eaters (HEI $\geq$ 70)	Less-Healthy Eaters (HEI<49)	Healthy Eaters (HEI $\geq$ 70)	Less-Healthy Eaters (HEI<49)	Healthy Eaters (HEI $\geq$ 70)	Less-Healthy Eaters (HEI<49)	Healthy Eaters (HEI $\geq$ 70)	Less-Healthy Eaters (HEI<49)
Num. of Individuals	506	2,792	76	661	243	1,260	187	871
Sex								
Male	34.5**	46.8	36.7	37.7	39.5	46.9	27.4**	53.8
Female	65.6**	53.2	63.3	62.3	60.5	53.1	72.6**	46.2
Age								
19-30	18.3**	34.7	18.2	37.8	15.8**	36.4	21.3	30.0
31-40	13.0**	21.7	12.5	23.4	14.9	20.0	11.1*	22.7
41-50	14.9	16.5	28.3	17.5	12.6	16.1	11.6	16.2
51-60	11.3	10.0	18.5	11.4	13.2	9.9	5.8	8.8
>60	42.5**	17.2	22.6	9.9	43.5**	17.6	50.2*	22.4
Race/Ethnicity								
Non-Hisp., White	59.6	59.5	57.4	49.1	52.1	61.2	69.5	65.5
Non-Hisp., Black	9.6**	18.2	10.3*	27.4	10.3	14.8	8.5*	15.4
Hispanic	24.7	17.5	28.1	18.4	28.9	18.2	18.1	15.8
Other	6.1	4.9	4.2	5.1	8.7	5.9	3.9	3.4
US-Born	67.3**	87.2	62.0*	91.3	63.5**	85.8	74.3*	85.9
10 or More Years in the USA	85.7**	94.3	75.7	97.4	85.1*	92.7	90.9	93.8
Education Level								
Less than HS	29.7	36.8	33.0	45.1	31.1	37.7	26.5	29.1
HS/GED	30.5	31.7	30.4	31.9	30.8	29.6	30.4	34.3
More than HS	39.8	31.5	36.7	23.0	38.2	32.7	43.1	36.6
Married	44.0	38.1	38.4	28.5	47.6	36.7	42.3	47.4
Work Hours								
0	67.8**	51.6	75.0	64.0	70.0**	52.3	62.0**	40.6
1 to 34	11.0	13.6	12.9	12.5	10.1	14.6	11.2	13.1
35 or more	21.2**	34.9	12.1	23.5	20.0*	33.1	26.9*	46.3
Works at Least 20 Hours	27.3**	44.6	19.7	33.7	24.9**	42.3	33.6**	56.3
Employed	32.2**	48.4	25.0	36.0	30.0**	47.7	38.0**	59.4

Source: NHANES 1999-2004.

\*Significantly different from less-healthy eaters at the .05 level, two-tailed test with Benjamini-Hochberg adjustment.

\*\*Significantly different from less-healthy eaters at the .01 level, two-tailed test with Benjamini-Hochberg adjustment.

Table B.2 Associations Between Household-Level Sociodemographic Characteristics and Healthy Eating Index-2005 Scores: Adults Ages 19+ (Entries in each column are the percentage of individuals who met row criteria)

	All Low-Income Individuals		SNAP Participants		Income-Eligible Nonparticipants		Other Low-Income Nonparticipants	
	Healthy Eaters (HEI $\geq$ 70)	Less-Healthy Eaters (HEI<49)	Healthy Eaters (HEI $\geq$ 70)	Less-Healthy Eaters (HEI<49)	Healthy Eaters (HEI $\geq$ 70)	Less-Healthy Eaters (HEI<49)	Healthy Eaters (HEI $\geq$ 70)	Less-Healthy Eaters (HEI<49)
Num. of Individuals	506	2,792	76	661	243	1,260	187	871
Household Size								
1	25.5*	15.7	23.5	14.9	24.2	17.8	28.0*	13.7
2	29.4	23.5	22.5	16.1	33.0	25.7	28.1	26.4
3	11.6**	20.5	9.6	15.3	8.8**	21.1	15.8	23.9
4	14.6	17.2	19.7	22.7	13.4	15.0	13.9	15.6
5+	18.9	23.1	24.7	31.0	20.7	20.4	14.1	20.4
Household Participates in WIC	14.6	18.6	33.6	30.3	11.3	16.7	7.9	10.7
Household Food Security Level								
Full	71.4	63.9	34.8	42.9	76.3*	63.3	82.2	81.7
Marginal	8.3	11.3	19.3	19.2	6.9	8.8	5.0	8.1
Low	14.3	14.9	26.3	22.0	13.9	18.1	9.2	5.0
Very Low	6.1*	9.9	19.6	15.9	2.9**	9.8	3.5	5.1
Adult Food Security Level								
Full	71.7	64.8	35.4	44.6	77.0*	64.0	82.2	82.2
Marginal	8.8	12.0	19.3	21.3	7.5	9.4	5.4	7.8
Low	13.5	12.6	25.7	14.7	12.6	17.0	9.0	4.9
Very Low	6.0	10.7	19.6	19.3	2.9**	9.6	3.3	5.1
Home Owned	54.7	45.4	42.2	27.9	47.7	46.0	68.7	58.6
Someone in Household Smokes	7.7**	39.9	17.5**	53.4	3.9**	38.6	7.8**	30.9

Source: NHANES 1999–2004.

\*Significantly different from less-healthy eaters at the .05 level, two-tailed test with Benjamini-Hochberg adjustment.

\*\*Significantly different from less-healthy eaters at the .01 level, two-tailed test with Benjamini-Hochberg adjustment.

Table B.3 Associations Between Health-Related Characteristics and Healthy Eating Index-2005 Scores: Adults Ages 19+ (Entries in each column are the percentage of individuals who met row criteria)

	All Low-Income Individuals		SNAP Participants		Income-Eligible Nonparticipants		Other Low-Income Nonparticipants	
	Healthy Eaters (HEI $\geq$ 70)	Less-Healthy Eaters (HEI<49)	Healthy Eaters (HEI $\geq$ 70)	Less-Healthy Eaters (HEI<49)	Healthy Eaters (HEI $\geq$ 70)	Less-Healthy Eaters (HEI<49)	Healthy Eaters (HEI $\geq$ 70)	Less-Healthy Eaters (HEI<49)
Num. of Individuals	506	2,792	76	661	243	1,260	187	871
Obese	35.4	33.6	47.4	37.2	32.3	31.5	33.9	33.6
Overweight or Obese	64.9	62.6	67.2	63.0	62.9	59.7	66.2	66.1
High Blood Pressure	39.3**	26.9	47.9	26.0	40.4*	26.7	34.0	27.9
High Cholesterol	35.9**	19.8	36.8	17.1	32.7*	19.6	39.4*	22.1
Diabetes	17.9**	6.2	19.9	6.0	16.1*	6.7	19.3**	5.9
Has Health Insurance	79.9**	63.7	82.0	67.4	73.0*	58.8	87.2**	67.3
Health Condition Good or Better	70.2	71.7	49.0	63.5	70.5	72.3	79.9	77.5
Doctor Said Overweight	35.1	27.8	34.5	30.6	36.9	25.7	33.2	28.5
Ever Had Cancer	13.2	7.7	8.9	10.5	11.0	6.5	17.8	7.1
Walked/Bicycled in Past 30 Days	29.9	24.8	26.0	29.2	29.6	24.7	32.0	21.5
Daily Physical Activity in Past 30 Days High	24.2	26.0	18.4	20.8	17.2*	27.6	35.3	28.2
Vigorous Activity in Past 30 Days	26.8	26.5	6.0**	20.5	26.9	27.1	36.1	30.3
Moderate Activity in Past 30 Days	46.3	38.4	46.0	37.6	44.7	33.4	48.4	45.5
More Active than Peers	36.0*	28.6	16.2	24.4	32.5	27.5	49.2*	33.3
Has Work Limitations	20.8	21.0	42.0	32.8	16.6	18.6	16.2	14.6
Taken Prescriptions in Past Month	65.1**	50.2	65.6	55.5	60.0	48.8	70.9**	47.8
Now Smoking	7.0**	35.5	16.5**	48.6	3.5**	33.8	6.7**	27.1
Consider Self Overweight	53.7	51.6	59.6	53.2	50.4	50.0	55.1	52.5
Would Like to Weigh Less	57.8	56.7	58.6	59.7	56.9	53.0	58.6	59.4
Screen Time at Least 2 Hrs/Day	45.0**	57.8	46.4	62.4	41.6*	56.4	48.6	56.1

Source: NHANES 1999–2004.

\*Significantly different from less-healthy eaters at the .05 level, two-tailed test with Benjamini-Hochberg adjustment.

\*\*Significantly different from less-healthy eaters at the .01 level, two-tailed test with Benjamini-Hochberg adjustment.

Table B.4 Associations Between Person-Level Sociodemographic Characteristics and Healthy Eating Index-2005 Scores: Children Ages 2-18 (Entries in each column are the percentage of individuals who met row criteria)

	All Low-Income Individuals		SNAP Participants		Income-Eligible Nonparticipants		Other Low-Income Nonparticipants	
	Healthy Eaters (HEI $\geq$ 70)	Less-Healthy Eaters (HEI < 49)	Healthy Eaters (HEI $\geq$ 70)	Less-Healthy Eaters (HEI < 49)	Healthy Eaters (HEI $\geq$ 70)	Less-Healthy Eaters (HEI < 49)	Healthy Eaters (HEI $\geq$ 70)	Less-Healthy Eaters (HEI < 49)
Num. of Individuals	246	3,344	73	1,178	109	1,322	64	844
Sex								
Male	49.1	53.1	61.7	50.0	39.8*	56.7	43.2	51.3
Female	50.9	46.9	38.3	50.0	60.2*	43.3	56.9	48.7
Age								
2-5	39.9*	21.8	46.2	28.7	33.7*	18.2	39.0	18.9
6-11	35.1	35.7	42.7	35.1	38.5	33.2	20.0	39.9
12-18	25.0*	42.6	11.1**	36.2	27.9**	48.6	41.0	41.2
Race/Ethnicity								
Non-Hisp., White	50.6	50.4	66.5	40.5	29.9*	52.5	54.5	58.9
Non-Hisp., Black	9.9*	21.7	10.5**	34.4	7.2*	16.9	12.5	13.6
Hispanic	34.4	20.9	22.4	18.1	51.2**	22.7	29.8	21.6
Other	5.2	7.1	0.6*	7.0	11.7	7.9	3.2	5.9
US-born	86.6	94.7	86.2	95.3	85.5	93.1	88.5	96.4
Currently in School	96.6	93.6	98.3*	91.5	95.0	93.2	96.3	96.6

Source: NHANES 1999-2004.

\*Significantly different from less-healthy eaters at the .05 level, two-tailed test with Benjamini-Hochberg adjustment.

\*\*Significantly different from less-healthy eaters at the .01 level, two-tailed test with Benjamini-Hochberg adjustment.

Table B.5 Associations Between Household-Level Sociodemographic Characteristics and Healthy Eating Index-2005 Scores: Children Ages 2-18 (Entries in each column are the percentage of individuals who met row criteria)

	All Low-Income Individuals		SNAP Participants		Income-Eligible Nonparticipants		Other Low-Income Nonparticipants	
	Healthy Eaters (HEI $\geq$ 70)	Less-Healthy Eaters (HEI < 49)	Healthy Eaters (HEI $\geq$ 70)	Less-Healthy Eaters (HEI < 49)	Healthy Eaters (HEI $\geq$ 70)	Less-Healthy Eaters (HEI < 49)	Healthy Eaters (HEI $\geq$ 70)	Less-Healthy Eaters (HEI < 49)
Num. of Individuals	246	3,344	73	1,178	109	1,322	64	844
Household Size								
1	0.0	0.6	0.0	0.0	0.0	0.6	0.0	1.1
2	2.7	6.2	2.5	4.8	3.4	6.7	2.1	7.1
3	10.4	18.6	6.0	15.1	7.2*	21.7	20.5	18.1
4	33.8	27.5	62.1	32.0	11.4*	23.3	22.6	28.6
5+	53.1	47.1	29.4	48.1	78.1**	47.7	54.7	45.1
Sex of HH Ref Person								
Male	42.5	42.2	17.8	27.6	57.8	46.4	58.1	53.3
Female	57.5	57.8	82.2	72.4	42.2	53.6	41.9	46.7
Age of HH Ref Person								
19-30	38.7	27.7	64.6	36.3	21.8	23.3	23.7	23.7
31-40	38.3	41.1	24.0	43.2	49.6	36.2	44.2	45.8
41-50	17.5	20.0	9.9	13.5	19.0	24.6	26.2	21.2
51-60	2.9*	7.0	0.9*	4.0	3.7*	10.5	4.6	5.6
>60	2.7	4.2	0.6*	3.0	5.9	5.4	1.4	3.8
HH Ref Person US-born	59.6*	82.7	74.3	85.6	42.1**	78.6	60.0	85.5
Education Level of HH Ref Person								
Less than HS	31.7	39.7	30.0	51.1	45.1	38.0	17.8	28.5
HS/GED	38.0	30.0	57.2	29.4	25.4	30.4	26.0	30.3
More than HS	30.4	30.3	12.8	19.5	29.5	31.6	56.3	41.2
HH Ref Person Married	73.0**	45.4	66.5*	31.3	76.4**	46.5	78.2*	61.1
Household Participates in WIC	39.5	24.0	42.1	37.4	50.7*	20.2	21.7	13.3
Household Food Security Level								
Full	47.4	56.0	28.7	38.0	51.2	59.3	69.1	72.7
Marginal	9.8	13.3	3.6**	17.7	13.0	11.1	14.7	11.4
Low	23.6	18.0	25.7	25.6	33.5	17.2	7.9	10.1
Very Low	19.2	12.7	42.1	18.6	2.4**	12.4	8.3	5.8
Child Food Security Level								
Full	57.5	68.7	35.9	55.2	59.3	69.7	85.9	83.9
Marginal	5.7	10.9	4.8**	16.5	9.8	9.3	1.8	6.3
Low	36.4	16.8	58.3	22.4	30.5	17.7	12.4	8.6
Very Low	0.5**	3.6	0.9*	5.9	0.4**	3.3	0.0	1.3
Home is Owned	40.4	44.0	8.0*	21.7	58.4	51.4	63.4	59.4
Someone in Household Smokes	30.9	37.5	56.5	47.5	15.8**	31.0	14.0*	35.3

Source: NHANES 1999-2004.

Note: The household reference (HH Ref) person is defined as the first household member 18 years of age or older listed on the NHANES screener household member roster who owns or rents the residence where members of the household reside.

\*Significantly different from less-healthy eaters at the .05 level, two-tailed test with Benjamini-Hochberg adjustment.

\*\*Significantly different from less-healthy eaters at the .01 level, two-tailed test with Benjamini-Hochberg adjustment.



Table B.6 Associations Between Health-Related Characteristics and Healthy Eating Index-2005 Scores: Children Ages 2-18 (Entries in each column are the percentage of individuals who met row criteria)

	All Low-Income Individuals		SNAP Participants		Income-Eligible Nonparticipants		Other Low-Income Nonparticipants	
	Healthy Eaters (HEI $\geq$ 70)	Less-Healthy Eaters (HEI<49)	Healthy Eaters (HEI $\geq$ 70)	Less-Healthy Eaters (HEI<49)	Healthy Eaters (HEI $\geq$ 70)	Less-Healthy Eaters (HEI<49)	Healthy Eaters (HEI $\geq$ 70)	Less-Healthy Eaters (HEI<49)
Num. of Individuals	246	3,344	73	1,178	109	1,322	64	844
Obese	21.9	17.1	26.4	17.9	27.9*	17.3	7.6	15.8
Overweight or Obese	17.0	15.6	7.3	14.6	8.0	17.5	42.9	14.0
Has Health Insurance	82.6	82.4	95.6	91.8	69.7	76.4	80.8	80.2
Health Condition Good or Better	88.8	92.5	79.2	90.9	94.8	91.9	94.5	95.3
Doctor Said Overweight	13.4	9.0	22.5	9.2	9.3	10.8	6.0	6.2
Taken Prescriptions in Past Month	14.7	24.9	5.7**	22.2	14.8	26.8	27.3	25.1
Screen Time at Least 2 Hrs/Day	65.8	63.8	64.0	66.2	58.7	59.6	77.5	67.1

Source: NHANES 1999-2004.

\*Significantly different from less-healthy eaters at the .05 level, two-tailed test with Benjamini-Hochberg adjustment.

\*\*Significantly different from less-healthy eaters at the .01 level, two-tailed test with Benjamini-Hochberg adjustment.

## APPENDIX C

### DIETARY CHARACTERISTICS: TABLES WITH MEANS

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Table C.1 Meal Patterns and Dietary Behaviors: Adults Ages 19+ (Entries in each column are the percentage of individuals who met row criteria or, for continuous variables, mean values)

	All Low-Income Individuals		SNAP Participants		Income-Eligible Nonparticipants		Other Low-Income Nonparticipants	
	Healthy Eaters (HEI $\geq$ 70)	Less-Healthy Eaters (HEI < 49)	Healthy Eaters (HEI $\geq$ 70)	Less-Healthy Eaters (HEI < 49)	Healthy Eaters (HEI $\geq$ 70)	Less-Healthy Eaters (HEI < 49)	Healthy Eaters (HEI $\geq$ 70)	Less-Healthy Eaters (HEI < 49)
Num. of Individuals	506	2,792	76	661	243	1,260	187	871
Ate Breakfast	92.0**	67.0	97.2**	59.2	91.7**	68.5	90.0**	71.2
Ate Three Meals	64.8**	39.0	51.3*	29.3	65.1**	39.8	70.4**	45.7
Num. Snacks Eaten								
0	17.5	12.3	9.1	13.6	22.3**	13.2	15.5*	10.1
1	27.0	26.5	34.5	30.5	24.8	24.6	26.3	26.0
2	26.4	25.1	19.3	19.8	25.3	27.3	31.0	26.3
3+	29.1	36.1	37.1	36.2	27.6	34.9	27.2*	37.6
% Total Calories								
Breakfast	22.8**	15.1	23.0*	13.7	23.2**	16.1	22.3**	14.8
Lunch	26.7*	22.0	20.7	20.2	27.9**	22.4	27.9	23.1
Dinner	32.5	35.4	34.9	37.3	30.9	34.1	33.2	35.6
Snacks	17.9**	27.5	21.4	28.8	17.8**	27.4	16.4**	26.4
Meals away from home	19.2**	34.8	17.0*	29.7	16.8**	35.9	23.0**	37.5
Recall Day Was a Weekend	21.7	26.2	26.0	22.6	25.2	25.7	15.6**	29.6
Eats in Restaurant								
0 Times/Week	44.1**	31.5	58.7	37.7	41.0	32.5	41.2*	25.3
1 Times/Week	23.3	20.3	19.2	17.8	24.3	21.7	24.0	20.4
2 Times/Week	17.7	17.1	14.6	19.5	17.5	14.7	19.3	18.4
3+ Times/Week	14.9**	31.1	7.5**	25.0	17.2**	31.1	15.5**	35.9
Alcohol Consumption								
None	39.8**	18.4	36.4	19.5	45.9**	18.2	33.6	17.7
1 or fewer drinks	31.8**	17.7	52.1**	12.3	21.8	18.2	36.1*	21.4
2 or 3 drinks	18.4**	31.4	10.1**	34.0	17.1*	29.1	23.2	32.3
4+ drinks	10.0**	32.5	1.4**	34.2	15.3**	34.4	7.0**	28.6
Took 1+ Dietary Supplements	59.0**	36.4	60.6**	29.6	53.1**	34.3	65.3**	44.6

Source: NHANES 1999–2004.

\*Significantly different from less-healthy eaters at the .05 level, two-tailed test with Benjamini-Hochberg adjustment.

\*\*Significantly different from less-healthy eaters at the .01 level, two-tailed test with Benjamini-Hochberg adjustment.

Table C.2 Means of HEI-2005 Component Scores: Adults ages 19+

	All Low-Income Individuals		SNAP Participants		Income-Eligible Nonparticipants		Other Low-Income Nonparticipants	
	Healthy Eaters (HEI $\geq$ 70)	Less- Healthy Eaters (HEI < 49)	Healthy Eaters (HEI $\geq$ 70)	Less- Healthy Eaters (HEI < 49)	Healthy Eaters (HEI $\geq$ 70)	Less- Healthy Eaters (HEI < 49)	Healthy Eaters (HEI $\geq$ 70)	Less- Healthy Eaters (HEI < 49)
Num. of Individuals	506	2,792	76	661	243	1,260	187	871
Total fruit	4.2**	1.1	4.3**	1.0	4.4**	1.0	4.1**	1.2
Whole fruit	4.1**	0.8	3.8**	0.6	4.5**	0.8	3.8**	0.9
Total vegetables	3.9**	2.4	3.6**	2.5	3.9**	2.3	4.0**	2.4
Dark green, orange vegetables	2.6**	0.6	2.3**	0.7	2.7**	0.6	2.5**	0.6
Total grains	4.6**	4.0	4.2	3.8	4.6**	4.0	4.6**	4.0
Whole grains	2.0**	0.5	1.5**	0.3	2.0**	0.5	2.2**	0.5
Milk	5.3**	4.2	5.4*	3.8	5.2**	4.0	5.5	4.6
Meat and beans	9.1**	7.6	9.2**	7.6	9.0**	7.7	9.0**	7.5
Oils	7.3**	3.9	7.1**	3.6	7.1**	3.9	7.7**	4.1
Saturated fat	8.8**	5.1	8.3**	5.2	8.8**	5.4	9.0**	4.8
Sodium	5.2*	4.5	6.2**	4.5	4.9	4.6	5.0	4.5
Calories from SoFAAS	18.5**	3.7	18.3**	3.8	18.6**	3.7	18.5**	3.6

Source: NHANES 1999-2004.

\*Significantly different from less-healthy eaters at the .05 level, two-tailed test with Benjamini-Hochberg adjustment.

\*\*Significantly different from less-healthy eaters at the .01 level, two-tailed test with Benjamini-Hochberg adjustment.

Table C.3 Food Choices, by Consumption: Adults Ages 19+ (Entries in each column are the percentage of individuals who met row criteria)

	All Low-Income Individuals		SNAP Participants		Income-Eligible Nonparticipants		Other Low-Income Nonparticipants	
	Healthy Eaters (HEI $\geq$ 70)	Less-Healthy Eaters (HEI < 49)	Healthy Eaters (HEI $\geq$ 70)	Less-Healthy Eaters (HEI < 49)	Healthy Eaters (HEI $\geq$ 70)	Less-Healthy Eaters (HEI < 49)	Healthy Eaters (HEI $\geq$ 70)	Less-Healthy Eaters (HEI < 49)
Num. of Individuals	506	2,792	76	661	243	1,260	187	871
Any milk	78.2**	45.9	79.3**	37.7	75.9**	44.6	80.6**	54.2
Whole milk	15.2	16.1	21.8	18.8	16.5	15.5	10.6	14.9
1% or skim milk	27.6**	4.2	18.3*	2.1	25.6**	3.6	34.1**	6.6
Flavored milk	2.3	3.7	0.0*	2.9	1.2*	4.3	4.6	3.5
Yogurt	4.8*	1.4	0.1	1.2	40	1.2	7.8	1.8
Cheese	16.2	17.2	12.3	15.0	15.8	14.6	18.3	22.3
Discrete serving of vegetables, including potatoes	80.1**	58.5	71.8*	54.8	78.2**	57.9	86.0**	62.3
Discrete serving of vegetables, excluding French fries	72.7**	36.9	65.2**	35.0	70.3**	36.5	78.9**	39.0
Discrete serving of vegetables, excluding potatoes and other starchy vegetables	43.2**	19.2	45.1**	16.7	38.0**	19.2	48.6**	21.3
Discrete serving of raw vegetables, salad	39.5**	16.0	33.3*	12.3	38.2**	16.1	43.8**	18.8
Legumes	19.4**	8.8	25.2	8.4	20.0**	9.6	16.0*	8.1
Discrete serving of fruit	80.3**	16.5	70.3**	10.4	88.7**	17.5	74.8**	19.9
Fresh fruit	76.5**	13.5	62.9**	9.6	84.2**	14.6	73.5**	15.1
Fruit juice	43.8**	14.4	51.7**	12.5	35.0**	13.3	50.8**	17.4
Any whole grains	40.9**	8.0	34.8**	5.5	36.0**	8.0	49.5**	10.0
Nuts or seeds (including PB sandwiches)	27.3**	6.1	29.2**	4.7	29.8**	5.7	23.4*	7.9
Sugar-sweetened beverages	27.3**	72.9	46.6*	74.1	26.3**	73.0	19.8**	71.8
Sweetened beverages, including artificially sweetened	45.2**	79.7	62.7	80.1	40.6**	79.0	42.8**	80.1
Alcohol	5.4**	20.7	10.8	18.4	4.1**	20.8	4.4**	22.3
Salty snack	24.8	26.9	38.6	28.2	19.1	25.2	25.3	28.1
Any sweets, desserts, or candy	78.5*	75.5	83.1*	70.9	75.8	75.0	79.6	79.7
Any dessert	51.7	50.9	51.8	45.6	45.8	50.0	58.6	55.3
Any candy	17.2*	25.4	16.4	23.7	9.92**	23.4	26.1	29.5

Source: NHANES 1999-2004.

\*Significantly different from less-healthy eaters at the .05 level, two-tailed test with Benjamini-Hochberg adjustment.

\*\*Significantly different from less-healthy eaters at the .01 level, two-tailed test with Benjamini-Hochberg adjustment.

Table C.4 Food Choices, by Relative Energy Contribution (Mean % of total calories): Adults Ages 19+

	All Low-Income Individuals		SNAP Participants		Income-Eligible Nonparticipants		Other Low-Income Nonparticipants	
	Healthy Eaters (HEI ≥ 70)	Less-Healthy Eaters (HEI < 49)	Healthy Eaters (HEI ≥ 70)	Less-Healthy Eaters (HEI < 49)	Healthy Eaters (HEI ≥ 70)	Less-Healthy Eaters (HEI < 49)	Healthy Eaters (HEI ≥ 70)	Less-Healthy Eaters (HEI < 49)
Num. of Individuals	506	2,792	76	661	243	1,260	187	871
Milk Group Foods	7.2**	4.8	7.8**	3.9	7.2**	4.7	7.0	5.5
Whole milk	1.1	1.6	1.8	1.9	1.2	1.5	0.8*	1.5
1% or skim milk	2.0**	0.3	1.0*	0.1	2.2**	0.3	2.2**	0.4
Flavored milk	0.1	0.2	0.0	0.2	0.1	0.2	0.2	0.1
Cheese	0.7**	1.1	0.5	0.9	0.7	1.0	0.7**	1.5
Yogurt	0.4*	0.1	0.0	0.1	0.3	0.1	0.6	0.1
Meat and Bean Group Foods	16.9**	12.6	18.8	13.4	17.7**	12.2	15.0	12.7
Meat	1.7**	3.4	2.0	4.2	2.3*	3.2	1.0**	3.2
Organ meats	0.1	0.1	0.4	0.0	0.0	0.1	0.0	0.1
Frankfurters, sausages, luncheon meats	0.3**	1.8	0.3**	1.5	0.3**	1.6	0.3**	2.2
Poultry	3.6	3.2	4.0	4.2	3.4	2.7	3.8	3.2
Fish	1.7**	0.9	1.5	0.8	1.8	0.9	1.7	0.8
Eggs	1.7	1.8	1.6	1.6	1.6	1.9	1.7	1.6
Beans and peas	2.6**	0.9	3.5	1.0	2.9**	1.0	1.9*	0.8
Soy products	0.9	0.0	2.3	0.0	0.3	0.0	1.0*	0.0
Nuts and seeds	3.4**	0.4	2.7	0.2	4.0**	0.5	3.0*	0.4
Mixed Dishes	18.9**	27.6	15.4**	28.8	19.1**	27.0	20.2*	27.5
Pizza	0.5**	4.2	0.7**	5.1	0.6**	3.1	0.2**	5.0
Sandwiches	8.9**	14.1	7.7	13.1	9.0**	14.5	9.3*	14.5
Pasta or rice dishes	3.0	2.9	1.6	4.2	3.1	2.6	3.5	2.4
Grain Foods	19.1**	9.3	18.3**	8.4	19.8**	10.1	18.5**	9.0
Whole grains	6.8**	1.0	5.9	0.7	5.5**	1.0	8.6**	1.1
Not whole grains	23.2	19.5	22.8*	18.2	23.6	20.1	22.8	19.4
Fruits	10.2**	1.9	10.4**	1.7	10.6**	1.8	10.7**	2.1
Fresh fruit	5.7**	0.7	4.2**	0.6	6.5**	0.7	5.4**	0.6
Canned fruit	0.6**	0.2	0.9	0.0	0.5*	0.1	0.5	0.3
Juice	4.0**	1.0	5.1**	1.0	3.2**	0.9	4.4**	1.1
Vegetables	9.7**	6.0	7.1	6.5	10.2**	5.9	10.4**	5.9
Dark-green	0.4**	0.1	0.3	0.1	0.5*	0.0	0.4**	0.1
Orange	0.7**	0.1	0.6*	0.1	0.7**	0.2	0.8*	0.1
White potatoes	2.5**	4.0	2.1*	4.4	2.8	3.7	2.3**	4.0
French fries	1.0**	2.7	0.6**	3.0	1.2	2.4	1.0**	2.8
Other starchy vegetables	1.0*	0.5	0.3	0.5	1.4*	0.5	0.7	0.5
Tomatoes	0.3*	0.1	0.6	0.1	0.2	0.1	0.3	0.2
Other vegetables	4.8**	1.2	3.2	1.3	4.5**	1.4	5.9**	1.0
Sweets, desserts, and candy	8.4**	13.2	8.4	11.7	7.0**	13.5	10*	14.0
Sugar Sweetened beverages	2.3	2.0	3.5	1.6	1.7	2.0	2.4	2.4
Salty snacks	2.8	2.4	4.2	2.5	2.3	2.5	2.7	2.2
Added sugar	7.8**	22.1	6.5**	22.5	7.4**	22.5	8.8**	21.3
Solid fat	11.4**	21.8	13.0**	21.7	11.7**	21.6	10.3**	22.3
Alcohol	0.3**	4.2	0.4**	4.0	0.4**	3.9	0.2**	4.7

Table C.4 (continued)

	All Low-Income Individuals		SNAP Participants		Income-Eligible Nonparticipants		Other Low-Income Nonparticipants	
	Healthy Eaters (HEI $\geq$ 70)	Less- Healthy Eaters (HEI < 49)	Healthy Eaters (HEI $\geq$ 70)	Less- Healthy Eaters (HEI < 49)	Healthy Eaters (HEI $\geq$ 70)	Less- Healthy Eaters (HEI < 49)	Healthy Eaters (HEI $\geq$ 70)	Less- Healthy Eaters (HEI < 49)
Foods recommended for frequent consumption	14.7**	4.6	14.2**	4.6	14.7**	4.6	15.0**	4.7
Foods recommended for selective consumption	30.3**	11.9	29.3**	10.7	30.9**	12.7	30.1**	11.6
Foods recommended for occasional consumption	54.5**	82.9	55.3**	84.0	54.1**	82.1	54.7**	83.0

Source: NHANES 1999–2004.

\*Significantly different from less-healthy eaters at the .05 level, two-tailed test with Benjamini–Hochberg adjustment.

\*\*Significantly different from less-healthy eaters at the .01 level, two-tailed test with Benjamini–Hochberg adjustment.



Table C.5 Mean Nutrient Density and Energy Density: Adults Ages 19+

	All Low-Income Individuals		SNAP Participants		Income-Eligible Nonparticipants		Other Low-Income Nonparticipants	
	Healthy Eaters (HEI $\geq$ 70)	Less-Healthy Eaters (HEI < 49)	Healthy Eaters (HEI $\geq$ 70)	Less-Healthy Eaters (HEI < 49)	Healthy Eaters (HEI $\geq$ 70)	Less-Healthy Eaters (HEI < 49)	Healthy Eaters (HEI $\geq$ 70)	Less-Healthy Eaters (HEI < 49)
Num. of Individuals	506	2,792	76	661	243	1,260	187	871
Nutrient-Rich Score	121.3**	78.4	121.2**	76.9	118.8**	78.6	124.1**	79.4
Energy density, foods only	1.3**	1.8	1.3**	1.8	1.3**	1.8	1.3**	1.8
Energy density, with juice and milk	1.1**	1.7	1.2**	1.8	1.1**	1.7	1.1**	1.7

Source: NHANES 1999-2004.

\*Significantly different from less-healthy eaters at the .05 level, two-tailed test with Benjamini-Hochberg adjustment.

\*\*Significantly different from less-healthy eaters at the .01 level, two-tailed test with Benjamini-Hochberg adjustment.

Table C.6 Meal Patterns and Dietary Behaviors: Children Ages 2-18 (Entries in each column are the percentage of individuals who met row criteria or, for continuous variables, mean values)

	All Low-Income Individuals		SNAP Participants		Income-Eligible Nonparticipants		Other Low-Income Nonparticipants	
	Healthy Eaters (HEI $\geq$ 70)	Less-Healthy Eaters (HEI < 49)	Healthy Eaters (HEI $\geq$ 70)	Less-Healthy Eaters (HEI < 49)	Healthy Eaters (HEI $\geq$ 70)	Less-Healthy Eaters (HEI < 49)	Healthy Eaters (HEI $\geq$ 70)	Less-Healthy Eaters (HEI < 49)
Num. of Individuals	246	3,344	73	1,178	109	1,322	64	844
Ate Breakfast	97.7**	74.2	97.5**	75.9	98.7**	73.3	96.7**	73.5
Ate Three Meals	81.8**	53.2	77.1	55.6	80.1**	51.2	90.6**	53.3
Num. Snacks Eaten								
0	5.6	8.2	3.4	11.1	7.4	7.0	6.4	6.8
1	20.1	21.8	13.9	20.9	18.4	22.9	31.0	21.3
2	32.7	27.4	42.9	26.3	27.5	30.6	24.9	23.8
3+	41.6	42.6	39.8	41.7	46.7**	39.5	37.7	48.2
% Total Calories								
Breakfast	23.2**	16.3	22.8	17.4	26.0**	16.0	20.2	15.4
Lunch	25.4	24.6	28.0	25.7	23.6	24.6	24.2	23.4
Dinner	27.1	29.6	22.6	27.2	26.1	30.1	34.9	31.6
Snacks	24.0**	29.5	26.0	29.7	24.2	29.3	20.8*	29.6
Meals away from home	25.4	35.4	27.7	32.2	22.5**	34.8	25.8**	40.3
Recall Day Was a Weekend	21.6	28.6	14.2	26.2	34.0	27.3	16.2	33.4
Eats in Restaurant								
0 Times/Week	54.9**	29.4	70.1*	34.4	42.4	29.1	49.4	24.1
1 Times/Week	20.6	27.8	13.1	26.1	37.3	28.6	10.1**	28.7
2 Times/Week	11.1*	19.7	4.5*	19.5	15.0	20.2	15.4	19.1
3+ Times/Week	13.4	23.1	12.3	20.0	5.3**	22.2	25.1	28.1
Regularly Eats School Lunch	66.8	73.5	79.6	74.0	73.4	75.2	38.2	70.1
Regularly Eats School Breakfast	57.5	37.1	72.8	48.9	67.1**	38.5	21.2	19.2
Took 1+ Dietary Supplements	38.6	23.6	54.9	17.7	26.5	22.0	31.1	33.1

Source: NHANES 1999-2004.

\*Significantly different from less-healthy eaters at the .05 level, two-tailed test with Benjamini-Hochberg adjustment.

\*\*Significantly different from less-healthy eaters at the .01 level, two-tailed test with Benjamini-Hochberg adjustment.

Table C.7 Means of HEI-2005 Component Scores: Children Ages 2-18

	All Low-Income Individuals		SNAP Participants		Income-Eligible Nonparticipants		Other Low-Income Nonparticipants	
	Healthy Eaters (HEI $\geq$ 70)	Less-Healthy Eaters (HEI < 49)	Healthy Eaters (HEI $\geq$ 70)	Less-Healthy Eaters (HEI < 49)	Healthy Eaters (HEI $\geq$ 70)	Less-Healthy Eaters (HEI < 49)	Healthy Eaters (HEI $\geq$ 70)	Less-Healthy Eaters (HEI < 49)
Num. of Individuals	246	3,344	73	1,178	109	1,322	64	844
Total fruit	4.7**	1.5	4.9**	1.5	4.5**	1.4	4.6**	1.6
Whole fruit	4.1**	0.8	4.2**	0.7	4.2**	0.8	3.8**	0.8
Total vegetables	3.1**	2.0	3.0**	1.9	3.4**	2.1	2.7*	2.00
Dark green, orange vegetables	1.8**	0.4	2.2**	0.4	1.8**	0.4	1.5*	0.3
Total grains	4.3	4.3	4.2	4.2	4.5	4.4	4.1	4.4
Whole grains	1.3**	0.5	1.3*	0.4	0.9*	0.6	1.6**	0.5
Milk	7.9**	6.4	7.8	6.6	7.9**	6.1	8.0	6.7
Meat and beans	8.6**	6.3	8.3**	6.3	8.6**	6.5	9.1**	6.1
Oils	6.4**	4.0	5.1	3.8	6.9**	4.3	7.4**	3.8
Saturated fat	8.5**	4.2	8.8**	3.8	8.5**	4.4	8.1**	4.3
Sodium	5.7**	4.3	5.8*	4.5	5.4*	4.3	5.8	4.3
Calories from SoFAAS	18.7**	4.2	19.3**	4.3	18.4**	4.2	18.3**	4.1

Source: NHANES 1999-2004.

\*Significantly different from less-healthy eaters at the .05 level, two-tailed test with Benjamini-Hochberg adjustment.

\*\*Significantly different from less-healthy eaters at the .01 level, two-tailed test with Benjamini-Hochberg adjustment.

Table C.8 Food Choices, by Consumption: Children Ages 2-18 (Entries in each column are the percentage of individuals who met row criteria)

	All Low-Income Individuals		SNAP Participants		Income-Eligible Nonparticipants		Other Low-Income Nonparticipants	
	Healthy Eaters (HEI $\geq$ 70)	Less-Healthy Eaters (HEI < 49)	Healthy Eaters (HEI $\geq$ 70)	Less-Healthy Eaters (HEI < 49)	Healthy Eaters (HEI $\geq$ 70)	Less-Healthy Eaters (HEI < 49)	Healthy Eaters (HEI $\geq$ 70)	Less-Healthy Eaters (HEI < 49)
Num. of Individuals	246	3,344	73	1,178	109	1,322	64	844
Any milk	93.8**	72.1	92.9	75.7	94.9**	66.9	93.7**	75.8
Whole milk	26.0	33.7	30.5	45.3	27.4	26.3	17.7	31.0
1% or skim milk	22.8**	4.3	20.8	3.0	18.8	5.8	31.0*	3.7
Flavored milk	13.5	17.6	6.8	18.2	15.9	16.6	19.8	18.3
Yogurt	8.3	2.2	1.2	1.9	15.0	1.9	9.7	3.2
Cheese	13.7	20.2	9.7	19.1	14.1	16.4	18.9	27.2
Discrete serving of vegetables, including potatoes	69.0*	55.2	77.0	56.5	60.8	53.9	68.4	55.6
Discrete serving of vegetables, excluding French fries	53.2*	27.9	59.6	29.6	44.9	26.1	54.8	28.4
Discrete serving of vegetables, excluding potatoes and other starchy vegetables	30.6*	15.3	29.7	15	26.9	13.1	36.7	19.0
Discrete serving of raw vegetables, salad	21.0	12.5	13.5	10.8	16.7	11.4	37.3	16.2
Legumes	18.8**	6.3	16.5	6.2	22.2**	6.4	17.8	6.2
Discrete serving of fruit	85.2**	19.6	85.0**	18.4	92.1**	19.2	76.6**	21.8
Fresh fruit	79.0**	15.3	84.2**	14.6	79.9**	13.8	70.4**	18.5
Fruit juice	74.4**	24.7	86.4**	25.5	68.4**	21.7	65.2**	28.0
Any whole grains	39.3**	14	40.8**	14.6	33.4	13.1	44.8*	14.8
Nuts or seeds (including PB sandwiches)	16.8	6.9	8.0	5.0	21.7	7.8	23.1	7.6.0
Sugar-sweetened beverages	47.9**	82.7	53.4	81.6	49.4**	84.0	38.1**	82.1
Sweetened beverages, including artificially sweetened	52.4**	85.2	53.4	83.6	53.8**	86.7	49.4**	84.6
Salty snack	41.3	44.1	27.4	45.7	52	45.1	47.2	40.6
Any sweets, desserts, or candy	72.6	79.2	87.4**	80	67.5**	76.4	58.1**	82.5
Any dessert	46.7	63	44.6**	65.4	51.5**	58.7	43.5**	66.7
Any candy	32.9	35.2	52.0**	33.1	25.4**	35.6	15.5**	37.1

Source: NHANES 1999-2004.

\*Significantly different from less-healthy eaters at the .05 level, two-tailed test with Benjamini-Hochberg adjustment.

\*\*Significantly different from less-healthy eaters at the .01 level, two-tailed test with Benjamini-Hochberg adjustment.

Table C.9 Food Choices, by Relative Energy Contribution (Mean % of total calories):  
Children Ages 2-18

	All Low-Income Individuals		SNAP Participants		Income-Eligible Nonparticipants		Other Low-Income Nonparticipants	
	Healthy Eaters (HEI ≥ 70)	Less- Healthy Eaters (HEI < 49)	Healthy Eaters (HEI ≥ 70)	Less- Healthy Eaters (HEI < 49)	Healthy Eaters (HEI ≥ 70)	Less- Healthy Eaters (HEI < 49)	Healthy Eaters (HEI ≥ 70)	Less- Healthy Eaters (HEI < 49)
Num. of Individuals	246	3,344	73	1,178	109	1,322	64	844
Milk Group Foods	13.7*	11.1	13.9	12.7	14.2**	9.9	12.7	11.3
Whole milk	3.3	4.2	3.4	6.1	3.6	3.4	2.8	3.2
1% or skim milk	1.6*	0.3	0.5	0.3	1.2	0.3	3.7	0.3
Flavored milk	0.7	1.0	0.4	1.0	0.7	0.9	1.1	1.0
Cheese	0.5**	1.4	0.2**	1.2	0.7	1.1	0.6**	2.0
Yogurt	0.5	0.2	0.1	0.2	0.8	0.2	0.8	0.2
Meat and Bean Group Foods	12.6*	8.9	10.0	9.3	12.6	9.0	16.4**	8.2
Meat	2.6	1.9	2.4	2.0	3.4	2.0	1.7	1.5
Organ meats	0.2	0.0	0.0	0.0	0.3	0.0	0.2	0.0
Frankfurters, sausages, luncheon meats	0.2**	2.3	0**	2.3	0.3**	2.2	0.3**	2.4
Poultry	3.8	2.6	2.8	3.0	3.0	2.4	6.3	2.2
Fish	0.8	0.4	0.6	0.4	0.3	0.4	2.0	0.2
Eggs	1.2	1.0	1.9	1.0	0.8	1.0	0.5	0.9
Beans and peas	2.6*	0.5	2.0	0.5	2.8*	0.5	3.3	0.5
Soy products	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1
Nuts and seeds	1.0	0.2	0.4	0.1	0.9	0.3	2.2	0.2
Mixed Dishes	21.3**	28.2	18.1**	26.3	23.4	29.3	23.0	20.0
Pizza	1.5**	6.1	0.3**	4.5	0.5**	6.1	4.6	8.1
Sandwiches	7.8*	12.6	6.1	11.9	10.4	13.4	6.9	12.1
Pasta or rice dishes	3.1	4.0	1.7*	4.7	3.0	3.2	5.3	4.2
Grain Foods	17.7**	10.5	21.3*	10.7	14.8	10.2	16.4	10.9
Whole grains	4.9*	1.2	5.3	1.2	2.3	1.2	6.8	1.4
Not whole grains	21.8	19.2	23.1	17.5	21.6	19.9	19.5	19.9
Fruits	16.3**	2.5	19.7**	2.6	15.0**	2.3	12.9**	2.8
Fresh fruit	6.0**	0.6	4.9**	0.6	7.8**	0.5	5.2*	0.6
Canned fruit	1.0*	0.2	1.4	0.2	0.8	0.2	0.8	0.1
Juice	9.2**	1.8	13.3**	1.8	6.4**	1.5	6.9	2.0
Vegetables	4.4	5.2	4.1	5.0	4.5	5.4	4.8	5.2
Dark-green	0.1	0.1	0.1	0.1	0.2	0.1	0.1	0.1
Orange	0.2	0.0	0.1	0.1	0.1	0.0	0.3	0.0
White potatoes	2.5	4.0	2.3	3.6	2.6	4.3	2.7	4.1
French fries	2.1	3.2	2.0	2.9	2.3	3.4	2.2	3.1
Other starchy vegetables	0.6	0.4	0.8	0.6	0.6	0.4	0.4	0.2
Tomatoes	0.1	0.1	0.1	0.0	0.1	0.1	0.1	0.1
Other vegetables	1.0	0.6	0.8	0.7	0.9	0.6	1.3	0.7
Sweets, desserts, and candy	5.6**	14.3	5.9**	15.1	6.1**	13.4	4.3**	14.5
Sugar sweetened beverages	0.9	1.0	0.7	0.9	1.2	1.2	0.9	1.0
Salty snacks	3.9	4.4	2.7	4.5	4.9	4.8	4.4	3.8
Added sugar	7.3**	21.7	6.8**	20.7	6.9**	22.2	8.5**	22.2
Solid fat	11.6**	23.8	10.0**	24.8	12.8**	23.2	13.6**	23.7

Table C.9 (continued)

	All Low-Income Individuals		SNAP Participants		Income-Eligible Nonparticipants		Other Low-Income Nonparticipants	
	Healthy Eaters (HEI $\geq 70$ )	Less-Healthy Eaters (HEI $< 49$ )	Healthy Eaters (HEI $\geq 70$ )	Less-Healthy Eaters (HEI $< 49$ )	Healthy Eaters (HEI $\geq 70$ )	Less-Healthy Eaters (HEI $< 49$ )	Healthy Eaters (HEI $\geq 70$ )	Less-Healthy Eaters (HEI $< 49$ )
Foods recommended for frequent consumption	15.3**	3.5	16.0*	3.3	18.3**	3.7	11.0	3.3
Foods recommended for selective consumption	34.9**	9.9	40.8**	10.0	26.8**	9.2	31.4**	11.0
Foods recommended for occasional consumption	49.4**	86.1	42.8**	86.3	54.5**	86.6	56.8**	85.0

Source: NHANES 1999–2004.

\*Significantly different from less-healthy eaters at the .05 level, two-tailed test with Benjamini-Hochberg adjustment.

\*\*Significantly different from less-healthy eaters at the .01 level, two-tailed test with Benjamini-Hochberg adjustment.

Table C.10 Mean Nutrient Density and Energy Density: Children Ages 2-18

	All Low-Income Individuals		SNAP Participants		Income-Eligible Nonparticipants		Other Low-Income Nonparticipants	
	Healthy Eaters (HEI $\geq$ 70)	Less- Healthy Eaters (HEI < 49)	Healthy Eaters (HEI $\geq$ 70)	Less- Healthy Eaters (HEI < 49)	Healthy Eaters (HEI $\geq$ 70)	Less- Healthy Eaters (HEI < 49)	Healthy Eaters (HEI $\geq$ 70)	Less- Healthy Eaters (HEI < 49)
Num. of Individuals	246	3,344	73	1,178	109	1,322	64	844
Nutrient-Rich Score	122.5**	85.7	119.9**	87.2	128.8**	83.4	117.9**	87.4
Energy density, foods only	1.4**	2.2	1.3**	2.1	1.4**	2.2	1.6**	2.2
Energy density, with juice and milk	1.1**	1.8	1.0**	1.8	1.2**	1.9	1.2**	1.8

Source: NHANES 1999-2004.

\*Significantly different from less-healthy eaters at the .05 level, two-tailed test with Benjamini-Hochberg adjustment.

\*\*Significantly different from less-healthy eaters at the .01 level, two-tailed test with Benjamini-Hochberg adjustment.

## APPENDIX D

### SOCIODEMOGRAPHIC CHARACTERISTICS: TABLES WITH STANDARD ERRORS



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Table D.1 Associations Between Person-Level Sociodemographic Characteristics and Healthy Eating Index- 2005 Scores: Adults Ages 19+ – Standard Errors

	All Low-Income Individuals		SNAP Participants		Income-Eligible Nonparticipants		Other Low-Income Nonparticipants	
	Healthy Eaters (HEI $\geq$ 70)	Less-Healthy Eaters (HEI < 49)	Healthy Eaters (HEI $\geq$ 70)	Less-Healthy Eaters (HEI < 49)	Healthy Eaters (HEI $\geq$ 70)	Less-Healthy Eaters (HEI < 49)	Healthy Eaters (HEI $\geq$ 70)	Less-Healthy Eaters (HEI < 49)
Num. of Individuals	506	2,792	76	661	243	1,260	187	871
Sex								
Male	2.5	1.5	8.5	2.0	4.4	1.8	3.8	2.2
Female	2.5	1.5	8.5	2.0	4.4	1.8	3.8	2.2
Age								
19-30	2.6	1.4	7.5	2.8	3.7	2.3	4.1	2.2
31-40	2.5	1.5	5.7	2.1	4.0	1.6	3.2	2.2
41-50	2.6	0.9	7.5	2.4	3.6	1.4	4.0	1.7
51-60	2.4	0.9	7.2	1.6	3.9	1.2	2.1	1.8
>60	4.0	0.9	6.9	1.4	6.0	1.2	5.3	1.7
Race/Ethnicity								
Non-Hisp., White	3.8	3.4	8.8	5.0	5.7	3.7	4.7	3.2
Non-Hisp., Black	2.1	2.3	3.8	3.8	2.8	2.5	2.2	2.0
Hispanic	4.0	3.1	9.6	4.7	5.6	3.6	4.5	2.4
Other	1.4	1.2	3.0	2.5	3.1	1.1	2.7	1.1
US-born	3.6	1.7	9.3	1.5	5.1	2.4	4.1	2.0
10 or More Years in the USA	2.8	1.0	10.5	0.9	3.4	1.3	3.1	1.5
Education Level								
Less than HS	3.3	1.5	9.5	2.7	4.5	2.3	3.9	2.5
HS/GED	3.1	1.4	8.4	3.5	4.9	2.2	7.0	2.5
More than HS	4.0	1.6	9.4	2.7	5.5	2.9	8.0	2.2
Married	3.6	1.6	7.9	2.7	5.1	1.6	6.2	2.7
Work Hours								
0	3.5	1.2	10.2	2.8	4.5	1.8	5.0	2.4
1 to 34	2.6	0.8	5.4	1.6	3.0	1.5	4.1	1.4
35 or more	3.4	1.2	6.3	2.3	4.1	1.4	6.6	2.5
Work at Least 20 Hours	3.4	1.4	9.9	2.7	4.6	1.8	5.2	2.5
Employed	3.5	1.2	10.2	2.8	4.5	1.8	5.0	2.4

Source: NHANES 1999-2004.

Table D.2 Associations Between Household-Level Sociodemographic Characteristics and Healthy Eating Index-2005 Scores: Adults Ages 19+ - Standard Errors

	All Low-Income Individuals		SNAP Participants		Income-Eligible Nonparticipants		Other Low-Income Nonparticipants	
	Healthy Eaters (HEI $\geq$ 70)	Less-Healthy Eaters (HEI<49)	Healthy Eaters (HEI $\geq$ 70)	Less-Healthy Eaters (HEI<49)	Healthy Eaters (HEI $\geq$ 70)	Less-Healthy Eaters (HEI<49)	Healthy Eaters (HEI $\geq$ 70)	Less-Healthy Eaters (HEI<49)
Num. of Individuals	506	2,792	76	661	243	1,260	187	871
Household Size								
1	3.4	1.3	7.5	2.2	4.2	1.7	4.8	1.7
2	3.7	1.5	5.9	2.6	4.5	2.9	5.9	2.2
3	2.4	1.4	5.7	2.7	3.0	1.8	4.4	2.4
4	2.9	1.4	6.6	2.8	3.6	1.8	6.1	1.8
5+	2.8	1.2	7.4	3.6	4.6	1.9	3.5	2.0
Household Participates in WIC	3.9	1.4	12.5	2.8	3.6	2.4	3.4	1.7
Household Food Security Level								
Full	3.2	2.1	9.2	3.7	3.7	2.7	3.6	2.4
Marginal	2.0	1.2	6.9	2.7	2.0	1.3	1.8	1.3
Low	2.5	1.0	8.8	2.2	3.1	1.9	3.3	1.1
Very Low	1.6	0.9	6.2	2.5	0.9	1.1	2.5	1.4
Adult Food Security Level								
Full	3.2	2.0	9.3	3.4	3.6	2.7	3.6	2.3
Marginal	2.0	1.2	6.9	2.7	2.1	1.4	1.8	1.2
Low	2.6	1.0	8.8	2.2	3.4	1.9	3.2	1.1
Very Low	1.6	0.9	6.2	2.9	0.9	1.1	2.5	1.4
Home Owned	3.6	2.2	8.2	2.8	4.7	2.5	4.8	2.9
Someone in Household Smokes	1.7	2.2	6.0	3.4	1.9	3.2	2.1	2.4

Source: NHANES 1999-2004.

Table D.3 Associations Between Health-Related Characteristics and Healthy Eating Index-2005 Scores: Adults Ages 19+ - Standard Errors

	All Low-Income Individuals		SNAP Participants		Income-Eligible Nonparticipants		Other Low-Income Nonparticipants	
	Healthy Eaters (HEI $\geq$ 70)	Less-Healthy Eaters (HEI < 49)	Healthy Eaters (HEI $\geq$ 70)	Less-Healthy Eaters (HEI < 49)	Healthy Eaters (HEI $\geq$ 70)	Less-Healthy Eaters (HEI < 49)	Healthy Eaters (HEI $\geq$ 70)	Less-Healthy Eaters (HEI < 49)
Num. of Individuals	506	2,792	76	661	243	1,260	187	871
Obese	2.9	1.1	7.8	3.0	3.9	1.8	5.6	2.2
Overweight or Obese	3.9	1.2	7.9	3.2	5.7	2.1	5.0	2.2
High Blood Pressure	3.2	1.2	10.7	2.4	4.5	1.6	4.1	2.1
High Cholesterol	3.1	1.0	8.1	2.4	3.7	1.6	5.1	2.2
Diabetes	2.2	0.5	6.5	1.2	3.0	0.9	4.0	1.0
Has Health Insurance	2.4	1.5	6.7	2.6	4.3	2.1	2.9	2.3
Health Condition Good or Better	2.7	1.5	7.8	2.6	4.1	1.9	3.1	1.7
Doctor Said Overweight	3.3	1.3	6.8	2.9	5.2	1.8	4.6	2.0
Ever Had Cancer	2.2	0.6	5.2	2.5	2.9	1.1	4.4	1.1
Walked/Bicycled in Past 30 Days	2.8	1.5	7.0	2.9	3.2	2.2	4.8	2.1
Daily Physical Activity in Past 30 Days High	2.9	1.4	5.4	2.7	3.7	2.1	5.4	2.5
Vigorous Activity in Past 30 Days	3.4	1.2	2.3	2.5	5.1	1.6	5.3	2.0
Moderate Activity in Past 30 Days	3.8	1.8	8.3	3.3	5.5	2.6	6.5	2.7
More Active than Peers	2.9	1.1	5.4	2.3	3.7	1.5	5.1	2.0
Has Work Limitations	2.5	1.4	9.8	2.9	3.7	1.4	3.5	1.7
Taken Prescriptions in Past Month	4.4	1.7	9.9	2.7	5.0	2.3	6.7	2.2
Now Smoking	1.5	1.8	5.9	2.6	1.4	2.5	2.6	2.1
Consider Self Overweight	2.8	1.1	6.0	2.7	4.9	1.8	4.6	2.3
Would Like to Weigh Less	3.0	1.1	6.3	2.5	5.7	1.7	4.4	2.0
Screen Time at Least 2 Hrs/Day	3.8	1.3	10.1	2.0	3.9	2.1	6.9	2.4

Source: NHANES 1999-2004

Table D.4 Associations Between Person-Level Sociodemographic Characteristics and Healthy Eating Index- 2005 Scores: Children Ages 2- 18 - Standard Errors

	All Low-Income Individuals		SNAP Participants		Income-Eligible Nonparticipants		Other Low-Income Nonparticipants	
	Healthy Eaters (HEI $\geq$ 70)	Less-Healthy Eaters (HEI < 49)	Healthy Eaters (HEI $\geq$ 70)	Less-Healthy Eaters (HEI < 49)	Healthy Eaters (HEI $\geq$ 70)	Less-Healthy Eaters (HEI < 49)	Healthy Eaters (HEI $\geq$ 70)	Less-Healthy Eaters (HEI < 49)
Num. of Individuals	246	3,344	73	1,178	109	1,322	64	844
Sex								
Male	7.8	1.3	15.2	2.5	5.1	2.5	11.7	2.2
Female	7.8	1.3	15.2	2.5	5.1	2.5	11.7	2.2
Age								
2-5	6.7	1.0	18.1	2.1	5.7	1.5	10.1	2.1
6-11	9.8	1.3	21.0	2.8	7.6	2.1	9.3	3.4
12-18	5.2	1.6	5.3	2.9	5.1	1.9	10.5	3.1
Race/Ethnicity								
Non-Hisp., White	9.2	3.6	13.4	5.2	10.2	4.4	10.1	4.2
Non-Hisp., Black	2.9	2.4	5.3	3.6	3.1	2.6	5.8	2.2
Hispanic	6.3	2.8	9.0	3.2	7.0	3.4	7.3	3.2
Other	3.0	1.6	0.6	1.9	8.1	1.9	3.3	2.7
US-born	3.8	0.8	8.5	1.5	4.2	1.2	4.1	0.8
Currently in School	1.8	0.9	1.4	2.2	3.7	1.2	2.4	1.3

Source: NHANES 1999-2004

Table D.5 Associations Between Household-Level Sociodemographic Characteristics and Healthy Eating Index-2005 Scores: Children Ages 2-18 - Standard Errors

	All Low-Income Individuals		SNAP Participants		Income-Eligible Nonparticipants		Other Low-Income Nonparticipants	
	Healthy Eaters (HEI $\geq$ 70)	Less-Healthy Eaters (HEI < 49)	Healthy Eaters (HEI $\geq$ 70)	Less-Healthy Eaters (HEI < 49)	Healthy Eaters (HEI $\geq$ 70)	Less-Healthy Eaters (HEI < 49)	Healthy Eaters (HEI $\geq$ 70)	Less-Healthy Eaters (HEI < 49)
Num. of Individuals	250	3,360	74	1,168	112	1,324	64	847
Household Size								
1	0.0	0.4	0.0	0.0	0.0	0.4	0.0	0.9
2	1.3	0.7	2.0	0.9	2.3	1.5	1.6	1.8
3	3.2	1.6	3.7	1.7	4.0	2.3	8.5	2.3
4	10.2	1.9	15.1	3.6	3.8	2.4	11.1	3.0
5+	9.4	2.4	12.3	3.4	5.9	3.3	12.9	3.7
Sex of HH Ref Person								
Male	7.5	1.8	8.9	2.9	9.8	2.8	9.8	3.6
Female	7.5	1.8	8.9	2.9	9.8	2.8	9.8	3.6
Age of HH Ref Person								
19-30	9.9	2.0	14.6	3.1	7.3	3.7	10.7	4.2
31-40	7.9	1.9	11.3	3.3	9.0	2.5	12.6	4.7
41-50	4.1	1.8	5.3	1.7	5.1	2.9	10.5	2.8
51-60	1.2	0.9	0.9	1.1	1.6	2.0	3.4	1.2
>60	1.1	0.6	0.5	0.9	3.0	1.3	1.2	1.1
HH Ref Person US-born	8.0	2.0	11.7	2.6	10.3	3.0	9.4	2.1
Education Level of HH Ref Person								
Less than HS	5.8	2.3	12.9	3.4	6.6	2.9	4.3	4.3
HS/GED	9.7	1.9	16.9	3.0	7.6	2.8	8.0	4.1
More than HS	6.3	2.0	6.7	2.7	6.3	3.4	7.8	3.7
HH Ref Person Married	5.9	2.2	14.4	3.8	6.5	3.0	7.4	4.3
Household Participates in WIC	7.8	1.3	17.4	3.0	10.0	2.2	6.3	2.8
Household Food Security Level								
Full	8.2	2.5	12.1	3.0	9.9	3.3	8.8	3.2
Marginal	3.6	1.6	2.4	3.1	7.4	1.8	7.3	2.5
Low	5.3	1.4	11.9	3.2	8.9	1.9	3.2	1.2
Very Low	11.5	1.4	22.0	3.4	0.8	1.6	7.2	1.6
Child Food Security Level								
Full	9.4	2.1	14.8	3.7	10.8	2.8	7.4	2.7
Marginal	2.8	1.2	3.0	2.0	7.3	1.6	1.3	1.9
Low	10.1	1.3	16.8	2.7	9.4	2.1	7.3	1.6
Very Low	0.3	1.0	0.6	2.5	0.4	0.6	0.0	1.1
Home is Owned	8.0	2.4	4.7	2.8	10.5	3.4	10.7	3.4
Someone in Household Smokes	10.2	2.4	16.4	3.9	6.7	3.4	7.8	3.8

Source: NHANES 1999-2004.

Note: The household reference (HH Ref) person is defined as the first household member 18 years of age or older listed on the NHANES screener household member roster who owns or rents the residence where members of the household reside.

Table D.6 Associations Between Health-Related Characteristics and Healthy Eating Index-2005 Scores: Children Ages 2-18 - Standard Errors

	All Low-Income Individuals		SNAP Participants		Income-Eligible Nonparticipants		Other Low-Income Nonparticipants	
	Healthy Eaters (HEI $\geq$ 70)	Less-Healthy Eaters (HEI < 49)	Healthy Eaters (HEI $\geq$ 70)	Less-Healthy Eaters (HEI < 49)	Healthy Eaters (HEI $\geq$ 70)	Less-Healthy Eaters (HEI < 49)	Healthy Eaters (HEI $\geq$ 70)	Less-Healthy Eaters (HEI < 49)
Num. of Individuals	250	3,360	74	1,168	112	1,324	64	847
Obese	4.9	1.1	9.0	2.1	5.5	1.5	3.6	2.1
Overweight or Obese	3.8	1.7	7.3	2.4	5.4	2.3	9.0	3.2
Has Health Insurance	3.9	1.6	2.4	2.0	5.7	2.4	6.8	2.7
Health Condition Good or Better	5.6	0.7	11.2	1.5	1.7	1.3	2.0	1.3
Doctor Said Overweight	5.0	0.7	9.7	1.1	3.1	1.1	3.1	1.1
Taken Prescriptions in Past Month	4.2	1.5	2.9	2.5	6.3	2.9	9.7	2.3
Screen Time at Least 2 Hrs/Day	6.5	2.2	14.8	1.8	9.1	3.7	6.2	2.6

Source: NHANES 1999-2004.

## APPENDIX E

### DIETARY CHARACTERISTICS: TABLES WITH STANDARD ERRORS



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Table E.1 Meal Patterns and Dietary Behaviors: Adults Ages 19+ - Standard Errors

	All Low-Income Individuals		SNAP Participants		Income-Eligible Nonparticipants		Other Low-Income Nonparticipants	
	Healthy Eaters (HEI $\geq$ 70)	Less-Healthy Eaters (HEI < 49)	Healthy Eaters (HEI $\geq$ 70)	Less-Healthy Eaters (HEI < 49)	Healthy Eaters (HEI $\geq$ 70)	Less-Healthy Eaters (HEI < 49)	Healthy Eaters (HEI $\geq$ 70)	Less-Healthy Eaters (HEI < 49)
Num. of Individuals	506	2792	76	661	243	1260	187	871
Ate Breakfast	1.75	1.28	2.11	2.36	2.63	2.06	3.42	2.05
Ate Three Meals	3.30	1.54	8.22	2.34	4.66	2.15	4.39	2.56
Num. Snacks Eaten								
0	2.87	0.89	3.75	1.22	2.82	1.63	6.07	1.4
1	2.78	1.35	0.01	2.67	3.58	1.39	3.57	2.48
2	3.39	1.27	6.58	1.77	3.95	1.80	6.07	1.94
3+	3.21	1.32	8.41	2.58	4.29	1.74	4.30	2.43
% Total Calories								
Breakfast	1.08	0.42	2.87	0.83	1.50	0.77	1.50	0.60
Lunch	1.47	0.69	3.25	1.06	1.40	1.04	2.37	0.76
Dinner	1.35	0.57	3.67	1.41	1.95	0.81	1.64	0.94
Snacks	1.20	0.59	3.21	1.14	1.57	0.97	1.90	1.00
Meals away from home	1.46	1.11	4.19	1.74	2.14	1.92	2.36	1.62
Recall Day Was a Weekend	1.90	1.34	7.08	1.96	2.66	1.51	2.88	2.44
Eats in Restaurant								
0 Times/Week	3.52	1.21	0.69	3.03	4.95	2.02	5.21	1.80
1 Times/Week	3.52	1.11	9.84	1.8	4.41	1.62	5.07	1.95
2 Times/Week	2.61	1.12	6.63	2.97	3.68	1.62	3.73	1.37
3+ Times/Week	1.83	1.13	4.30	2.38	3.38	2.10	3.33	1.99
Alcohol Consumption								
None	5.49	1.74	9.60	2.82	6.12	1.80	7.60	2.76
1 or fewer drinks	4.07	1.28	9.64	2.21	5.41	2.13	6.02	1.91
2 or 3 drinks	3.09	1.49	5.05	2.72	3.89	2.17	5.49	2.40
4+ drinks	2.46	1.63	1.12	2.89	4.70	2.42	3.93	2.77
Took 1+ Dietary Supplements	3.35	1.11	6.77	2.55	5.04	1.92	5.50	2.70

Source: NHANES

1999-2004.

Table E.2 Means of HEI-2005 Component Scores: Adults ages 19+ – Standard Errors

	All Low-Income Individuals		SNAP Participants		Income-Eligible Nonparticipants		Other Low-Income Nonparticipants	
	Healthy Eaters (HEI $\geq$ 70)	Less- Healthy Eaters (HEI < 49)	Healthy Eaters (HEI $\geq$ 70)	Less- Healthy Eaters (HEI < 49)	Healthy Eaters (HEI $\geq$ 70)	Less- Healthy Eaters (HEI < 49)	Healthy Eaters (HEI $\geq$ 70)	Less- Healthy Eaters (HEI < 49)
Num. of Individuals	506	2792	76	661	243	1260	187	871
Total fruit	0.08	0.04	0.14	0.07	0.13	0.06	0.12	0.07
Whole fruit	0.10	0.05	0.26	0.06	0.12	0.06	0.16	0.08
Total vegetables	0.09	0.04	0.27	0.09	0.15	0.08	0.12	0.08
Dark green, orange vegetables	0.15	0.03	0.32	0.09	0.23	0.06	0.20	0.05
Total grains	0.05	0.04	0.22	0.09	0.06	0.05	0.07	0.06
Whole grains	0.10	0.03	0.24	0.04	0.14	0.05	0.18	0.04
Milk	0.32	0.09	0.60	0.20	0.39	0.12	0.52	0.16
Meat and beans	0.12	0.08	0.24	0.18	0.21	0.11	0.16	0.15
Oils	0.21	0.08	0.56	0.20	0.29	0.12	0.27	0.14
Saturated fat	0.13	0.12	0.45	0.22	0.14	0.16	0.14	0.17
Sodium	0.24	0.11	0.39	0.18	0.31	0.11	0.42	0.18
Calories from SoFAAS	0.14	0.12	0.39	0.28	0.17	0.15	0.21	0.20

Source: NHANES 1999-2004.

Table E.3 Food Choices, by Consumption: Adults Ages 19+ - Standard Errors

	All Low-Income Individuals		SNAP Participants		Income-Eligible Nonparticipants		Other Low-Income Nonparticipants	
	Healthy Eaters (HEI $\geq$ 70)	Less-Healthy Eaters (HEI<49)	Healthy Eaters (HEI $\geq$ 70)	Less-Healthy Eaters (HEI<49)	Healthy Eaters (HEI $\geq$ 70)	Less-Healthy Eaters (HEI<49)	Healthy Eaters (HEI $\geq$ 70)	Less-Healthy Eaters (HEI<49)
Num. of Individuals	506	2792	76	661	243	1260	187	871
Any milk	3.51	1.83	6.67	2.56	3.90	2.43	6.47	3.16
Whole milk	2.78	0.94	7.43	1.85	3.77	1.73	2.98	1.70
1% or skim milk	3.47	0.42	6.63	0.66	4.65	0.63	5.40	1.13
Flavored milk	1.01	0.71	0.00	1.01	0.31	1.23	2.55	0.93
Yogurt	1.24	0.28	0.12	0.49	1.59	0.35	2.72	0.58
Cheese	2.64	1.23	5.91	1.93	3.74	1.37	4.34	2.36
Discrete serving of vegetables, including potatoes	2.28	1.65	5.58	2.15	4.02	2.39	3.54	2.40
Discrete serving of vegetables, excluding French fries	3.43	1.61	6.77	2.98	5.37	2.09	4.11	2.28
Discrete serving of vegetables, excluding potatoes and other starchy vegetables	3.34	1.25	7.37	2.3	5.02	1.93	5.79	2.22
Discrete serving of raw vegetables, salad	3.32	1.07	7.15	1.87	4.92	1.25	5.68	2.13
Legumes	2.26	0.59	8.76	1.24	3.26	1.05	3.25	1.24
Discrete serving of fruit	2.28	1.12	6.87	1.24	2.46	1.45	3.47	1.77
Fresh fruit	2.62	0.96	7.36	1.26	3.25	1.38	3.57	1.53
Fruit juice	3.08	0.89	8.04	1.54	4.87	1.42	3.88	1.69
Any whole grains	3.41	0.75	7.41	1.23	4.43	0.97	6.13	1.44
Nuts or seeds (including PB sandwiches)	3.73	0.64	6.88	1.09	3.82	0.73	6.45	1.30
Sugar-sweetened beverages	2.24	1.05	9.17	2.22	3.95	1.58	4.09	2.09
Sweetened beverages, including artificially sweetened	3.92	0.92	8.92	1.98	5.05	1.43	6.7	1.65
Alcohol	1.39	1.17	6.17	2.14	1.77	1.24	1.82	2.18
Salty snack	3.59	1.21	8.80	2.01	4.67	1.68	6.400	2.31
Any sweets, desserts, or candy	2.81	0.98	4.90	2.54	4.00	1.75	5.08	1.48
Any dessert	3.18	1.46	6.42	2.38	3.56	1.78	6.46	2.35
Any candy	2.96	1.25	6.30	2.08	2.54	1.78	6.74	2.16

Source: NHANES 1999-2004.

Table E.4 Food Choices, by Relative Energy Contribution: Adults Ages 19+ - Standard Errors

	All Low-Income Individuals		SNAP Participants		Income-Eligible Nonparticipants		Other Low-Income Nonparticipants	
	Healthy Eaters (HEI $\geq$ 70)	Less-Healthy Eaters (HEI < 49)	Healthy Eaters (HEI $\geq$ 70)	Less-Healthy Eaters (HEI < 49)	Healthy Eaters (HEI $\geq$ 70)	Less-Healthy Eaters (HEI < 49)	Healthy Eaters (HEI $\geq$ 70)	Less-Healthy Eaters (HEI < 49)
Num. of Individuals	506	2792	76	661	243	1260	187	871
Milk Group Foods	0.47	0.23	1.07	0.38	0.69	0.31	0.71	0.41
Whole milk	0.21	0.11	0.82	0.29	0.20	0.16	0.23	0.19
1% or skim milk	0.31	0.04	0.36	0.06	0.51	0.07	0.47	0.11
Flavored milk	0.05	0.04	0.00	0.06	0.03	0.07	0.11	0.04
Cheese	0.10	0.12	0.24	0.11	0.18	0.16	0.15	0.22
Yogurt	0.10	0.03	0.01	0.04	0.14	0.03	0.19	0.06
Meat and Bean Group Foods	1.19	0.42	3.03	1.04	1.56	0.73	1.91	0.74
Meat	0.25	0.25	0.71	0.81	0.51	0.33	0.23	0.31
Organ meats	0.05	0.02	0.32	0.01	0.00	0.05	0.02	0.03
Frankfurters, sausages, luncheon meats	0.06	0.13	0.17	0.27	0.11	0.21	0.11	0.23
Poultry	0.48	0.23	1.33	0.53	0.42	0.25	0.87	0.37
Fish	0.30	0.11	0.62	0.21	0.52	0.18	0.53	0.13
Eggs	0.52	0.11	0.75	0.2	0.67	0.18	1.03	0.17
Beans and peas	0.35	0.10	1.23	0.24	0.52	0.12	0.47	0.14
Soy products	0.46	0.01	2.22	0.00	0.14	0.02	0.62	0.01
Nuts and seeds	0.76	0.08	1.41	0.05	0.88	0.16	1.08	0.08
Mixed Dishes	1.25	0.72	2.34	1.66	1.62	0.67	2.78	1.43
Pizza	0.23	0.45	0.68	1.03	0.40	0.40	0.14	0.97
Sandwiches	1.01	0.83	2.15	1.31	1.31	0.82	1.72	1.23
Pasta or rice dishes	0.59	0.29	0.72	0.97	0.60	0.26	1.51	0.35
Grain Foods	0.78	0.36	1.85	0.71	1.29	0.57	1.51	0.35
Whole grains	0.80	0.15	1.99	0.21	1.32	0.24	1.81	0.22
Not whole grains	1.33	1.07	2.09	1.71	1.58	0.77	2.79	1.83
Fruits	0.45	0.10	0.81	0.21	0.74	0.19	0.73	0.17
Fresh fruit	0.28	0.08	0.60	0.16	0.38	0.13	0.42	0.08
Canned fruit	0.12	0.03	0.49	0.02	0.15	0.03	0.12	0.07
Juice	0.44	0.07	0.90	0.14	0.61	0.12	0.70	0.14
Vegetables	0.65	0.31	1.10	0.75	1.07	0.41	1.20	0.42
Dark-green	0.08	0.02	0.09	0.04	0.16	0.02	0.06	0.03
Orange	0.14	0.04	0.18	0.04	0.20	0.07	0.28	0.05
White potatoes	0.30	0.26	0.63	0.45	0.55	0.34	0.37	0.40
French fries	0.26	0.25	0.37	0.48	0.45	0.25	0.29	0.42
Other starchy vegetables	0.18	0.07	0.21	0.11	0.34	0.10	0.22	0.14
Tomatoes	0.07	0.02	0.24	0.04	0.09	0.02	0.11	0.03
Other vegetables	0.71	0.17	1.32	0.54	0.94	0.23	1.15	0.15
Sweets, desserts, and candy	0.62	0.43	1.36	0.69	0.46	0.54	1.32	0.74
Sugar sweetened beverages	0.29	0.10	1.17	0.22	0.23	0.17	0.45	0.13
Salty snacks	0.43	0.12	1.62	0.21	0.59	0.19	0.67	0.24
Added sugar	0.50	0.41	1.11	1.16	0.64	0.55	0.80	0.81
Solid fat	0.35	0.29	0.96	0.84	0.53	0.29	0.44	0.45
Alcohol	0.13	0.36	0.28	0.94	0.26	0.40	0.05	0.61

Table E.4 (continued)

	All Low-Income Individuals		SNAP Participants		Income-Eligible Nonparticipants		Other Low-Income Nonparticipants	
	Healthy Eaters (HEI $\geq 70$ )	Less- Healthy Eaters (HEI $< 49$ )	Healthy Eaters (HEI $\geq 70$ )	Less- Healthy Eaters (HEI $< 49$ )	Healthy Eaters (HEI $\geq 70$ )	Less- Healthy Eaters (HEI $< 49$ )	Healthy Eaters (HEI $\geq 70$ )	Less- Healthy Eaters (HEI $< 49$ )
Foods recommended for frequent consumption	0.81	0.27	2.74	0.69	1.25	0.40	1.80	0.42
Foods recommended for selective consumption	1.68	0.43	4.17	1.09	1.90	0.79	3.40	0.67
Foods recommended for occasional consumption	1.83	0.56	3.92	1.17	1.85	1.10	4.61	0.74

Source: NHANES 1999–2004.

Table E.5 Nutrient Density and Energy Density: Adults Ages 19+ - Standard Errors

	All Low-Income Individuals		SNAP Participants		Income-Eligible Nonparticipants		Other Low-Income Nonparticipants	
	Healthy Eaters (HEI $\geq$ 70)	Less- Healthy Eaters (HEI<49)	Healthy Eaters (HEI $\geq$ 70)	Less- Healthy Eaters (HEI<49)	Healthy Eaters (HEI $\geq$ 70)	Less- Healthy Eaters (HEI<49)	Healthy Eaters (HEI $\geq$ 70)	Less- Healthy Eaters (HEI<49)
Num. of Individuals	506	2792	76	661	243	1260	187	871
Nutrient-Rich Score	3.08	0.69	9.50	1.62	3.50	0.93	5.78	0.94
Energy density, foods only	0.03	0.02	0.05	0.04	0.05	0.03	0.06	0.04
Energy density, with juice and milk	0.03	0.02	0.05	0.04	0.05	0.03	0.06	0.03

Source: NHANES 1999–2004.

Table E.6 Meal Patterns and Dietary Behaviors: Children Ages 2-18 - Standard Errors

	All Low-Income Individuals		SNAP Participants		Income-Eligible Nonparticipants		Other Low-Income Nonparticipants	
	Healthy Eaters (HEI $\geq 70$ )	Less-Healthy Eaters (HEI < 49)	Healthy Eaters (HEI $\geq 70$ )	Less-Healthy Eaters (HEI < 49)	Healthy Eaters (HEI $\geq 70$ )	Less-Healthy Eaters (HEI < 49)	Healthy Eaters (HEI $\geq 70$ )	Less-Healthy Eaters (HEI < 49)
Num. of Individuals	246	3344	73	1178	109	1322	64	844
Ate Breakfast	0.99	1.28	1.72	2.07	0.52	1.92	1.78	2.65
Ate Three Meals	4.33	1.54	11.22	2.88	4.40	2.67	3.20	2.73
Num. Snacks Eaten								
0	1.63	0.77	2.78	1.70	2.83	1.01	3.54	1.28
1	5.36	1.23	6.38	2.16	4.39	2.08	14.07	2.18
2	5.45	1.62	7.70	2.17	8.63	2.71	6.94	2.87
3+	4.97	1.97	6.01	3.65	9.41	2.22	11.46	3.61
% Total Calories								
Breakfast	1.31	0.44	2.30	0.87	1.79	0.53	2.37	0.70
Lunch	1.84	0.48	3.53	1.06	2.24	0.8	1.45	0.97
Dinner	1.70	0.73	1.86	1.00	1.40	1.39	3.41	1.36
Snacks	1.06	0.70	2.67	1.15	2.26	1.20	3.05	1.18
Meals away from home	4.99	1.11	11.87	1.48	2.27	1.53	4.11	2.33
Recall Day Was a Weekend	4.92	1.47	6.22	2.51	6.71	1.79	8.44	3.10
Eats in Restaurant								
0 Times/Week	7.65	1.49	12.27	2.29	8.68	2.00	11.75	4.15
1 Times/Week	4.53	1.49	5.95	1.85	6.49	2.32	3.52	2.93
2 Times/Week	3.21	1.41	3.05	2.72	6.97	2.01	8.59	2.19
3+ Times/Week	5.13	1.65	7.32	1.76	2.47	2.53	13.98	4.89
Regularly Eats School Lunch	10.61	2.00	15.91	3.47	9.32	2.67	13.93	2.84
Regularly Eats School Breakfast	12.63	2.21	18.83	3.81	7.63	3.74	8.39	2.89
Took 1+ Dietary Supplements	9.37	1.81	17.83	2.72	6.30	2.48	8.22	4.09

Source: NHANES 1999-2004.



Table E.7 Means of HEI-2005 Component Scores: Children Ages 2-18 – Standard Errors

	All Low-Income Individuals		SNAP Participants		Income-Eligible Nonparticipants		Other Low-Income Nonparticipants	
	Healthy Eaters (HEI $\geq$ 70)	Less- Healthy Eaters (HEI < 49)	Healthy Eaters (HEI $\geq$ 70)	Less- Healthy Eaters (HEI < 49)	Healthy Eaters (HEI $\geq$ 70)	Less- Healthy Eaters (HEI < 49)	Healthy Eaters (HEI $\geq$ 70)	Less- Healthy Eaters (HEI < 49)
Num. of Individuals	246	3344	73	1178	109	1322	64	844
Total fruit	0.10	0.06	0.08	0.10	0.21	0.09	0.17	0.09
Whole fruit	0.29	0.06	0.40	0.07	0.27	0.07	0.66	0.09
Total vegetables	0.21	0.04	0.34	0.10	0.28	0.06	0.36	0.09
Dark green, orange vegetables	0.19	0.04	0.35	0.08	0.18	0.05	0.45	0.05
Total grains	0.17	0.04	0.21	0.07	0.18	0.06	0.49	0.05
Whole grains	0.16	0.03	0.34	0.04	0.13	0.06	0.24	0.05
Milk	0.34	0.15	0.66	0.21	0.33	0.22	0.63	0.20
Meat and beans	0.18	0.1	0.31	0.17	0.32	0.16	0.28	0.15
Oils	0.70	0.12	1.20	0.23	0.53	0.16	0.58	0.19
Saturated fat	0.28	0.14	0.50	0.20	0.27	0.18	0.37	0.26
Sodium	0.30	0.10	0.47	0.16	0.41	0.16	0.76	0.20
Calories from SoFAAS	0.24	0.18	0.29	0.21	0.29	0.22	0.38	0.33

Source: NHANES 1999-2004.

Table E.8 Food Choices, by Consumption: Children Ages 2-18 - Standard Errors

	All Low-Income Individuals		SNAP Participants		Income-Eligible Nonparticipants		Other Low-Income Nonparticipants	
	Healthy Eaters (HEI $\geq$ 70)	Less-Healthy Eaters (HEI < 49)	Healthy Eaters (HEI $\geq$ 70)	Less-Healthy Eaters (HEI < 49)	Healthy Eaters (HEI $\geq$ 70)	Less-Healthy Eaters (HEI < 49)	Healthy Eaters (HEI $\geq$ 70)	Less-Healthy Eaters (HEI < 49)
Num. of Individuals	246	3344	73	1178	109	1322	64	844
Any milk	3.00	1.57	6.03	2.46	2.21	2.55	2.64	2.54
Whole milk	5.32	1.78	12.68	3.12	6.36	2.52	6.45	2.96
1% or skim milk	5.93	0.65	10.22	1.25	9.89	1.21	10.36	0.91
Flavored milk	3.45	1.63	3.59	2.46	4.06	2.51	10.21	2.35
Yogurt	3.63	0.36	0.91	0.59	8.17	0.61	7.72	0.76
Cheese	3.91	1.71	5.65	2.27	3.67	1.68	8.56	3.18
Discrete serving of vegetables, including potatoes	6.39	1.85	10.81	3.15	5.93	2.96	10.67	3.31
Discrete serving of vegetables, excluding French fries	9.22	1.57	16.46	2.28	9.64	2.48	13.44	2.63
Discrete serving of vegetables, excluding potatoes and other starchy vegetables	6.10	1.38	8.06	1.96	8.57	1.85	12.04	2.26
Discrete serving of raw vegetables, salad	4.61	1.39	6.54	1.74	4.9	1.65	11.61	2.74
Legumes	3.80	0.67	7.19	1.14	4.35	1.04	8.63	1.88
Discrete serving of fruit	5.17	1.56	7.57	1.87	2.43	2.06	13.98	2.54
Fresh fruit	6.01	1.21	8.17	1.57	7.52	1.64	13.67	2.64
Fruit juice	6.41	1.43	7.25	1.91	10.20	2.55	10.89	2.79
Any whole grains	4.74	1.24	7.55	2.33	8.71	1.94	9.37	2.54
Nuts or seeds (including PB sandwiches)	4.77	0.84	4.52	0.9	6.23	1.41	13.14	1.71
Sugar-sweetened beverages	8.28	1.28	18.03	2.03	9.59	1.75	7.25	2.90
Sweetened beverages, including artificially sweetened	7.85	1.37	18.03	2.23	9.25	1.50	8.16	2.97
Salty snack	7.73	1.68	11.78	2.33	9.12	3.44	9.50	2.76
Any sweets, desserts, or candy	6.40	1.34	7.38	2.57	8.04	1.99	12.76	1.90
Any dessert	8.73	1.78	18.04	3.05	8.63	2.51	12.52	2.34
Any candy	10.08	1.86	18.14	2.95	8.35	3.55	7.24	3.49

Source: NHANES 1999-2004

Table E.9 Food Choices, by Relative Energy Contribution: Children Ages 2–18 – Standard Errors

	All Low-Income Individuals		SNAP Participants		Income-Eligible Nonparticipants		Other Low-Income Nonparticipants	
	Healthy Eaters (HEI ≥ 70)	Less-Healthy Eaters (HEI < 49)	Healthy Eaters (HEI ≥ 70)	Less-Healthy Eaters (HEI < 49)	Healthy Eaters (HEI ≥ 70)	Less-Healthy Eaters (HEI < 49)	Healthy Eaters (HEI ≥ 70)	Less-Healthy Eaters (HEI < 49)
Num. of Individuals	246	3344	73	1178	109	1322	64	844
Milk Group Foods	0.89	0.54	1.41	0.85	1.11	0.69	1.36	0.61
Whole milk	0.73	0.32	1.4	0.55	0.82	0.38	1.18	0.42
1% or skim milk	0.51	0.07	0.25	0.17	0.57	0.07	1.53	0.12
Flavored milk	0.19	0.10	0.23	0.16	0.24	0.15	0.55	0.12
Cheese	0.14	0.16	0.10	0.17	0.23	0.17	0.23	0.38
Yogurt	0.24	0.03	0.07	0.06	0.45	0.06	0.63	0.06
Meat and Bean Group Foods	1.53	0.31	2.71	0.60	1.76	0.55	1.69	0.54
Meat	0.53	0.19	0.91	0.26	0.77	0.32	1.18	0.40
Organ meats	0.15	0.00	0.00	0.01	0.29	0.00	0.19	0.00
Frankfurters, sausages, luncheon meats	0.09	0.17	0.00	0.30	0.17	0.32	0.22	0.29
Poultry	0.89	0.16	1.38	0.30	0.69	0.26	1.75	0.25
Fish	0.23	0.06	0.47	0.09	0.11	0.11	1.04	0.06
Eggs	0.38	0.08	0.69	0.15	0.21	0.12	0.26	0.15
Beans and peas	0.76	0.08	1.14	0.15	0.80	0.08	2.03	0.17
Soy products	0.00	0.02	0.00	0.00	0.00	0.04	0.00	0.05
Nuts and seeds	0.44	0.05	0.22	0.03	0.31	0.10	1.33	0.05
Mixed Dishes	1.69	0.71	1.91	1.07	2.81	1.11	3.58	1.03
Pizza	0.73	0.45	0.18	0.47	0.24	0.71	2.19	0.96
Sandwiches	1.71	0.72	2.75	0.72	2.89	1.20	2.02	0.97
Pasta or rice dishes	1.26	0.39	0.89	0.84	0.99	0.27	4.00	0.95
Grain Foods	2.27	0.32	3.72	0.59	2.50	0.56	3.83	0.76
Whole grains	1.35	0.14	2.30	0.20	0.77	0.22	2.57	0.28
Not whole grains	2.58	1.03	5.42	1.04	3.58	2.14	2.82	0.87
Fruits	1.22	0.14	1.51	0.22	1.91	0.22	1.51	0.27
Fresh fruit	1.17	0.06	1.10	0.11	2.04	0.08	1.74	0.10
Canned fruit	0.34	0.03	0.66	0.04	0.24	0.04	0.42	0.06
Juice	1.46	0.11	1.89	0.18	0.86	0.17	2.35	0.25
Vegetables	1.08	0.23	1.70	0.50	1.69	0.46	1.29	0.56
Dark-green	0.04	0.01	0.05	0.01	0.08	0.02	0.05	0.03
Orange	0.05	0.01	0.05	0.02	0.04	0.01	0.13	0.01
White potatoes	0.90	0.23	1.33	0.36	1.58	0.43	1.33	0.50
French fries	0.90	0.21	1.32	0.30	1.58	0.42	1.37	0.36
Other starchy vegetables	0.36	0.04	0.55	0.09	0.33	0.06	0.26	0.05
Tomatoes	0.02	0.01	0.04	0.01	0.02	0.02	0.04	0.02
Other vegetables	0.18	0.10	0.21	0.22	0.34	0.10	0.52	0.18
Sweets, desserts, and candy	0.71	0.46	1.16	0.13	0.90	0.66	1.35	0.61
Sugar sweetened beverages	0.28	0.10	0.32	0.49	0.46	0.19	0.34	0.17
Salty snacks	0.68	0.25	1.15	0.37	0.78	0.47	0.90	0.37
Added sugar	0.62	0.50	0.84	0.61	0.86	0.55	1.22	1.00
Solid fat	1.00	0.29	0.97	0.45	0.79	0.400	1.56	0.52

Table E.9 (continued)

	All Low-Income Individuals		SNAP Participants		Income-Eligible Nonparticipants		Other Low-Income Nonparticipants	
	Healthy Eaters (HEI $\geq$ 70)	Less- Healthy Eaters (HEI < 49)	Healthy Eaters (HEI $\geq$ 70)	Less- Healthy Eaters (HEI < 49)	Healthy Eaters (HEI $\geq$ 70)	Less- Healthy Eaters (HEI < 49)	Healthy Eaters (HEI $\geq$ 70)	Less- Healthy Eaters (HEI < 49)
Foods recommended for frequent consumption	2.80	0.24	4.20	0.24	2.50	0.39	3.91	0.27
Foods recommended for selective consumption	4.75	0.66	6.15	1.03	2.63	0.69	3.94	1.42
Foods recommended for occasional consumption	3.09	0.8	4.62	1.02	2.69	0.97	2.53	1.56

Source: NHANES 1999–2004.

Table E.10 Nutrient Density and Energy Density: Children Ages 2-18 - Standard Errors

	All Low-Income Individuals		SNAP Participants		Income-Eligible Nonparticipants		Other Low-Income Nonparticipants	
	Healthy Eaters (HEI $\geq 70$ )	Less-Healthy Eaters (HEI $< 49$ )	Healthy Eaters (HEI $\geq 70$ )	Less-Healthy Eaters (HEI $< 49$ )	Healthy Eaters (HEI $\geq 70$ )	Less-Healthy Eaters (HEI $< 49$ )	Healthy Eaters (HEI $\geq 70$ )	Less-Healthy Eaters (HEI $< 49$ )
Num. of Individuals	246	3344	73	1178	109	1322	64	844
Nutrient-Rich Score	4.21	0.75	5.75	1.18	5.10	1.23	7.34	1.51
Energy density, foods only	0.08	0.03	0.08	0.04	0.08	0.05	0.19	0.04
Energy density, with juice and milk	0.04	0.03	0.06	0.03	0.04	0.06	0.05	0.03

Source: NHANES 1999-2004.

## APPENDIX F

### CLUSTER ANALYSIS: TABLES WITH STANDARD ERRORS

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**Table F.1. Mean Grams Per Day from Selected Food Groups Across the 4 Dietary Patterns Identified in Cluster Analysis of Adult Healthy Eaters: Standard Errors**

<i>Food or Food Group</i>	Mean Grams Consumed Per Day			
	Cluster 1	Cluster 2	Cluster 3	Cluster 4
	Beverages	Plant-based	Breakfast and Sweets	Low-Fat Milk
	n = 149 SE	n = 136 SE	n = 61 SE	n = 51 SE
Milk, high fat, not sweetened	27.5	16.2	22.9	38.3
Milk, high fat, sweetened	0.0	0.0	0.0	0.0
Milk, low-fat, reduced fat, nonfat, not sweetened	1.8	10.1	38.5	45.1
Milk, low-fat, reduced fat, nonfat, sweetened	1.6	0.0	4.4	3.4
Dairy products (not milk), high fat	0.9	1.7	3.1	2.6
Dairy products (not milk), low-fat, reduced fat, nonfat	6.8	4.3	4.8	6.3
Dairy desserts and beverages, high fat	2.2	5.6	7.8	8.0
Dairy desserts and beverages, reduced-fat	5.3	1.9	1.6	0.0
Red meats, not fried	4.1	4.1	3.4	6.2
Chicken and turkey, not fried	4.0	5.6	10.3	6.5
Processed meat	3.0	1.8	2.7	3.3
Fish and shellfish, not fried	4.1	8.3	4.5	9.6
Fried meat, poultry, or fish	4.8	4.4	8.4	4.8
Mixed dishes with meat (including organ meats and processed meat)	10.4	9.5	15.5	8.7
Mixed dishes with fish and shellfish	1.9	11.6	9.9	9.5
Mixed dishes with chicken and turkey	9.7	7.0	11.2	16.5
Mixed dishes, grain and vegetable (no meat)	27.9	3.5	10.7	1.5
Hamburgers and cheeseburgers	2.0	0.1	0.0	0.0
Pizza	0.5	7.0	1.5	0.0
Mexican dishes	6.6	5.0	3.4	5.7
Soups	15.0	11.2	22.3	31.7
Eggs and egg dishes	2.7	4.9	3.9	21.9
Beans and legumes, soy milk and soy products	8.0	11.8	4.1	1.0
Beans and legumes, beans, nuts, and seeds	9.3	9.1	13.4	9.2
White/non-whole-grain bread	7.5	4.3	6.8	10.3
Whole grain bread	1.4	2.4	2.1	1.8
Rice, pasta, noodles, dumplings, similar grain products, non-whole grain	12.4	6.1	11.1	17.1
Rice, pasta, noodles, dumplings, similar grain products whole grain	5.5	2.6	0.0	5.8
Other grains, whole grain	1.6	1.7	3.1	0.5
Cereal, non-whole grain	1.8	1.3	4.8	5.3
Cereal, whole grain	6.3	10.7	26.0	13.2
Sweet breakfast foods/breads	3.8	2.3	7.5	5.8
Desserts (non-dairy)	3.3	3.4	6.1	4.2
Salty snacks	3.5	1.4	1.1	1.7
Fruit, fresh, citrus	5.4	7.3	7.9	6.5
Fruit, fresh, melons and berries	6.0	22.7	5.8	26.8
Fruit, fresh, other	9.3	8.8	16.7	11.1
Fruit, canned or frozen	5.3	5.7	7.2	3.3
100% fruit juice	34.6	19.7	28.8	35.2
Vegetables, raw and salad	7.1	11.7	19.4	16.8
Vegetables, cooked, not starchy, fried, creamed, w/cheese, or stuffed	13.0	8.9	8.4	11.9
Vegetables, cooked, starchy (not fried)	5.6	6.8	10.9	10.8
Fried potatoes	6.5	1.0	6.7	2.4
Butter, margarine, and other added fats	0.6	0.9	2.3	1.1
Salad Dressings and mayo, regular, and added oils	2.6	2.0	4.7	1.8
Miscellaneous sugary foods	4.2	2.0	7.3	0.8
Coffee or tea (not sweetened)	14.6	14.4	38.8	32.1
Sugar-sweetened drinks (with calories), other than carbonated sodas	38.0	23.7	11.0	10.7
Sweetened drinks without calories (no calories or art. sweetener)	39.7	19.1	14.2	132.3
Carbonated soda (not diet)	26.8	22.7	1.7	36.7
Alcoholic drinks	3.8	7.5	2.3	4.5



**Table F.2. Mean Energy and Nutrient Intakes Across the 4 Dietary Patterns Identified in Cluster Analysis of Adult Healthy Eaters: Standard Errors**

	Mean Intake Over 24 Hours			
	Cluster 1	Cluster 2	Cluster 3	Cluster 4
	Beverages n = 149 SE	Plant-based n = 136 SE	Breakfast and Sweets n = 61 SE	Low-fat milk n = 51 SE
<i>Energy/Nutrient</i>				
Energy (kcal)	57.8	64.4	79.9	118.0
Fat (g)	2.9	3.6	3.1	5.4
Percent of Total Energy from Fat	0.9	1.0	1.4	1.9
Sodium (mg)	122.2	144.1	144.9	145.0
Calcium (mg)	50.4	39.0	62.4	90.3
Folate (mcg FE)	42.0	46.2	38.3	56.4
Cholesterol (mg)	18.2	21.5	25.3	19.1
Fiber (gm)	1.2	0.9	1.3	1.6
Protein (g)	2.6	3.5	3.8	4.6
Percent of Total Energy from Protein	0.6	0.5	0.9	0.6
Carbohydrate (g)	10.3	8.9	14.3	18.6
Percent of Total Energy from Carbohydrate	1.2	1.3	1.3	1.7
Saturated Fat (g)	0.9	1.0	0.9	1.2
Percent of Total Energy from Saturated Fat	0.3	0.3	0.3	0.4

**Table F.3. Mean Intake of MyPyramid Food Groups and Subgroups Across the 4 Dietary Patterns Identified in Cluster Analysis of Adult Healthy Eaters: Standard Errors**

MyPyramid Food Group/Subgroup	Mean Intake of MyPyramid Food Groups and Subgroups Over 24 Hours			
	Cluster 1	Cluster 2	Cluster 3	Cluster 4
	Beverages	Plant-based	Breakfast and Sweets	Low-fat milk
	n = 149 SE	n = 136 SE	n = 61 SE	n = 51 SE
Total grains (oz. equivalents)	0.44	0.33	0.36	0.50
Whole grains (oz. equivalents)	0.12	0.15	0.31	0.20
Non-whole grains (oz. equivalents)	0.43	0.32	0.27	0.57
Total vegetables (cup equivalents)	0.10	0.16	0.16	0.22
Dark-green, leafy vegetables (cup equivalents)	0.03	0.05	0.05	0.04
Orange vegetables (cup equivalents)	0.03	0.05	0.04	0.03
White potatoes (cup equivalents)	0.06	0.05	0.06	0.11
Other starchy vegetables (cup equivalents)	0.02	0.02	0.06	0.02
Tomatoes (cup equivalents)	0.05	0.05	0.07	0.06
Other vegetables (cup equivalents)	0.07	0.10	0.11	0.11
Total fruit (cup equivalents)	0.15	0.19	0.18	0.32
Citrus fruit, melons, and berries (cup equivalents)	0.13	0.17	0.14	0.31
Other fruit (cup equivalents)	0.10	0.09	0.14	0.10
Total milk (cup equivalents)	0.13	0.11	0.15	0.30
Milk (cup equivalents)	0.12	0.09	0.15	0.30
Yogurt (cup equivalents)	0.03	0.02	0.02	0.02
Cheese (cup equivalents)	0.03	0.04	0.06	0.04
Meat, poultry, fish (oz. equivalents)	0.35	0.33	0.37	0.52
Red meat (oz. equivalents)	0.21	0.21	0.18	0.23
Organ meats (oz. equivalents)	0.05	0.00	0.01	0.00
Frankfurters, sausages, and luncheon meat (oz. equivalents)	0.10	0.06	0.09	0.14
Poultry (oz. equivalents)	0.19	0.20	0.37	0.36
Fish and shellfish high in Omega-3 fatty acids (oz. equivalents)	0.05	0.18	0.15	0.22
Fish and shellfish low in Omega-3 fatty acids (oz. equivalents)	0.11	0.21	0.23	0.24
Eggs (oz. equivalents)	0.05	0.08	0.08	0.43
Cooked dry beans and peas (oz. equivalents)	0.04	0.05	0.08	0.02
Soybean products (oz. equivalents)	0.26	0.07	0.06	0.00
Nuts and seeds (oz. equivalents)	0.50	0.31	0.17	0.60
Discretionary oil (Grams)	1.76	1.80	2.20	3.81
Discretionary solid fat (Grams)	1.73	1.31	1.35	2.04
Added sugars (Tbsp. Equivalents)	1.01	0.77	0.90	1.38
Alcohol (Drinks of alcohol)	0.01	0.03	0.02	0.01

Table F.4. Mean Healthy Eating Index- 2005 Scores Across the 4 Dietary Patterns Identified in Cluster Analysis of Adult Healthy Eaters: Standard Errors				
	Mean Healthy Eating Index-2005 Scores			
	Cluster 1	Cluster 2	Cluster 3	Cluster 4
	Beverages	Plant-based	Breakfast and Sweets	Low-fat milk
	n = 149	n = 136	n = 61	n = 51
<i>Healthy Eating Index (HEI)-2005 Score</i>	SE	SE	SE	SE
HEI-2005 Score (Total)	0.5	0.4	0.6	0.7
HEI-2005 Component Scores				
Total Fruit	0.2	0.2	0.1	0.3
Whole Fruit	0.2	0.2	0.1	0.4
Total Vegetables	0.2	0.2	0.2	0.4
Dark Green and Orange Vegetables and Legumes	0.3	0.2	0.4	0.4
Total Grains	0.1	0.1	0.1	0.1
Whole Grains	0.2	0.2	0.4	0.4
Milk	0.5	0.4	0.4	0.4
Meat and Beans	0.3	0.1	0.6	0.2
Oils	0.4	0.3	0.6	0.9
Saturated Fat	0.2	0.1	0.3	0.2
Sodium	0.4	0.4	0.4	0.5
Calories from SoFAAS	0.3	0.3	0.3	0.3

**Table F.5. Sociodemographic Characteristics Across the 4 Dietary Patterns Identified in Cluster Analysis of Adult Healthy Eaters: Standard Errors**

<i>Characteristic</i>	Proportion with Characteristic			
	Cluster 1	Cluster 2	Cluster 3	Cluster 4
	Beverages n = 149 SE	Plant-based n = 136 SE	Breakfast and Sweets n = 61 SE	Low-fat milk n = 51 SE
SNAP Participation Status				
SNAP participant	7.3	3.8	3.8	4.5
Income-eligible non-participant	6.3	5.1	7.1	9.8
Other low-income non-participant	6.4	5.2	7.6	10.9
Household Participates in WIC	8.6	2.6	1.3	3.3
Sex				
Male	4.8	5.1	9.3	10.6
Female	4.8	5.1	9.3	10.6
Age				
19-30	6.3	3.5	5.9	12.3
31-40	5.2	3.3	2.2	5.2
41-50	3.9	5.2	7.2	1.3
51-60	4.6	4.3	3.7	9.5
>60	5.9	6.9	9.2	11.3
Race/Ethnicity				
Non-Hispanic, White	7.8	4.7	5.6	7.2
Non-Hispanic, Black	5.1	2.4	1.3	3.3
Hispanic	7.0	4.6	4.3	5.4
Other	3.7	1.6	3.7	3.7
US-Born	7.2	4.5	5.6	7.8
10 or More Years in the USA	6.6	3.1	1.3	4.6
Education Level				
Less than high school	6.5	4.7	8.3	6.1
High-school/GED	6.5	5.1	7.2	10.2
More than HS	7.4	5.2	9.1	11.0
Married	5.8	6.7	9.7	6.8
Work Hours				
0	6.6	5.4	9.2	6.5
1 to 34	4.0	3.6	7.2	5.3
35 or more	5.9	3.4	7.6	5.4
Works at Least 20 Hours	7.0	5.2	7.5	5.9
Employed	6.6	5.4	9.2	6.5
Household Size				
1	4.8	5.4	9.3	10.8
2	5.5	5.6	10.8	11.6
3	3.8	4.6	3.1	5.6
4	6.8	3.6	5.3	3.7
5+	4.9	3.5	4.6	2.5
Household Food Security Level				
Full food security	7.5	5.5	6.6	5.7
Marginal food security	4.7	2.4	5.4	3.9
Low food security	4.7	3.3	2.7	4.5
Very low food security	2.9	3.8	2.8	2.6
Adult Food Security Level				
Full food security	7.5	5.5	6.3	5.7
Marginal food security	4.7	2.7	5.2	4.8
Low food security	4.7	3.1	2.7	4.4
Very low food security	2.9	3.8	2.8	2.6
Home Owned	6.1	6.4	8.8	8.5
Someone in Household smokes	2.0	2.6	5.0	9.3
Obese	5.6	5.0	7.5	8.3
Overweight or Obese	4.6	6.2	8.9	9.9
High Blood Pressure	5.8	6.4	8.7	10.3
High Cholesterol	5.2	5.7	9.0	10.9
Diabetes	3.1	4.5	7.7	4.3
Has Health Insurance	4.2	3.6	6.9	5.1
Health Condition Good or Better	5.3	5.3	8.8	10.6
Doctor said Overweight	5.5	5.0	10.1	9.0
Ever Had Cancer	3.7	4.4	6.8	5.5
Walked/ Bicycled in Past 30 Days	7.0	4.5	7.0	5.9
Daily Physical Activity in Past 30 Days	6.3	4.8	7.7	3.6
Vigorous Activity in Past 30 Days	7.4	6.7	10.8	4.8
Moderate Activity in Past 30 Days	5.6	7.6	10.8	6.7
More Active than Peers	4.9	6.9	7.4	10.7
Has Work Limitations	4.2	4.5	7.3	11.0
Taken Prescriptions in Past Month	7.7	4.8	7.1	7.2
Now Smoking	1.7	2.6	5.0	3.4
Considers Self Overweight	4.9	5.7	8.6	7.8
Would Like to Weigh Less	4.9	4.7	8.5	7.9
Screen Time at Least 2 Hrs/Day	5.3	4.5	9.9	10.3

**Table F.6. Mean Grams Per Day from Selected Food Groups Across the 4 Dietary Patterns Identified in Cluster Analysis of Adult Less- Healthy Eaters: Standard Errors**

<i>Food or Food Group</i>	Mean Grams Consumed Per Day			
	Cluster 1	Cluster 2	Cluster 3	Cluster 4
	Soda and Pizza	Alcohol	Non-Carbonated Sugar-Sweetened Drinks	Coffee
	n = 443 SE	n = 177 SE	n = 1443 SE	n = 185 SE
Milk, high fat, not sweetened	11.3	13.3	7.2	19.0
Milk, high fat, sweetened	5.5	4.2	2.3	1.1
Milk, low-fat, reduced fat, nonfat, not sweetened	6.0	0.7	6.1	2.3
Milk, low-fat, reduced fat, nonfat, sweetened	2.0	3.8	2.8	0.9
Dairy products (not milk), high fat	3.3	3.5	1.5	4.9
Dairy products (not milk), low-fat, reduced fat, nonfat	1.5	0.5	0.8	3.3
Dairy desserts and beverages, high fat	4.7	3.3	2.3	9.0
Dairy desserts and beverages, reduced-fat	0.7	4.8	1.4	2.2
Red meats, not fried	4.5	5.9	2.3	4.8
Chicken and turkey, not fried	2.6	4.5	1.6	1.1
Processed meat	3.3	5.0	1.4	5.3
Fish and shellfish, not fried	1.4	1.1	0.6	1.1
Fried meat, poultry, or fish	5.7	7.1	1.9	5.2
Mixed dishes with meat (including organ meats and processed meat)	6.9	10.1	5.6	14.7
Mixed dishes with fish and shellfish	1.0	3.5	1.2	6.8
Mixed dishes with chicken and turkey	5.5	5.7	1.6	5.6
Mixed dishes, grain and vegetable (no meat)	5.4	10.4	2.6	4.9
Hamburgers and cheeseburgers	5.0	8.0	2.6	6.3
Pizza	10.4	7.1	4.7	18.1
Mexican dishes	8.0	9.2	3.7	5.2
Soups	5.7	20.5	4.0	15.4
Eggs and egg dishes	4.5	4.4	2.0	4.9
Beans and legumes, soy milk and soy products	0.5	0.0	0.2	0.4
Beans and legumes, beans, nuts, and seeds	3.7	4.7	1.6	3.3
White/non-whole-grain bread	3.1	4.4	1.6	5.2
Whole grain bread	0.1	0.0	0.2	0.8
Rice, pasta, noodles, dumplings, similar grain products, non-whole grain	7.5	7.4	3.9	6.9
Rice, pasta, noodles, dumplings, similar grain products whole grain	0.2	0.0	0.1	0.0
Other grains, whole grain	0.4	0.2	0.3	1.2
Cereal, non-whole grain	1.5	1.0	1.3	2.3
Cereal, whole grain	1.8	0.4	1.4	3.0
Sweet breakfast foods/breads	2.7	2.5	1.9	4.2
Desserts (non-dairy)	2.9	4.5	2.4	5.0
Salty snacks	1.5	1.5	0.7	2.3
Fruit, fresh, citrus	0.5	4.1	0.7	1.1
Fruit, fresh, melons and berries	1.1	0.4	1.3	1.4
Fruit, fresh, other	2.3	3.0	2.1	3.1
Fruit, canned or frozen	0.6	0.5	1.0	2.2
100% fruit juice	5.9	15.5	3.1	10.7
Vegetables, raw and salad	3.5	7.0	1.9	3.4
Vegetables, cooked, not starchy, fried, creamed, w/cheese, or stuffed	2.7	2.4	2.2	5.4
Vegetables, cooked, starchy (not fried)	2.8	6.0	2.3	6.3
Fried potatoes	3.5	5.2	2.2	4.2
Butter, margarine, and other added fats	1.3	1.1	0.7	1.1
Salad Dressings and mayo, regular, and added oils	1.0	2.2	0.5	1.1
Miscellaneous sugary foods	2.9	2.0	1.5	5.1
Coffee or tea (not sweetened)	14.3	56.8	7.9	77.7
Sugar-sweetened drinks (with calories), other than carbonated sodas	20.0	25.9	25.5	14.5
Sweetened drinks without calories (no calories or art. sweetener)	6.6	15.6	14.0	21.5
Carbonated soda (not diet)	38.6	57.2	13.8	35.4
Alcoholic drinks	16.0	88.8	7.0	15.0

**Table F.7. Mean Energy and Nutrient Intakes Across the 4 Dietary Patterns Identified in Cluster Analysis of Adult Less- Healthy Eaters: Standard Errors**

<i>Energy/Nutrient</i>	Mean Intake Over 24 Hours			
	Cluster 1	Cluster 2	Cluster 3	Cluster 4
	Soda and Pizza	Alcohol	Non-Carbonated Sugar-Sweetened Drinks	Coffee
	n = 443	n = 177	n = 1443	n = 185
	SE	SE	SE	SE
Energy (kcal)	47.4	82.6	34.5	93.1
Fat (g)	2.3	4.8	1.5	4.6
Percent of Total Energy from Fat	0.5	1.1	0.3	0.5
Sodium (mg)	90.4	140.4	69.2	163.9
Calcium (mg)	26.5	48.0	19.2	52.4
Folate (mcg FE)	14.2	21.0	10.5	25.9
Cholesterol (mg)	15.9	16.0	6.3	21.6
Fiber (gm)	0.5	0.6	0.2	0.5
Protein (g)	2.2	2.6	1.3	3.7
Percent of Total Energy from Protein	0.3	0.4	0.1	0.3
Carbohydrate (g)	7.0	9.5	4.4	11.1
Percent of Total Energy from Carbohydrate	0.7	1.2	0.3	0.8
Saturated Fat (g)	1.0	1.8	0.6	1.7
Percent of Total Energy from Saturated Fat	0.2	0.4	0.1	0.3

**Table F.8. Mean Intake of MyPyramid Food Groups and Subgroups Across the 4 Dietary Patterns Identified in Cluster Analysis of Adult Less- Healthy Eaters: Standard Errors**

<i>MyPyramid Food Group/Subgroup</i>	Mean Intake of MyPyramid Food Groups and Subgroups Over 24 Hours			
	Cluster 1	Cluster 2	Cluster 3	Cluster 4
	Soda and Pizza	Alcohol	Non-Carbonated Sugar-Sweetened Drinks	Coffee
	n = 443 SE	n = 177 SE	n = 1443 SE	n = 185 SE
Total grains (oz. equivalents)	0.22	0.33	0.17	0.50
Whole grains (oz. equivalents)	0.03	0.03	0.02	0.06
Non-whole grains (oz. equivalents)	0.22	0.32	0.16	0.51
Total vegetables (cup equivalents)	0.06	0.11	0.03	0.08
Dark-green, leafy vegetables (cup equivalents)	0.01	0.02	0.01	0.01
Orange vegetables (cup equivalents)	0.01	0.01	0.01	0.01
White potatoes (cup equivalents)	0.02	0.04	0.02	0.05
Other starchy vegetables (cup equivalents)	0.01	0.02	0.01	0.02
Tomatoes (cup equivalents)	0.02	0.04	0.02	0.05
Other vegetables (cup equivalents)	0.03	0.05	0.02	0.03
Total fruit (cup equivalents)	0.04	0.06	0.03	0.05
Citrus fruit, melons, and berries (cup equivalents)	0.03	0.06	0.02	0.03
Other fruit (cup equivalents)	0.02	0.03	0.02	0.03
Total milk (cup equivalents)	0.08	0.13	0.06	0.15
Milk (cup equivalents)	0.06	0.06	0.04	0.09
Yogurt (cup equivalents)	0.01	0.00	0.00	0.01
Cheese (cup equivalents)	0.07	0.08	0.04	0.11
Meat, poultry, fish (oz. equivalents)	0.26	0.23	0.11	0.28
Red meat (oz. equivalents)	0.19	0.25	0.09	0.21
Organ meats (oz. equivalents)	0.01	0.02	0.02	0.00
Frankfurters, sausages, and luncheon meat (oz. equivalents)	0.09	0.16	0.05	0.16
Poultry (oz. equivalents)	0.18	0.18	0.08	0.13
Fish and shellfish high in Omega-3 fatty acids (oz. equivalents)	0.01	0.03	0.01	0.02
Fish and shellfish low in Omega-3 fatty acids (oz. equivalents)	0.03	0.12	0.03	0.06
Eggs (oz. equivalents)	0.06	0.06	0.03	0.08
Cooked dry beans and peas (oz. equivalents)	0.02	0.02	0.01	0.02
Soybean products (oz. equivalents)	0.01	0.00	0.00	0.00
Nuts and seeds (oz. equivalents)	0.04	0.09	0.03	0.09
Discretionary oil (Grams)	0.72	1.62	0.44	1.36
Discretionary solid fat (Grams)	1.79	3.27	1.18	3.01
Added sugars (Tbsp. Equivalents)	1.29	1.46	0.53	1.73
Alcohol (Drinks of alcohol)	0.07	0.34	0.04	0.06

**Table F.9. Mean Healthy Eating Index- 2005 Scores Across the 4 Dietary Patterns Identified in Cluster Analysis of Adult Less-Healthy Eaters: Standard Errors**

	Mean Healthy Eating Index-2005 Scores			
	Cluster 1	Cluster 2	Cluster 3	Cluster 4
	Soda and Pizza	Alcohol	Non-Carbonated Sugar-Sweetened Drinks	Coffee
	n = 443 SE	n = 177 SE	n = 1443 SE	n = 185 SE
<i>Healthy Eating Index (HEI)-2005 Score</i>				
HEI-2005 Score (Total)	0.5	0.6	0.2	0.4
HEI-2005 Component Scores				
Total Fruit	0.1	0.2	0.1	0.1
Whole Fruit	0.1	0.1	0.1	0.1
Total Vegetables	0.1	0.2	0.1	0.1
Dark Green and Orange Vegetables and Legumes	0.1	0.1	0.1	0.1
Total Grains	0.1	0.2	0.0	0.1
Whole Grains	0.0	0.0	0.0	0.1
Milk	0.2	0.3	0.1	0.3
Meat and Beans	0.2	0.3	0.1	0.3
Oils	0.2	0.4	0.2	0.3
Saturated Fat	0.2	0.4	0.1	0.3
Sodium	0.3	0.3	0.1	0.3
Calories from SoFAAS	0.1	0.2	0.2	0.4



**Table F.10. Sociodemographic Characteristics Across the 4 Dietary Patterns Identified in Cluster Analysis of Adult Less-Healthy Eaters: Standard Errors**

<i>Characteristic</i>	Proportion with Characteristic			
	Cluster 1	Cluster 2	Cluster 3	Cluster 4
	Soda and Pizza n = 443 SE	Alcohol n = 177 SE	Non-Carbonated Sugar-Sweetened Drinks n = 1443 SE	Coffee n = 185 SE
SNAP Participation Status				
SNAP participant	3.3	4.7	2.6	4.2
Income-eligible non-participant	3.8	5.1	2.7	5.8
Other low-income non-participant	3.5	4.6	1.8	4.3
Household Participates in WIC	2.8	3.5	2.4	3.2
Sex				
Male	3.1	4.7	2.3	5.1
Female	3.1	4.7	2.3	5.1
Age				
19-30	3.8	5.0	2.3	3.4
31-40	3.5	4.1	2.1	4.5
41-50	2.3	4.2	1.2	3.2
51-60	1.2	2.1	1.4	3.8
>60	1.3	2.4	1.6	2.8
Race/Ethnicity				
Non-Hispanic, White	4.9	5.4	3.5	3.7
Non-Hispanic, Black	3.1	2.3	2.4	1.5
Hispanic	3.2	5.0	3.5	3.2
Other	1.9	2.4	1.4	2.0
US-Born	2.7	4.0	1.8	2.7
10 or More Years in the USA	1.8	3.6	0.9	0.0
Education Level				
Less than high school	3.5	4.1	2.1	4.4
High-school/GED	3.2	4.6	1.9	4.3
More than HS	4.1	4.9	2.0	3.9
Married	3.7	4.2	1.9	4.7
Work Hours				
0	3.2	4.9	1.8	4.7
1 to 34	1.8	3.2	1.4	2.9
35 or more	3.1	4.8	1.6	4.7
Works at Least 20 Hours	3.3	4.7	1.9	5.0
Employed	3.2	4.9	1.8	4.7
Household Size				
1	2.9	5.6	1.3	3.2
2	2.1	5.1	1.7	5.0
3	3.6	5.1	1.7	3.4
4	2.9	2.6	1.9	3.5
5+	3.1	4.2	1.7	3.5
Household Food Security Level				
Full food security	2.95	5.69	2.58	5.34
Marginal food security	2.57	3.39	1.5	2.99
Low food security	2.93	4.08	1.4	3.05
Very low food security	1.34	4.18	0.83	3.12
Adult Food Security Level				
Full food security	3.0	5.7	2.3	5.1
Marginal food security	2.7	3.2	1.7	2.5
Low food security	2.3	4.0	1.2	2.9
Very low food security	2.0	4.3	0.9	3.2
Home Owned	3.9	6.2	2.7	4.6
Someone in Household Smokes	3.6	4.9	2.5	5.1
Obese	3.0	3.8	1.6	4.2
Overweight or Obese	3.4	5.2	1.9	4.6
High Blood Pressure	2.3	3.4	1.8	3.5
High Cholesterol	2.3	2.9	1.4	4.1
Diabetes	0.6	0.3	0.9	2.1
Has Health Insurance	3.7	5.6	1.7	3.8
Health Condition Good or Better	2.9	5.1	2.1	3.9
Doctor said Overweight	2.4	4.6	1.9	3.5
Ever Had Cancer	1.6	3.3	1.1	2.3
Walked/Bicycled in Past 30 Days	3.4	5.6	1.6	4.1
Daily Physical Activity in Past 30 Days	3.2	4.7	2.0	4.4
Vigorous Activity in Past 30 Days	3.5	4.4	2.1	2.2
Moderate Activity in Past 30 Days	3.2	4.7	2.4	4.9
More Active than Peers	3.0	4.5	2.0	3.8
Has Work Limitations	2.9	3.6	1.9	3.7
Taken Prescriptions in Past Month	3.1	4.3	2.4	4.5
Now Smoking	3.4	5.3	2.3	4.7
Considers Self Overweight	3.2	5.5	1.6	4.7
Would Like to Weigh Less	3.2	5.7	1.8	5.0
Screen Time at Least 2 Hrs/Day	4.0	4.5	2.0	4.0

**Table F.11. Mean Grams Per Day from Selected Food Groups Across the 6 Dietary Patterns Identified in Cluster Analysis of Child Healthy Eaters: Standard Errors**

Food or Food Group	Mean Grams Consumed Per Day					
	Cluster 1	Cluster 2	Cluster 3	Cluster 4	Cluster 5	Cluster 6
	Sweet Milk n = 50 SE	Dairy Desserts n = 41 SE	Soda n = 17 SE	High-Fat Milk n = 25 SE	100% Fruit Juice n = 27 SE	Low-Fat Milk n = 15 SE
Milk, high fat, not sweetened	26.8	21.8	55.9	37.4	89.7	7.1
Milk, high fat, sweetened	18.8	0.7	26.2	0.0	18.3	0.0
Milk, low-fat, reduced fat, nonfat, not sweetened	25.8	0.0	0.0	0.0	24.3	85.3
Milk, low-fat, reduced fat, nonfat, sweetened	11.9	2.8	5.8	2.9	0.0	30.6
Dairy products (not milk), high fat	5.9	4.5	11.2	1.7	1.1	3.6
Dairy products (not milk), low-fat, reduced fat, nonfat	7.7	2.4	0.8	1.4	16.7	3.1
Dairy desserts and beverages, high fat	6.8	9.2	8.1	7.6	7.9	8.2
Dairy desserts and beverages, reduced-fat	0.9	1.0	14.2	4.9	1.0	0.0
Red meats, not fried	7.3	4.5	6.1	4.3	2.1	1.8
Chicken and turkey, not fried	4.1	8.6	9.7	9.9	7.7	33.9
Processed meat	8.5	4.8	3.4	1.5	5.7	0.2
Fish and shellfish, not fried	0.4	0.0	0.0	0.0	4.3	2.2
Fried meat, poultry, or fish	2.3	4.3	2.9	6.3	4.4	3.1
Mixed dishes with meat (including organ meats and processed meat)	21.5	17.7	42.3	23.0	23.2	3.9
Mixed dishes with fish and shellfish	17.0	25.0	21.3	0.0	1.9	0.0
Mixed dishes with chicken and turkey	30.1	20.7	107.8	28.8	70.6	19.8
Mixed dishes, grain and vegetable (no meat)	18.0	12.1	14.8	8.8	23.1	124.5
Hamburgers and cheeseburgers	0.3	8.1	0.0	3.6	0.0	0.0
Pizza	9.3	0.6	5.4	3.7	23.9	0.0
Mexican dishes	8.6	4.6	17.2	8.4	3.5	9.5
Soups	6.2	25.3	21.7	25.0	7.7	72.7
Eggs and egg dishes	4.5	2.7	4.5	7.6	7.2	2.3
Beans and legumes, soy milk and soy products	2.7	30.2	2.6	0.2	57.8	0.0
Beans and legumes, beans, nuts, and seeds	34.7	21.6	19.5	17.0	9.9	26.8
White/non-whole-grain bread	9.1	10.5	10.5	28.3	4.7	9.0
Whole grain bread	0.0	2.1	0.9	0.0	0.2	0.0
Rice, pasta, noodles, dumplings, similar grain products, non-whole grain	35.4	13.7	11.9	47.0	8.3	6.4
Rice, pasta, noodles, dumplings, similar grain products whole grain	1.2	0.0	3.8	0.0	0.0	0.0
Other grains, whole grain	0.6	0.7	0.5	0.0	0.6	8.0
Cereal, non-whole grain	35.0	11.2	22.4	9.1	9.3	13.4
Cereal, whole grain	11.7	6.0	2.9	20.6	12.6	2.7
Sweet breakfast foods/breads	4.0	3.3	2.4	3.6	2.2	20.9
Desserts (non-dairy)	3.6	12.4	7.6	1.3	3.3	4.5
Salty snacks	2.7	3.4	10.3	5.0	4.7	6.9
Fruit, fresh, citrus	10.0	13.4	12.1	9.2	1.1	3.2
Fruit, fresh, melons and berries	10.4	5.9	0.0	22.7	37.3	17.0
Fruit, fresh, other	19.3	54.7	26.1	12.5	22.2	9.7
Fruit, canned or frozen	3.8	1.6	0.0	10.1	21.3	0.0
100% fruit juice	27.2	43.5	60.0	22.7	45.9	77.5
Vegetables, raw and salad	13.4	15.4	10.0	1.8	7.7	6.8
Vegetables, cooked, not starchy, fried, creamed, w/cheese, or stuffed	17.1	3.3	7.6	8.4	13.3	11.9
Vegetables, cooked, starchy (not fried)	3.4	2.1	7.8	9.3	5.8	2.0
Fried potatoes	1.6	9.3	1.6	3.7	4.9	0.8
Butter, margarine, and other added fats	1.6	0.1	0.4	0.9	0.3	0.6
Salad Dressings and mayo, regular, and added oils	1.8	2.5	1.2	0.4	0.9	0.7
Miscellaneous sugary foods	8.9	3.0	1.1	2.6	6.1	12.2
Coffee or tea (not sweetened)	8.9	0.0	12.9	44.7	14.2	9.3
Sugar-sweetened drinks (with calories), other than carbonated sodas	32.5	19.4	28.1	8.9	20.4	6.1
Sweetened drinks without calories (no calories or art. sweetener)	10.6	1.8	0.0	9.6	8.1	2.3
Carbonated soda (not diet)	15.3	4.3	62.8	33.0	37.9	42.9
Alcoholic drinks	0.7	0.0	0.0	0.0	0.0	0.0

Table F.12. Mean Energy and Nutrient Intakes Across the 4 Main Dietary Patterns Identified in Cluster Analysis of Child Healthy Eaters: Standard Errors

Energy/Nutrient	Mean Intake Over 24 Hours			
	Cluster 1	Cluster 2	Cluster 4	Cluster 5
	Sweet Milk	Dairy Desserts	High-Fat Milk	100% Fruit Juice
	n = 50	n = 41	n = 25	n = 27
	SE	SE	SE	SE
Energy (kcal)	143.9	93.5	94.4	83.2
Fat (g)	6.5	6.1	6.2	6.4
Percent of Total Energy from Fat	1.5	2.3	2.5	2.7
Sodium (mg)	102.8	177.5	163.9	180.6
Calcium (mg)	56.7	28.6	76.3	82.8
Folate (mcg FE)	209.5	61.1	24.2	51.3
Cholesterol (mg)	22.1	16.2	16.6	42.2
Fiber (gm)	3.7	1.8	1.3	1.7
Protein (g)	4.1	3.0	2.3	5.6
Percent of Total Energy from Protein	1.0	0.6	0.8	1.3
Carbohydrate (g)	21.2	12.2	20.6	9.9
Percent of Total Energy from Carbohydrate	1.7	2.1	2.8	1.9
Saturated Fat (g)	2.3	1.8	2.3	1.4
Percent of Total Energy from Saturated Fat	0.6	0.6	1.1	0.5

**Table F.13. Mean Intake of MyPyramid Food Groups and Subgroups Across the 4 Main Dietary Patterns Identified in Cluster Analysis of Child Healthy Eaters: Standard Errors**

MyPyramid Food Group/Subgroup	Mean Intake of MyPyramid Food Groups and Subgroups Over 24 Hours			
	Cluster 1	Cluster 2	Cluster 4	Cluster 5
	Sweet Milk n = 50 SE	Dairy Desserts n = 41 SE	High-Fat Milk n = 25 SE	100% Fruit Juice n = 27 SE
Total grains (oz. equivalents)	0.85	0.56	1.53	0.45
Whole grains (oz. equivalents)	0.16	0.24	0.24	0.16
Non-whole grains (oz. equivalents)	0.75	0.75	1.76	0.44
Total vegetables (cup equivalents)	0.15	0.20	0.18	0.15
Dark-green, leafy vegetables (cup equivalents)	0.03	0.03	0.01	0.05
Orange vegetables (cup equivalents)	0.06	0.05	0.02	0.05
White potatoes (cup equivalents)	0.09	0.09	0.12	0.10
Other starchy vegetables (cup equivalents)	0.02	0.02	0.04	0.01
Tomatoes (cup equivalents)	0.04	0.08	0.02	0.05
Other vegetables (cup equivalents)	0.13	0.06	0.06	0.11
Total fruit (cup equivalents)	0.14	0.19	0.13	0.22
Citrus fruit, melons, and berries (cup equivalents)	0.08	0.12	0.05	0.26
Other fruit (cup equivalents)	0.17	0.24	0.14	0.27
Total milk (cup equivalents)	0.15	0.12	0.25	0.13
Milk (cup equivalents)	0.17	0.11	0.19	0.28
Yogurt (cup equivalents)	0.04	0.00	0.00	0.07
Cheese (cup equivalents)	0.07	0.10	0.06	0.24
Meat, poultry, fish (oz. equivalents)	0.55	0.27	0.26	0.65
Red meat (oz. equivalents)	0.32	0.25	0.16	0.55
Organ meats (oz. equivalents)	0.00	0.00	0.00	0.00
Frankfurters, sausages, and luncheon meat (oz. equivalents)	0.30	0.17	0.05	0.20
Poultry (oz. equivalents)	0.31	0.26	0.18	0.66
Fish and shellfish high in Omega-3 fatty acids (oz. equivalents)	0.05	0.00	0.00	0.15
Fish and shellfish low in Omega-3 fatty acids (oz. equivalents)	0.13	0.17	0.09	0.01
Eggs (oz. equivalents)	0.08	0.06	0.12	0.16
Cooked dry beans and peas (oz. equivalents)	0.16	0.10	0.09	0.05
Soybean products (oz. equivalents)	0.09	0.00	0.00	0.00
Nuts and seeds (oz. equivalents)	0.28	0.31	0.21	0.47
Discretionary oil (Grams)	1.24	3.74	2.64	4.48
Discretionary solid fat (Grams)	5.38	2.49	3.47	2.11
Added sugars (Tbsp. Equivalents)	1.48	0.62	0.63	1.05

**Table F.14. Mean Healthy Eating Index- 2005 Scores Across the 4 Main Dietary Patterns Identified in Cluster Analysis of Child Healthy Eaters: Standard Errors**

	Mean Healthy Eating Index-2005 Scores			
	Cluster 1	Cluster 2	Cluster 4	Cluster 5
	Sweet Milk n = 50 SE	Dairy Desserts n = 41 SE	High-Fat Milk n = 25 SE	100% Fruit Juice n = 27 SE
<i>Healthy Eating Index (HEI)-2005 Score</i>				
HEI-2005 Score (Total)	1.1	0.7	1.2	1.7
HEI-2005 Component Scores				
Total Fruit	0.2	0.1	0.2	0.0
Whole Fruit	0.3	0.5	0.1	0.8
Total Vegetables	0.3	0.3	0.5	0.2
Total Vegetables	0.5	0.4	0.2	0.7
Total Grains	0.2	0.3	0.1	0.4
Whole Grains	0.3	0.5	0.5	0.3
Milk	0.8	0.3	0.4	0.6
Meat and Beans	0.6	0.4	0.6	0.5
Oils	0.4	1.1	0.8	1.6
Saturated Fat	0.4	0.6	0.9	0.3
Sodium	0.8	0.5	0.5	0.5
Calories from SoFAAS	0.6	0.2	0.7	0.3

**Table F.15. Sociodemographic Characteristics Across the 4 Main Dietary Patterns Identified in Cluster Analysis of Child Healthy Eaters: Standard Errors**

Characteristic	Proportion with Characteristic			
	Cluster 1	Cluster 2	Cluster 4	Cluster 5
	Sweet Milk n = 50 SE	Dairy Desserts n = 41 SE	High-Fat Milk n = 25 SE	100% Fruit Juice n = 27 SE
SNAP Participation Status				
SNAP participant	9.3	12.9	21.7	19.4
Income-eligible non-participant	12.0	15.1	13.7	12.9
Other low-income non-participant	12.2	8.0	9.5	15.6
Household Participates in WIC	9.6	13.1	14.5	10.7
Sex				
Male	10.1	8.2	13.8	18.3
Female	10.1	8.2	13.8	18.3
Age				
2-5	10.2	12.6	12.9	16.9
6-11	11.5	12.3	16.3	23.2
12-18	9.5	3.2	5.6	15.8
Race/Ethnicity				
Non-Hispanic, White	12.6	16.6	23.2	11.6
Non-Hispanic, Black	6.1	2.6	9.4	5.7
Hispanic	8.4	13.2	14.2	8.4
Other	7.0	11.7	3.7	0.0
US-Born	5.2	13.3	2.3	5.0
Household Size				
1	0.0	0.0	0.0	0.0
2	1.1	0.0	3.0	5.2
3	10.3	6.6	4.2	4.2
4	10.7	12.8	19.1	19.7
5+	12.7	14.4	16.2	18.5
Sex of HH Ref Person*				
Male	11.7	14.4	14.6	17.6
Female	11.7	14.4	14.6	17.6
Age of HH Ref Person*				
19-30	12.9	8.4	16.4	17.7
31-40	11.9	11.3	11.4	15.4
41-50	9.0	6.6	3.7	10.4
51-60	4.3	1.0	0.0	0.0
>60	4.8	0.0	3.2	0.9
HH Ref Person US-Born*	10.4	14.7	13.1	6.9
HH Ref Person Married*	9.5	14.2	7.8	12.9
Education Level of HH Ref Person*				
Less than high school	14.3	8.7	12.4	11.2
High-school/GED	10.8	10.5	19.9	23.7
More than HS	13.8	9.1	9.9	17.5
Household Food Security Level				
Full food security	9.4	12.3	13.2	16.5
Marginal food security	2.6	3.0	4.9	14.0
Low food security	3.5	13.1	11.9	7.3
Very low food security	9.2	3.9	25.6	23.9
Child Food Security Level				
Full food security	10.0	10.8	17.7	21.6
Marginal food security	1.8	1.8	4.4	0.0
Low food security	9.8	11.3	20.8	21.6
Very low food security	0.9	0.7	0.0	0.0
Home is Owned	10.3	15.2	12.8	11.0
Someone in Household smokes	10.7	12.5	22.3	15.8
Obese	7.3	8.5	3.5	21.7
Overweight or Obese	11.2	9.5	11.7	17.3
Has Health Insurance	10.7	6.7	7.0	4.6
Health Condition Good or Better	2.5	2.0	21.5	0.0
Doctor said Overweight	1.1	4.1	2.7	21.5
Taken Prescriptions in Past Month	11.6	5.0	5.5	2.1
Screen Time at Least 2 Hrs/Day	8.4	8.1	11.3	7.5

\*The household reference (HH Ref) person is defined as the first household member 18 years of age or older listed on the NHANES screener household member roster who owns or rents the residence where members of the household reside.

**Table F.16. Mean Grams Per Day from Selected Food Groups Across the 5 Dietary Patterns Identified in Cluster Analysis of Child Less- Healthy Eaters: Standard Errors**

Food or Food Group	Mean Grams Consumed Per Day				
	Cluster 1	Cluster 2	Cluster 3	Cluster 4	Cluster 5
	Soda and Pizza n = 559	Sweets n = 1295	High-Fat Dairy n = 348	Non-Carbonated Sugar-Sweetened Drinks n = 395	Alcohol and Burgers n = 12
	SE	SE	SE	SE	SE
Milk, high fat, not sweetened	13.3	6.4	17.5	22.4	86.9
Milk, high fat, sweetened	7.0	6.2	8.6	8.6	0.0
Milk, low-fat, reduced fat, nonfat, not sweetened	2.8	7.2	0.6	2.7	4.7
Milk, low-fat, reduced fat, nonfat, sweetened	4.7	4.5	5.2	5.4	0.0
Dairy products (not milk), high fat	2.9	1.6	3.3	2.6	14.8
Dairy products (not milk), low-fat, reduced fat, nonfat	2.4	0.9	1.3	0.9	0.0
Dairy desserts and beverages, high fat	7.5	2.5	7.5	4.5	0.1
Dairy desserts and beverages, reduced-fat	1.9	0.8	2.4	2.5	0.0
Red meats, not fried	3.9	2.1	2.5	3.1	5.4
Chicken and turkey, not fried	2.4	1.0	1.8	2.8	22.5
Processed meat	3.3	2.3	3.1	3.1	19.1
Fish and shellfish, not fried	0.4	0.6	0.2	0.4	0.0
Fried meat, poultry, or fish	1.9	1.6	2.5	2.1	1.0
Mixed dishes with meat (including organ meats and processed meat)	7.3	4.2	8.9	8.8	3.2
Mixed dishes with fish and shellfish	0.7	3.8	1.1	2.4	0.0
Mixed dishes with chicken and turkey	2.6	2.8	6.6	3.2	0.0
Mixed dishes, grain and vegetable (no meat)	3.6	7.9	8.2	6.5	0.0
Hamburgers and cheeseburgers	4.1	1.5	3.8	3.0	29.7
Pizza	8.4	4.3	8.8	7.2	42.2
Mexican dishes	4.2	2.8	3.5	5.9	17.0
Soups	8.1	5.1	9.7	16.3	21.0
Eggs and egg dishes	2.3	1.4	3.7	5.3	47.0
Beans and legumes, soy milk and soy products	0.1	0.3	0.2	0.1	0.0
Beans and legumes, beans, nuts, and seeds	1.4	1.5	4.2	4.6	4.8
White/non-whole-grain bread	2.1	1.9	3.1	3.4	28.1
Whole grain bread	0.1	0.2	0.1	0.0	0.0
Rice, pasta, noodles, dumplings, similar grain products, non-whole grain	5.7	2.9	5.6	3.4	0.6
Rice, pasta, noodles, dumplings, similar grain products whole grain	0.1	0.0	0.2	0.3	0.0
Other grains, whole grain	0.4	0.2	2.1	0.6	0.0
Cereal, non-whole grain	2.2	1.5	3.0	3.1	0.0
Cereal, whole grain	1.4	1.0	2.4	2.2	0.0
Sweet breakfast foods/breads	1.8	1.7	1.9	2.1	5.6
Desserts (non-dairy)	4.1	3.0	5.6	3.9	7.4
Salty snacks	2.1	1.2	1.7	2.5	5.9
Fruit, fresh, citrus	1.0	2.4	1.0	3.2	0.0
Fruit, fresh, melons and berries	1.1	0.9	1.7	1.0	10.3
Fruit, fresh, other	1.6	1.9	3.7	4.1	2.4
Fruit, canned or frozen	1.6	1.2	1.9	2.0	0.0
100% fruit juice	9.3	6.0	14.0	5.6	39.6
Vegetables, raw and salad	2.6	1.0	5.0	2.3	5.8
Vegetables, cooked, not starchy, fried, creamed, w/cheese, or stuffed	1.7	1.6	3.0	1.6	4.5
Vegetables, cooked, starchy (not fried)	2.2	2.7	7.0	4.6	0.7
Fried potatoes	5.3	1.3	2.9	4.2	32.0
Butter, margarine, and other added fats	0.6	0.6	0.6	1.3	1.6
Salad Dressings and mayo, regular, and added oils	1.0	0.2	0.6	0.7	3.5
Miscellaneous sugary foods	3.5	2.4	4.1	15.2	2.2
Coffee or tea (not sweetened)	5.1	3.7	3.4	1.9	0.0
Sugar-sweetened drinks (with calories), other than carbonated sodas	10.4	6.1	15.6	23.5	110.9
Sweetened drinks without calories (no calories or art. sweetener)	7.3	8.9	6.2	2.8	189.0
Carbonated soda (not diet)	17.8	6.6	26.9	22.4	160.5
Alcoholic drinks	6.7	1.8	0.2	1.1	462.2

**Table F.17. Mean Energy and Nutrient Intakes Across the 4 Main Dietary Patterns Identified in Cluster Analysis of Child Less- Healthy Eaters: Standard Errors**

<i>Energy/Nutrient</i>	Mean Intake Over 24 Hours			
	Cluster 1	Cluster 2	Cluster 3	Cluster 4
	Soda and Pizza	Sweets	High-Fat Dairy	Non-Carbonated Sugar-Sweetened Drinks
	n = 559	n = 1295	n = 348	n = 395
	SE	SE	SE	SE
Energy (kcal)	45.8	24.3	41.2	48.2
Fat (g)	2.4	1.2	1.9	2.4
Percent of Total Energy from Fat	0.6	0.3	0.4	0.7
Sodium (mg)	97.3	48.4	76.6	103.4
Calcium (mg)	36.2	23.3	29.3	31.7
Folate (mcg FE)	34.2	15.9	29.7	21.7
Cholesterol (mg)	9.7	6.3	8.3	14.2
Fiber (gm)	0.3	0.3	0.4	0.4
Protein (g)	1.8	1.0	1.2	2.0
Percent of Total Energy from Protein	0.3	0.2	0.3	0.3
Carbohydrate (g)	6.6	3.4	6.5	8.5
Percent of Total Energy from Carbohydrate	0.5	0.4	0.5	0.9
Saturated Fat (g)	0.9	0.5	0.7	0.9
Percent of Total Energy from Saturated Fat	0.3	0.2	0.2	0.3



**Table F.18. Mean Intake of MyPyramid Food Groups and Subgroups Across the 4 Main Dietary Patterns Identified in Cluster Analysis of Child Less- Healthy Eaters: Standard Errors**

	Mean Intake of MyPyramid Food Groups and Subgroups Over 24 Hours			
	Cluster 1	Cluster 2	Cluster 3	Cluster 4
	Soda and Pizza	Sweets	High-Fat Dairy	Non-Carbonated Sugar-Sweetened Drinks
	n = 559 SE	n = 1295 SE	n = 348 SE	n = 395 SE
<i>Food or Food Group</i>				
Total grains (oz. equivalents)	0.23	0.10	0.26	0.21
Whole grains (oz. equivalents)	0.03	0.03	0.09	0.03
Non-whole grains (oz. equivalents)	0.22	0.10	0.27	0.20
Total vegetables (cup equivalents)	0.03	0.03	0.08	0.06
Dark-green, leafy vegetables (cup equivalents)	0.00	0.00	0.01	0.00
Orange vegetables (cup equivalents)	0.02	0.00	0.01	0.01
White potatoes (cup equivalents)	0.04	0.02	0.05	0.05
Other starchy vegetables (cup equivalents)	0.01	0.01	0.01	0.02
Tomatoes (cup equivalents)	0.02	0.02	0.02	0.02
Other vegetables (cup equivalents)	0.02	0.01	0.04	0.02
Total fruit (cup equivalents)	0.05	0.04	0.07	0.06
Citrus fruit, melons, and berries (cup equivalents)	0.03	0.03	0.04	0.03
Other fruit (cup equivalents)	0.02	0.03	0.05	0.04
Total milk (cup equivalents)	0.10	0.07	0.08	0.10
Milk (cup equivalents)	0.06	0.05	0.06	0.10
Yogurt (cup equivalents)	0.01	0.00	0.01	0.00
Cheese (cup equivalents)	0.07	0.04	0.06	0.05
Meat, poultry, fish (oz. equivalents)	0.14	0.11	0.16	0.20
Red meat (oz. equivalents)	0.15	0.07	0.12	0.12
Organ meats (oz. equivalents)	0.00	0.00	0.00	0.01
Frankfurters, sausages, and luncheon meat (oz. equivalents)	0.09	0.06	0.09	0.09
Poultry (oz. equivalents)	0.08	0.05	0.08	0.12
Fish and shellfish high in Omega-3 fatty acids (oz. equivalents)	0.00	0.01	0.01	0.01
Fish and shellfish low in Omega-3 fatty acids (oz. equivalents)	0.04	0.03	0.02	0.02
Eggs (oz. equivalents)	0.04	0.03	0.04	0.06
Cooked dry beans and peas (oz. equivalents)	0.01	0.01	0.02	0.01
Soybean products (oz. equivalents)	0.00	0.01	0.01	0.00
Nuts and seeds (oz. equivalents)	0.06	0.02	0.02	0.04
Discretionary oil (Grams)	1.42	0.39	0.93	1.09
Discretionary solid fat (Grams)	1.46	0.90	1.41	1.60
Added sugars (Tbsp. Equivalents)	0.73	0.43	0.84	1.38

Table F.19. Mean Healthy Eating Index- 2005 Scores Across the 4 Main Dietary Patterns Identified in Cluster Analysis of Child Less- Healthy Eaters: Standard Errors

	Mean Healthy Eating Index- 2005 Scores			
	Cluster 1	Cluster 2	Cluster 3	Cluster 4
	Soda and Pizza n = 559 SE	Sweets n = 1295 SE	High-Fat Dairy n = 348 SE	Non-Carbonated Sugar-Sweetened Drinks n = 395 SE
<i>Healthy Eating Index (HEI)-2005 Score</i>				
HEI-2005 Score (Total)	0.75	0.28	0.52	0.65
HEI-2005 Component Scores				
Total Fruit	0.11	0.09	0.14	0.14
Whole Fruit	0.10	0.09	0.14	0.12
Total Vegetables	0.08	0.07	0.14	0.13
Dark Green and Orange Vegetables and Legumes	0.09	0.06	0.08	0.05
Total Grains	0.07	0.03	0.09	0.07
Whole Grains	0.05	0.04	0.14	0.06
Milk	0.23	0.20	0.05	0.29
Meat and Beans	0.20	0.16	0.27	0.23
Oils	0.40	0.14	0.27	0.36
Saturated Fat	0.28	0.19	0.17	0.35
Sodium	0.21	0.14	0.23	0.27
Calories from SoFAAS	0.29	0.15	0.39	0.29

**Table F.20. Sociodemographic Characteristics Across the 4 Main Dietary Patterns Identified in Cluster Analysis of Child Less-Healthy Eaters: Standard Errors**

<i>Characteristic</i>	Proportion with Characteristic			
	Cluster 1	Cluster 2	Cluster 3	Cluster 4
	Soda and Pizza n = 559 SE	Sweets n = 1295 SE	High-Fat Dairy n = 348 SE	Non-Carbonated Sugar-Sweetened Drinks n = 395 SE
SNAP Participation Status				
SNAP participant	3.4	3.1	5.0	4.1
Income-eligible non-participant	4.0	3.1	4.4	4.1
Other low-income non-participant	3.9	2.6	3.5	2.9
Household Participates in WIC	2.2	2.3	3.6	3.8
Sex				
Male	3.8	2.1	3.6	3.6
Female	3.8	2.1	3.6	3.6
Age				
2-5	1.7	2.2	3.8	3.6
6-11	4.4	2.5	4.6	3.8
12-18	3.7	2.1	3.4	4.2
Race/Ethnicity				
Non-Hispanic, White	5.3	4.4	4.4	6.3
Non-Hispanic, Black	2.7	3.1	2.7	4.7
Hispanic	4.2	3.0	2.8	3.4
Other	4.5	1.9	1.9	3.3
US-Born	1.1	1.3	0.8	1.1
Household Size				
1	1.9	0.1	0.0	0.3
2	1.7	1.2	2.0	1.4
3	2.9	1.9	3.8	3.2
4	3.9	2.0	5.2	5.0
5+	4.3	2.4	5.0	4.9
Sex of HH Ref Person				
Male	3.5	2.4	4.4	3.5
Female	3.5	2.4	4.4	3.5
Age of HH Ref Person*				
19-30	2.8	2.8	4.5	5.5
31-40	3.1	2.8	4.9	4.5
41-50	3.2	1.9	2.4	3.3
51-60	2.8	1.6	1.2	1.6
>60	1.5	0.8	1.6	1.6
HH Ref Person US-Born*	3.3	2.3	2.3	3.4
HH Ref Person Married*	3.4	3.1	4.6	4.5
Education Level of HH Ref Person*				
Less than high school	5.4	2.8	3.4	4.4
High-school/GED	4.9	2.0	3.7	5.0
More than HS	4.6	2.5	4.1	4.1
Household Food Security Level				
Full food security	3.4	3.2	4.7	4.2
Marginal food security	2.8	2.3	2.6	2.8
Low food security	4.0	1.7	2.4	3.8
Very low food security	2.8	1.3	3.3	3.6
Child Food Security Level				
Full food security	3.5	2.3	4.4	4.7
Marginal food security	1.6	1.6	3.2	3.0
Low food security	2.9	1.5	3.1	4.0
Very low food security	1.4	1.0	1.6	2.9
Home is Owned	3.5	3.2	4.4	4.7
Someone in Household smokes	5.8	2.7	4.7	4.7
Obese	3.0	1.7	2.5	2.4
Overweight or Obese	3.2	2.2	3.7	4.5
Has Health Insurance	2.3	2.2	2.4	4.3
Health Condition Good or Better	2.7	0.7	2.3	1.4
Doctor said Overweight	1.5	1.1	2.2	2.3
Taken Prescriptions in Past Month	3.4	2.2	3.6	3.7
Screen Time at Least 2 Hrs/Day	3.7	2.5	4.0	4.3

\*The household reference (HH Ref) person is defined as the first household member 18 years of age or older listed on the NHANES screener household member roster who owns or rents the residence where members of the household reside.

## APPENDIX G

### ADDITIONAL CLUSTER ANALYSIS TABLES: FOOD GROUP INTAKES

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**Table G.1. Mean Grams Per Day from Selected Food Groups Across the 4 Dietary Patterns Identified in Cluster Analysis of Adult Healthy Eaters (Full List of Food Groups)**

<i>Food or Food Group</i>	Mean Grams			
	Cluster 1	Cluster 2	Cluster 3	Cluster 4
	Beverages	Plant-based	Breakfast and Sweets	Low-Fat Milk
	n = 149 Mean	n = 136 Mean	n = 61 Mean	n = 51 Mean
Milk, high fat, not sweetened	<b>197.9</b>	70.3	90.0	<u>44.5</u>
Milk, high fat, sweetened	0.0	0.0	0.0	0.0
Milk, low-fat, reduced fat, nonfat, not sweetened	<u>2.4</u>	39.1	120.2	<b>433.9</b>
Milk, low-fat, reduced fat, nonfat, sweetened	2.3	<u>0.0</u>	<b>4.7</b>	3.3
Dairy products (not milk), high fat	<u>3.6</u>	8.0	<b>10.8</b>	5.9
Dairy products (not milk), low-fat, reduced fat, nonfat	<b>18.0</b>	13.7	12.3	<u>10.5</u>
Dairy desserts and beverages, high fat	<u>4.7</u>	<b>14.1</b>	13.3	9.4
Dairy desserts and beverages, reduced-fat	<u>7.7</u>	4.6	1.6	<u>0.0</u>
Red meats, not fried	<b>15.1</b>	10.3	<u>7.9</u>	14.7
Chicken and turkey, not fried	<u>17.3</u>	28.7	<b>31.8</b>	23.0
Liver and organ meats	0.0	<b>0.1</b>	0.0	0.0
Processed meat	8.8	<u>6.6</u>	<b>12.1</b>	6.9
Fish and shellfish, not fried	<u>8.4</u>	16.6	9.6	<b>19.6</b>
Fried meat, poultry, or fish	<b>18.4</b>	16.2	16.8	<u>7.5</u>
Mixed dishes with meat (including organ meats and processed meat)	<b>43.0</b>	30.2	39.5	<u>15.5</u>
Mixed dishes with fish and shellfish	<u>3.5</u>	<b>30.7</b>	14.2	14.1
Mixed dishes with chicken and turkey	27.0	<u>19.8</u>	20.2	<b>35.0</b>
Mixed dishes, grain and vegetable (no meat)	<b>68.8</b>	6.8	15.3	<u>2.1</u>
Hamburgers and cheeseburgers	<b>2.1</b>	0.1	0.0	0.0
Pizza	0.5	<b>10.2</b>	1.5	<u>0.0</u>
Mexican dishes	<b>26.5</b>	12.5	<u>8.7</u>	12.6
Soups	53.2	<u>24.4</u>	61.8	<b>66.4</b>
Eggs and egg dishes	10.3	17.9	<u>10.1</u>	<b>33.4</b>
Beans and legumes, soy milk and soy products	13.9	<b>26.0</b>	7.7	<u>1.0</u>
Beans and legumes, beans, nuts, and seeds	49.1	<b>50.3</b>	36.9	<u>31.3</u>
White/non-whole-grain bread	47.8	47.4	<b>51.1</b>	<u>44.4</u>
Whole grain bread	<u>2.0</u>	<b>3.6</b>	3.4	2.6
Rice, pasta, noodles, dumplings, similar grain products, non-whole grain	<b>50.7</b>	38.7	<u>25.1</u>	43.1
Rice, pasta, noodles, dumplings, similar grain products whole grain	<b>7.9</b>	4.0	<u>0.0</u>	7.1
Other grains, not-whole grain	0.0	0.0	0.0	0.0
Other grains, whole grain	2.4	2.8	<b>4.4</b>	<u>0.5</u>
Cereal, non-whole grain	6.3	<u>4.2</u>	15.7	<b>16.3</b>
Cereal, whole grain	<u>36.1</u>	56.1	<b>79.8</b>	39.8
Sweet breakfast foods/breads	<u>10.0</u>	10.7	<b>20.1</b>	18.7
Desserts (non-dairy)	15.7	<u>14.8</u>	20.9	<b>24.5</b>
Salty snacks	<b>9.9</b>	4.0	<u>1.5</u>	3.8
Meal replacement bars/products	7.3	<b>14.7</b>	0.0	0.0
Fruit, fresh, citrus	24.1	<b>25.4</b>	23.5	<u>18.5</u>
Fruit, fresh, melons and berries	15.8	<b>55.8</b>	<u>12.1</u>	35.0
Fruit, fresh, other	109.4	<u>90.5</u>	<b>136.0</b>	117.8
Fruit, canned or frozen	14.0	16.4	<b>17.5</b>	<u>5.4</u>
100% fruit juice	<b>211.8</b>	112.5	109.9	<u>103.1</u>
Fruit, dried	1.3	1.4	<b>4.7</b>	<u>0.7</u>
100% vegetable juice	4.9	<b>5.6</b>	0.0	0.0
Vegetables, raw and salad	<u>51.4</u>	<b>77.1</b>	73.2	56.7
Vegetables, cooked, not starchy, fried, creamed, w/cheese, or stuffed	57.9	<b>65.5</b>	<u>31.8</u>	56.5
Vegetables, cooked, starchy (not fried)	<u>21.1</u>	35.2	<b>42.0</b>	29.9
Vegetables, fried or creamed	<b>2.0</b>	1.8	0.0	0.0
Fried potatoes	11.5	<u>1.9</u>	<b>13.3</b>	4.5
Butter, margarine, and other added fats	<u>1.8</u>	4.1	<b>4.8</b>	2.1
Salad Dressings and mayo, regular, and added oils	11.6	8.7	<b>15.4</b>	<u>4.1</u>
Salad Dressings and Mayo, reduced fat/calorie, nonfat	<u>1.1</u>	3.1	<b>3.5</b>	1.7
Miscellaneous sugary foods	10.3	8.5	<b>24.4</b>	<u>2.4</u>
Chocolate candy	1.3	2.2	<u>0.4</u>	<b>2.6</b>
Coffee or tea (not sweetened)	<u>55.7</u>	411.2	<b>996.1</b>	128.4
Sugar-sweetened drinks (with calories), other than carbonated sodas	<b>119.3</b>	55.0	<u>30.7</u>	31.6
Sweetened drinks without calories (no calories or art. sweetener)	104.2	74.5	<u>29.5</u>	<b>299.5</b>
Carbonated soda (not diet)	<b>91.5</b>	71.3	<u>2.4</u>	59.2
Alcoholic drinks	4.7	<b>16.0</b>	<u>2.2</u>	4.8
Condiments	<u>3.5</u>	<b>8.8</b>	6.1	7.3
Miscellaneous foods	<b>9.3</b>	5.6	<u>1.1</u>	9.1

Note: For each food or food group, the highest intake across clusters is in boldface and the lowest intake is underlined.

**Table G.2. Mean Grams Per Day from Selected Food Groups Across the 4 Dietary Patterns Identified in Cluster Analysis of Adult Healthy Eaters (Full List of Food Groups): Standard Errors**

<i>Food or Food Group</i>	Mean Grams Consumed Per Day			
	Cluster 1	Cluster 2	Cluster 3	Cluster 4
	Beverages n = 149 SE	Plant-based n = 136 SE	Breakfast and Sweets n = 61 SE	Low-Fat Milk n = 51 SE
Milk, high fat, not sweetened	27.5	16.2	22.9	38.3
Milk, high fat, sweetened	0.0	0.0	0.0	0.0
Milk, low-fat, reduced fat, nonfat, not sweetened	1.8	10.1	38.5	45.1
Milk, low-fat, reduced fat, nonfat, sweetened	1.6	0.0	4.4	3.4
Dairy products (not milk), high fat	0.9	1.7	3.1	2.6
Dairy products (not milk), low-fat, reduced fat, nonfat	6.8	4.3	4.8	6.3
Dairy desserts and beverages, high fat	2.2	5.6	7.8	8.0
Dairy desserts and beverages, reduced-fat	5.3	1.9	1.6	0.0
Red meats, not fried	4.1	4.1	3.4	6.2
Chicken and turkey, not fried	4.0	5.6	10.3	6.5
Liver and organ meats	0.0	0.1	0.0	0.0
Processed meat	3.0	1.8	2.7	3.3
Fish and shellfish, not fried	4.1	8.3	4.5	9.6
Fried meat, poultry, or fish	4.8	4.4	8.4	4.8
Mixed dishes with meat (including organ meats and processed meat)	10.4	9.5	15.5	8.7
Mixed dishes with fish and shellfish	1.9	11.6	9.9	9.5
Mixed dishes with chicken and turkey	9.7	7.0	11.2	16.5
Mixed dishes, grain and vegetable (no meat)	27.9	3.5	10.7	1.5
Hamburgers and cheeseburgers	2.0	0.1	0.0	0.0
Pizza	0.5	7.0	1.5	0.0
Mexican dishes	6.6	5.0	3.4	5.7
Soups	15.0	11.2	22.3	31.7
Eggs and egg dishes	2.7	4.9	3.9	21.9
Beans and legumes, soy milk and soy products	8.0	11.8	4.1	1.0
Beans and legumes, beans, nuts, and seeds	9.3	9.1	13.4	9.2
White/non-whole-grain bread	7.5	4.3	6.8	10.3
Whole grain bread	1.4	2.4	2.1	1.8
Rice, pasta, noodles, dumplings, similar grain products, non-whole grain	12.4	6.1	11.1	17.1
Rice, pasta, noodles, dumplings, similar grain products whole grain	5.5	2.6	0.0	5.8
Other grains, not-whole grain	0.0	0.0	0.0	0.0
Other grains, whole grain	1.6	1.7	3.1	0.5
Cereal, non-whole grain	1.8	1.3	4.8	5.3
Cereal, whole grain	6.3	10.7	26.0	13.2
Sweet breakfast foods/breads	3.8	2.3	7.5	5.8
Desserts (non-dairy)	3.3	3.4	6.1	4.2
Salty snacks	3.5	1.4	1.1	1.7
Meal replacement bars/products	4.7	10.5	0.0	0.0
Fruit, fresh, citrus	5.4	7.3	7.9	6.5
Fruit, fresh, melons and berries	6.0	22.7	5.8	26.8
Fruit, fresh, other	9.3	8.8	16.7	11.1
Fruit, canned or frozen	5.3	5.7	7.2	3.3
100% fruit juice	34.6	19.7	28.8	35.2
Fruit, dried	0.7	0.6	3.0	0.5
100% vegetable juice	3.9	3.8	0.0	0.0
Vegetables, raw and salad	7.1	11.7	19.4	16.8
Vegetables, cooked, not starchy, fried, creamed, w/cheese, or stuffed	13.0	8.9	8.4	11.9
Vegetables, cooked, starchy (not fried)	5.6	6.8	10.9	10.8
Vegetables, fried or creamed	1.7	1.3	0.0	0.0
Fried potatoes	6.5	1.0	6.7	2.4
Butter, margarine, and other added fats	0.6	0.9	2.3	1.1
Salad Dressings and mayo, regular, and added oils	2.6	2.0	4.7	1.8
Salad Dressings and Mayo, reduced fat/calorie, nonfat	0.7	1.1	2.0	0.8
Miscellaneous sugary foods	4.2	2.0	7.3	0.8
Chocolate candy	0.6	1.8	0.4	2.0
Coffee or tea (not sweetened)	14.6	14.4	38.8	32.1
Sugar-sweetened drinks (with calories), other than carbonated sodas	38.0	23.7	11.0	10.7
Sweetened drinks without calories (no calories or art. sweetener)	39.7	19.1	14.2	132.3
Carbonated soda (not diet)	26.8	22.7	1.7	36.7
Alcoholic drinks	3.8	7.5	2.3	4.5
Condiments	1.1	3.5	3.5	3.3
Miscellaneous foods	4.4	2.9	0.8	5.8

**Table G.3. Mean Grams Per Day from Selected Food Groups Across the 4 Dietary Patterns Identified in Cluster Analysis of Adult Less-Healthy Eaters (Full List of Food Groups)**

Food or Food Group	Mean Grams Consumed Per Day			
	Cluster 1	Cluster 2	Cluster 3	Cluster 4
	Soda and Pizza n = 443 Mean	Alcohol n = 177 Mean	Non-Carbonated Sugar-Sweetened Drinks n = 1443 Mean	Coffee n = 185 Mean
Milk, high fat, not sweetened	71.7	<u>45.7</u>	98.4	<b>125.4</b>
Milk, high fat, sweetened	<b>10.6</b>	4.2	9.5	<u>1.5</u>
Milk, low-fat, reduced fat, nonfat, not sweetened	12.5	<u>0.8</u>	<b>22.8</b>	4.7
Milk, low-fat, reduced fat, nonfat, sweetened	4.2	3.8	<b>7.8</b>	<u>0.9</u>
Dairy products (not milk), high fat	24.3	<u>13.6</u>	20.6	<b>32.7</b>
Dairy products (not milk), low-fat, reduced fat, nonfat	3.2	<u>0.8</u>	3.5	<b>5.6</b>
Dairy desserts and beverages, high fat	25.2	<u>9.2</u>	26.0	<b>31.3</b>
Dairy desserts and beverages, reduced-fat	<u>1.5</u>	<b>8.0</b>	5.7	4.3
Red meats, not fried	<b>33.7</b>	29.0	28.3	<u>21.5</u>
Chicken and turkey, not fried	11.3	<b>15.1</b>	12.7	<u>3.2</u>
Liver and organ meats	0.1	<b>0.7</b>	0.1	<u>0.0</u>
Processed meat	27.6	26.1	<u>25.8</u>	<b>32.4</b>
Fish and shellfish, not fried	3.1	2.5	<b>3.5</b>	<u>1.4</u>
Fried meat, poultry, or fish	29.2	<b>40.3</b>	24.9	<u>23.9</u>
Mixed dishes with meat (including organ meats and processed meat)	57.9	<u>46.5</u>	49.4	<b>71.4</b>
Mixed dishes with fish and shellfish	<u>2.6</u>	8.6	5.9	<b>9.4</b>
Mixed dishes with chicken and turkey	<b>21.4</b>	21.1	16.8	<u>14.0</u>
Mixed dishes, grain and vegetable (no meat)	<u>18.1</u>	<b>28.2</b>	23.9	<u>18.1</u>
Hamburgers and cheeseburgers	<b>26.9</b>	22.4	<u>16.4</u>	21.4
Pizza	<b>52.9</b>	<u>24.6</u>	27.5	41.4
Mexican dishes	37.0	<b>45.5</b>	26.0	<u>14.8</u>
Soups	<u>26.0</u>	47.4	41.3	<b>49.2</b>
Eggs and egg dishes	<u>22.8</u>	<b>26.3</b>	25.2	24.7
Beans and legumes, soy milk and soy products	<b>1.0</b>	<u>0.0</u>	0.5	0.7
Beans and legumes, beans, nuts, and seeds	<b>20.1</b>	13.6	12.4	<u>9.7</u>
White/non-whole-grain bread	41.4	<u>35.7</u>	40.8	<b>52.4</b>
Whole grain bread	0.1	<u>0.0</u>	0.7	<b>1.0</b>
Rice, pasta, noodles, dumplings, similar grain products, non-whole grain	<b>29.4</b>	25.2	25.1	<u>17.5</u>
Rice, pasta, noodles, dumplings, similar grain products whole grain	0.1	<u>0.0</u>	<b>0.2</b>	<u>0.0</u>
Other grains, not-whole grain	0.0	0.0	0.0	0.0
Other grains, whole grain	1.2	<u>0.3</u>	1.8	<b>2.3</b>
Cereal, non-whole grain	5.8	<u>3.4</u>	<b>10.0</b>	6.2
Cereal, whole grain	4.4	<u>0.4</u>	<b>8.5</b>	7.9
Sweet breakfast foods/breads	<b>23.3</b>	<u>9.2</u>	22.5	22.6
Desserts (non-dairy)	23.9	<u>16.8</u>	<b>33.6</b>	31.7
Salty snacks	10.5	7.2	<u>6.5</u>	<b>10.7</b>
Meal replacement bars/products	0.6	<u>0.2</u>	<b>4.2</b>	0.3
Fruit, fresh, citrus	<u>1.8</u>	<b>6.3</b>	2.5	2.4
Fruit, fresh, melons and berries	2.7	<u>0.4</u>	<b>5.7</b>	1.5
Fruit, fresh, other	<u>10.4</u>	10.6	<b>15.4</b>	14.7
Fruit, canned or frozen	1.2	<u>0.5</u>	<b>4.7</b>	3.1
100% fruit juice	<u>31.1</u>	<b>47.8</b>	44.2	35.3
Fruit, dried	<u>0.0</u>	<b>0.1</b>	<u>0.0</u>	<u>0.0</u>
100% vegetable juice	2.2	<b>3.0</b>	<u>0.8</u>	2.3
Vegetables, raw and salad	20.3	<b>28.3</b>	22.1	<u>15.2</u>
Vegetables, cooked, not starchy, fried, creamed, w/cheese, or stuffed	14.7	<u>13.0</u>	<b>21.2</b>	16.8
Vegetables, cooked, starchy (not fried)	<u>20.4</u>	23.0	<b>35.9</b>	33.0
Vegetables, fried or creamed	3.1	<u>0.1</u>	2.2	<b>3.4</b>
Fried potatoes	<b>27.1</b>	23.0	<u>18.4</u>	20.1
Butter, margarine, and other added fats	5.2	<u>3.1</u>	<b>5.8</b>	5.3
Salad Dressings and mayo, regular, and added oils	4.3	<b>8.3</b>	4.6	<u>4.1</u>
Salad Dressings and Mayo, reduced fat/calorie, nonfat	0.4	<u>0.1</u>	<b>0.5</b>	0.2
Miscellaneous sugary foods	14.9	<u>9.5</u>	15.8	<b>31.3</b>
Chocolate candy	5.9	<u>5.0</u>	5.4	<b>7.9</b>
Coffee or tea (not sweetened)	<u>119.5</u>	264.5	181.0	<b>1662.5</b>
Sugar-sweetened drinks (with calories), other than carbonated sodas	114.7	103.9	<b>279.3</b>	<u>38.8</u>
Sweetened drinks without calories (no calories or art. sweetener)	<u>16.5</u>	35.0	<b>104.5</b>	57.9
Carbonated soda (not diet)	<b>1511.7</b>	391.1	<u>266.3</u>	420.6
Alcoholic drinks	<u>63.7</u>	<b>2097.4</b>	70.8	85.6
Condiments	11.3	<b>13.2</b>	10.4	<u>8.9</u>
Miscellaneous foods	3.9	<u>1.5</u>	<b>4.5</b>	3.6

Note: For each food or food group, the highest intake across clusters is in boldface and the lowest intake is underlined.



**Table G.4. Mean Grams Per Day from Selected Food Groups Across the 4 Dietary Patterns Identified in Cluster Analysis of Adult Less- Healthy Eaters (Full List of Food Groups): Standard Errors**

<i>Food or Food Group</i>	Mean Grams Consumed Per Day			
	Cluster 1	Cluster 2	Cluster 3	Cluster 4
	Soda and Pizza	Alcohol	Non-Carbonated Sugar-Sweetened Drinks	Coffee
	n = 443 SE	n = 177 SE	n = 1443 SE	n = 185 SE
Milk, high fat, not sweetened	11.3	13.3	7.2	19.0
Milk, high fat, sweetened	5.5	4.2	2.3	1.1
Milk, low-fat, reduced fat, nonfat, not sweetened	6.0	0.7	6.1	2.3
Milk, low-fat, reduced fat, nonfat, sweetened	2.0	3.8	2.8	0.9
Dairy products (not milk), high fat	3.3	3.5	1.5	4.9
Dairy products (not milk), low-fat, reduced fat, nonfat	1.5	0.5	0.8	3.3
Dairy desserts and beverages, high fat	4.7	3.3	2.3	9.0
Dairy desserts and beverages, reduced-fat	0.7	4.8	1.4	2.2
Red meats, not fried	4.5	5.9	2.3	4.8
Chicken and turkey, not fried	2.6	4.5	1.6	1.1
Liver and organ meats	0.1	0.7	0.1	0.0
Processed meat	3.3	5.0	1.4	5.3
Fish and shellfish, not fried	1.4	1.1	0.6	1.1
Fried meat, poultry, or fish	5.7	7.1	1.9	5.2
Mixed dishes with meat (including organ meats and processed meat)	6.9	10.1	5.6	14.7
Mixed dishes with fish and shellfish	1.0	3.5	1.2	6.8
Mixed dishes with chicken and turkey	5.5	5.7	1.6	5.6
Mixed dishes, grain and vegetable (no meat)	5.4	10.4	2.6	4.9
Hamburgers and cheeseburgers	5.0	8.0	2.6	6.3
Pizza	10.4	7.1	4.7	18.1
Mexican dishes	8.0	9.2	3.7	5.2
Soups	5.7	20.5	4.0	15.4
Eggs and egg dishes	4.5	4.4	2.0	4.9
Beans and legumes, soy milk and soy products	0.5	0.0	0.2	0.4
Beans and legumes, beans, nuts, and seeds	3.7	4.7	1.6	3.3
White/non-whole-grain bread	3.1	4.4	1.6	5.2
Whole grain bread	0.1	0.0	0.2	0.8
Rice, pasta, noodles, dumplings, similar grain products, non-whole grain	7.5	7.4	3.9	6.9
Rice, pasta, noodles, dumplings, similar grain products whole grain	0.2	0.0	0.1	0.0
Other grains, not-whole grain	0.0	0.0	0.0	0.0
Other grains, whole grain	0.4	0.2	0.3	1.2
Cereal, non-whole grain	1.5	1.0	1.3	2.3
Cereal, whole grain	1.8	0.4	1.4	3.0
Sweet breakfast foods/breads	2.7	2.5	1.9	4.2
Desserts (non-dairy)	2.9	4.5	2.4	5.0
Salty snacks	1.5	1.5	0.7	2.3
Meal replacement bars/products	0.4	0.2	1.2	0.2
Fruit, fresh, citrus	0.5	4.1	0.7	1.1
Fruit, fresh, melons and berries	1.1	0.4	1.3	1.4
Fruit, fresh, other	2.3	3.0	2.1	3.1
Fruit, canned or frozen	0.6	0.5	1.0	2.2
100% fruit juice	5.9	15.5	3.1	10.7
Fruit, dried	0.0	0.1	0.0	0.0
100% vegetable juice	1.9	2.3	0.5	1.8
Vegetables, raw and salad	3.5	7.0	1.9	3.4
Vegetables, cooked, not starchy, fried, creamed, w/cheese, or stuffed	2.7	2.4	2.2	5.4
Vegetables, cooked, starchy (not fried)	2.8	6.0	2.3	6.3
Vegetables, fried or creamed	1.1	0.1	0.6	1.6
Fried potatoes	3.5	5.2	2.2	4.2
Butter, margarine, and other added fats	1.3	1.1	0.7	1.1
Salad Dressings and mayo, regular, and added oils	1.0	2.2	0.5	1.1
Salad Dressings and Mayo, reduced fat/calorie, nonfat	0.2	0.1	0.1	0.1
Miscellaneous sugary foods	2.9	2.0	1.5	5.1
Chocolate candy	1.2	2.1	0.9	2.6
Coffee or tea (not sweetened)	14.3	56.8	7.9	77.7
Sugar-sweetened drinks (with calories), other than carbonated sodas	20.0	25.9	25.5	14.5
Sweetened drinks without calories (no calories or art. sweetener)	6.6	15.6	14.0	21.5
Carbonated soda (not diet)	38.6	57.2	13.8	35.4
Alcoholic drinks	16.0	88.8	7.0	15.0
Condiments	1.9	2.4	1.3	2.4
Miscellaneous foods	3.4	1.2	0.8	2.2

**Table G.5. Mean Grams Per Day from Selected Food Groups Across the 6 Dietary Patterns Identified in Cluster Analysis of Child Healthy Eaters (Full List of Food Groups)**

Food or Food Group	Mean Grams Consumed Per Day					
	Cluster 1	Cluster 2	Cluster 3	Cluster 4	Cluster 5	Cluster 6
	Sweet Milk n = 50 Mean	Dairy Desserts n = 41 Mean	Soda n = 17 Mean	High-Fat Milk n = 25 Mean	100% Fruit Juice n = 27 Mean	Low-Fat Milk n = 15 Mean
Milk, high fat, not sweetened	64.3	396.6	328.0	<b>564.5</b>	258.6	<u>6.5</u>
Milk, high fat, sweetened	<b>38.5</b>	0.7	25.9	<u>0.0</u>	29.7	<u>0.0</u>
Milk, low-fat, reduced fat, nonfat, not sweetened	43.7	0.0	0.0	0.0	41.0	<b>757.4</b>
Milk, low-fat, reduced fat, nonfat, sweetened	21.3	2.7	5.6	2.4	<u>0.0</u>	<b>32.6</b>
Infant Formula	0.0	0.0	0.0	0.0	0.0	0.0
Dairy products (not milk), high fat	14.3	5.9	<b>16.9</b>	2.3	<u>1.8</u>	4.1
Dairy products (not milk), low-fat, reduced fat, nonfat	9.7	2.6	<u>0.8</u>	1.5	<b>17.6</b>	2.8
Dairy desserts and beverages, high fat	<u>7.7</u>	<b>27.0</b>	10.4	8.1	12.9	13.7
Dairy desserts and beverages, reduced-fat	1.0	0.9	<b>14.0</b>	4.3	1.0	<u>0.0</u>
Red meats, not fried	16.1	13.2	9.7	<b>20.2</b>	3.3	<u>1.7</u>
Chicken and turkey, not fried	<u>8.6</u>	19.1	15.4	14.4	13.4	<b>78.8</b>
Liver and organ meats	0.0	0.0	0.0	0.0	0.0	0.0
Processed meat	<b>19.8</b>	5.2	3.5	1.8	8.4	<u>0.2</u>
Fish and shellfish, not fried	0.5	<u>0.0</u>	<u>0.0</u>	<u>0.0</u>	<b>4.5</b>	1.8
Fried meat, poultry, or fish	4.2	<b>9.2</b>	4.1	7.6	7.0	<u>4.0</u>
Mixed dishes with meat (including organ meats and processed meat)	33.6	18.7	<b>127.7</b>	103.3	29.3	<u>3.5</u>
Mixed dishes with fish and shellfish	<b>47.6</b>	27.6	27.5	<u>0.0</u>	1.8	<u>0.0</u>
Mixed dishes with chicken and turkey	45.8	32.8	141.4	70.3	<b>142.7</b>	<u>22.5</u>
Mixed dishes, grain and vegetable (no meat)	42.5	15.6	20.5	<u>11.6</u>	29.5	<b>197.9</b>
Hamburgers and cheeseburgers	0.2	<b>7.2</b>	0.0	2.9	0.0	0.0
Pizza	12.2	0.9	9.7	4.0	<b>29.0</b>	<u>0.0</u>
Mexican dishes	22.3	15.4	<b>49.7</b>	37.6	<u>4.5</u>	13.2
Soups	10.8	63.6	30.2	38.6	<u>10.6</u>	<b>130.2</b>
Eggs and egg dishes	8.7	5.5	5.7	<b>28.8</b>	19.2	<u>2.8</u>
Beans and legumes, soy milk and soy products	3.2	31.8	3.0	0.2	<b>49.9</b>	<u>0.0</u>
Beans and legumes, beans, nuts, and seeds	<b>66.7</b>	49.1	40.9	25.6	<u>19.6</u>	28.7
White/non-whole-grain bread	49.3	29.7	23.9	<b>80.0</b>	30.1	<u>18.7</u>
Whole grain bread	<u>0.0</u>	<b>2.4</b>	0.8	<u>0.0</u>	0.2	<u>0.0</u>
Rice, pasta, noodles, dumplings, similar grain products, non-whole grain	68.4	38.0	21.9	<b>126.6</b>	14.5	<u>7.0</u>
Rice, pasta, noodles, dumplings, similar grain products whole grain	1.1	<u>0.0</u>	<b>3.6</b>	<u>0.0</u>	<u>0.0</u>	<u>0.0</u>
Other grains, not-whole grain	0.0	0.0	0.0	0.0	0.0	0.0
Other grains, whole grain	0.5	1.1	0.4	<u>0.0</u>	0.7	<b>9.6</b>
Cereal, non-whole grain	<b>35.0</b>	11.2	22.4	<u>9.1</u>	9.3	13.4
Cereal, whole grain	26.4	23.1	4.0	28.5	<b>32.0</b>	<u>3.1</u>
Sweet breakfast foods/breads	7.8	6.5	3.2	13.1	<u>3.0</u>	<b>37.0</b>
Desserts (non-dairy)	9.7	18.7	<b>19.3</b>	<u>1.8</u>	6.2	9.3
Salty snacks	9.6	<u>6.3</u>	<b>28.7</b>	7.5	8.1	14.2
Meal replacement bars/products	<b>0.3</b>	0.0	0.0	0.0	0.0	0.0
Fruit, fresh, citrus	<b>28.9</b>	26.9	14.9	13.7	<u>1.0</u>	3.5
Fruit, fresh, melons and berries	14.5	9.9	<u>0.0</u>	48.1	<b>57.4</b>	31.5
Fruit, fresh, other	111.6	<b>199.6</b>	106.9	<u>19.3</u>	48.0	117.1
Fruit, canned or frozen	6.8	1.6	<u>0.0</u>	<b>93.3</b>	40.2	<u>0.0</u>
100% fruit juice	<u>76.1</u>	207.1	327.1	220.4	<b>727.8</b>	143.8
Fruit, dried	0.0	0.1	0.0	0.0	0.0	<b>0.7</b>
100% vegetable juice	0.0	0.0	0.0	0.0	0.0	0.0
Vegetables, raw and salad	<b>32.9</b>	28.0	16.4	<u>2.0</u>	11.7	8.8
Vegetables, cooked, not starchy, fried, creamed, w/cheese, or stuffed	32.5	<u>5.3</u>	16.3	17.7	<b>47.3</b>	32.2
Vegetables, cooked, starchy (not fried)	5.4	2.7	10.5	<b>23.4</b>	9.5	<u>2.1</u>
Vegetables, fried or creamed	<b>2.3</b>	0.0	0.0	0.0	0.0	0.0
Fried potatoes	2.2	<b>17.5</b>	1.6	4.5	6.6	<u>0.7</u>
Butter, margarine, and other added fats	3.6	<u>0.2</u>	0.6	<b>3.8</b>	0.4	0.6
Salad Dressings and mayo, regular, and added oils	<b>4.4</b>	3.4	1.9	<u>0.5</u>	1.2	0.9
Salad Dressings and Mayo, reduced fat/calorie, nonfat	<b>0.4</b>	0.0	0.0	0.0	0.0	0.3
Miscellaneous sugary foods	14.3	8.3	<u>1.8</u>	16.6	18.8	<b>38.9</b>
Chocolate candy	0.6	0.9	<b>1.4</b>	1.0	0.0	0.0
Coffee or tea (not sweetened)	14.1	<u>0.0</u>	13.3	<b>99.2</b>	32.9	8.5
Sugar-sweetened drinks (with calories), other than carbonated sodas	<b>95.9</b>	39.6	66.4	11.0	27.9	<u>5.6</u>
Sweetened drinks without calories (no calories or art. sweetener)	<b>17.9</b>	2.1	<u>0.0</u>	7.9	9.9	2.2
Carbonated soda (not diet)	32.2	<u>8.7</u>	<b>507.7</b>	133.6	126.9	59.8
Alcoholic drinks	<b>0.7</b>	0.0	0.0	0.0	0.0	0.0
Condiments	11.1	5.0	<b>14.3</b>	<u>1.9</u>	9.5	8.3
Miscellaneous foods	0.9	3.4	<b>5.5</b>	0.2	1.6	<u>0.0</u>

Note: For each food or food group, the highest intake across clusters is in boldface and the lowest intake is underlined.

**Table G.6. Mean Grams Per Day from Selected Food Groups Across the 6 Dietary Patterns Identified in Cluster Analysis of Child Healthy Eaters (Full List of Food Groups): Standard Errors**

Food or Food Group	Mean Grams Consumed Per Day					
	Cluster 1	Cluster 2	Cluster 3	Cluster 4	Cluster 5	Cluster 6
	Sweet Milk n = 50 SE	Dairy Desserts n = 41 SE	Soda n = 17 SE	High-Fat Milk n = 25 SE	100% Fuir Juice n = 27 SE	Low-Fat Milk n = 15 SE
Milk, high fat, not sweetened	26.8	21.8	55.9	37.4	89.7	7.1
Milk, high fat, sweetened	18.8	0.7	26.2	0.0	18.3	0.0
Milk, low-fat, reduced fat, nonfat, not sweetened	25.8	0.0	0.0	0.0	24.3	85.3
Milk, low-fat, reduced fat, nonfat, sweetened	11.9	2.8	5.8	2.9	0.0	30.6
Infant Formula	0.0	0.0	0.0	0.0	0.0	0.0
Dairy products (not milk), high fat	5.9	4.5	11.2	1.7	1.1	3.6
Dairy products (not milk), low-fat, reduced fat, nonfat	7.7	2.4	0.8	1.4	16.7	3.1
Dairy desserts and beverages, high fat	6.8	9.2	8.1	7.6	7.9	8.2
Dairy desserts and beverages, reduced-fat	0.9	1.0	14.2	4.9	1.0	0.0
Red meats, not fried	7.3	4.5	6.1	4.3	2.1	1.8
Chicken and turkey, not fried	4.1	8.6	9.7	9.9	7.7	33.9
Liver and organ meats	0.0	0.0	0.0	0.0	0.0	0.0
Processed meat	8.5	4.8	3.4	1.5	5.7	0.2
Fish and shellfish, not fried	0.4	0.0	0.0	0.0	4.3	2.2
Fried meat, poultry, or fish	2.3	4.3	2.9	6.3	4.4	3.1
Mixed dishes with meat (including organ meats and processed meat)	21.5	17.7	42.3	23.0	23.2	3.9
Mixed dishes with fish and shellfish	17.0	25.0	21.3	0.0	1.9	0.0
Mixed dishes with chicken and turkey	30.1	20.7	107.8	28.8	70.6	19.8
Mixed dishes, grain and vegetable (no meat)	18.0	12.1	14.8	8.8	23.1	124.5
Hamburgers and cheeseburgers	0.3	8.1	0.0	3.6	0.0	0.0
Pizza	9.3	0.6	5.4	3.7	23.9	0.0
Mexican dishes	8.6	4.6	17.2	8.4	3.5	9.5
Soups	6.2	25.3	21.7	25.0	7.7	72.7
Eggs and egg dishes	4.5	2.7	4.5	7.6	7.2	2.3
Beans and legumes, soy milk and soy products	2.7	30.2	2.6	0.2	57.8	0.0
Beans and legumes, beans, nuts, and seeds	34.7	21.6	19.5	17.0	9.9	26.8
White/non-whole-grain bread	9.1	10.5	10.5	28.3	4.7	9.0
Whole grain bread	0.0	2.1	0.9	0.0	0.2	0.0
Rice, pasta, noodles, dumplings, similar grain products, non-whole grain	35.4	13.7	11.9	47.0	8.3	6.4
Rice, pasta, noodles, dumplings, similar grain products whole grain	1.2	0.0	3.8	0.0	0.0	0.0
Other grains, not-whole grain	0.0	0.0	0.0	0.0	0.0	0.0
Other grains, whole grain	0.6	0.7	0.5	0.0	0.6	8.0
Cereal, non-whole grain	19.8	3.0	8.3	5.8	6.4	9.5
Cereal, whole grain	11.7	6.0	2.9	20.6	12.6	2.7
Sweet breakfast foods/breads	4.0	3.3	2.4	3.6	2.2	20.9
Desserts (non-dairy)	3.6	12.4	7.6	1.3	3.3	4.5
Salty snacks	2.7	3.4	10.3	5.0	4.7	6.9
Meal replacement bars/products	0.3	0.0	0.0	0.0	0.0	0.0
Fruit, fresh, citrus	10.0	13.4	12.1	9.2	1.1	3.2
Fruit, fresh, melons and berries	10.4	5.9	0.0	22.7	37.3	17.0
Fruit, fresh, other	19.3	54.7	26.1	12.5	22.2	9.7
Fruit, canned or frozen	3.8	1.6	0.0	10.1	21.3	0.0
100% fruit juice	27.2	43.5	60.0	22.7	45.9	77.5
Fruit, dried	0.0	0.1	0.0	0.0	0.0	0.7
100% vegetable juice	0.0	0.0	0.0	0.0	0.0	0.0
Vegetables, raw and salad	13.4	15.4	10.0	1.8	7.7	6.8
Vegetables, cooked, not starchy, fried, creamed, w/cheese, or stuffed	17.1	3.3	7.6	8.4	13.3	11.9
Vegetables, cooked, starchy (not fried)	3.4	2.1	7.8	9.3	5.8	2.0
Vegetables, fried or creamed	2.2	0.0	0.0	0.0	0.0	0.0
Fried potatoes	1.6	9.3	1.6	3.7	4.9	0.8
Butter, margarine, and other added fats	1.6	0.1	0.4	0.9	0.3	0.6
Salad Dressings and mayo, regular, and added oils	1.8	2.5	1.2	0.4	0.9	0.7
Salad Dressings and Mayo, reduced fat/calorie, nonfat	0.4	0.0	0.0	0.0	0.0	0.3
Miscellaneous sugary foods	8.9	3.0	1.1	2.6	6.1	12.2
Chocolate candy	0.3	0.7	1.0	0.9	0.0	0.0
Coffee or tea (not sweetened)	8.9	0.0	12.9	44.7	14.2	9.3
Sugar-sweetened drinks (with calories), other than carbonated sodas	32.5	19.4	28.1	8.9	20.4	6.1
Sweetened drinks without calories (no calories or art. sweetener)	10.6	1.8	0.0	9.6	8.1	2.3
Carbonated soda (not diet)	15.3	4.3	62.8	33.0	37.9	42.9
Alcoholic drinks	0.7	0.0	0.0	0.0	0.0	0.0
Condiments	8.0	2.1	9.4	1.5	3.9	3.6
Miscellaneous foods	0.9	1.7	6.0	0.2	1.5	0.0

**Table G.7. Mean Grams Per Day from Selected Food Groups Across the 5 Dietary Patterns Identified in Cluster Analysis of Child Less- Healthy Eaters (Full List of Food Groups)**

Food or Food Group	Mean Grams Consumed Per Day				
	Cluster 1	Cluster 2	Cluster 3	Cluster 4	Cluster 5
	Soda and Pizza n = 559 Mean	Sweets n = 1295 Mean	High-Fat Dairy n = 348 Mean	Non-Carbonated Sugar-Sweetened Drinks n = 395 Mean	Alcohol and Burgers n = 12 Mean
Milk, high fat, not sweetened	131.5	111.2	<b>711.4</b>	161.5	<u>92.5</u>
Milk, high fat, sweetened	18.2	<b>52.0</b>	31.5	25.6	<u>0.0</u>
Milk, low-fat, reduced fat, nonfat, not sweetened	8.1	<b>23.3</b>	<u>0.6</u>	5.6	4.5
Milk, low-fat, reduced fat, nonfat, sweetened	10.7	<b>23.1</b>	13.2	10.1	<u>0.0</u>
Infant Formula	0.0	0.3	0.3	0.0	0.0
Dairy products (not milk), high fat	<u>16.2</u>	16.3	16.9	<b>17.9</b>	<b>17.9</b>
Dairy products (not milk), low-fat, reduced fat, nonfat	<b>4.8</b>	4.4	4.1	1.2	<u>0.0</u>
Dairy desserts and beverages, high fat	27.6	26.3	<b>37.7</b>	27.1	<u>0.1</u>
Dairy desserts and beverages, reduced-fat	4.9	3.8	<b>6.2</b>	5.5	<u>0.0</u>
Red meats, not fried	21.6	17.6	14.9	<b>23.8</b>	<u>10.1</u>
Chicken and turkey, not fried	14.6	9.3	<u>7.6</u>	11.5	<b>50.2</b>
Liver and organ meats	0.0	0.0	0.0	0.0	0.0
Processed meat	24.2	26.0	<u>20.6</u>	25.2	<b>26.6</b>
Fish and shellfish, not fried	0.9	<b>1.9</b>	0.9	1.0	<u>0.0</u>
Fried meat, poultry, or fish	11.4	<b>11.6</b>	8.3	10.4	<u>1.0</u>
Mixed dishes with meat (including organ meats and processed meat)	46.7	42.7	<b>49.1</b>	47.6	<u>3.1</u>
Mixed dishes with fish and shellfish	1.7	<b>8.2</b>	1.8	5.5	<u>0.0</u>
Mixed dishes with chicken and turkey	9.5	11.7	<b>16.6</b>	13.0	<u>0.0</u>
Mixed dishes, grain and vegetable (no meat)	17.0	<b>36.3</b>	34.6	29.5	<u>0.0</u>
Hamburgers and cheeseburgers	24.6	11.4	<u>11.2</u>	14.2	<b>64.9</b>
Pizza	<b>64.5</b>	<u>33.7</u>	50.5	36.1	51.4
Mexican dishes	18.4	18.1	<u>11.9</u>	24.1	<b>26.4</b>
Soups	<u>28.3</u>	41.0	45.9	<b>59.1</b>	30.3
Eggs and egg dishes	<u>11.8</u>	13.9	12.3	17.0	<b>63.7</b>
Beans and legumes, soy milk and soy products	0.2	<b>0.5</b>	0.3	0.2	<u>0.0</u>
Beans and legumes, beans, nuts, and seeds	6.5	8.1	<b>12.2</b>	8.8	<u>5.6</u>
White/non-whole-grain bread	<u>33.4</u>	39.3	35.5	40.8	<b>86.7</b>
Whole grain bread	0.1	<b>0.3</b>	0.1	<u>0.0</u>	<u>0.0</u>
Rice, pasta, noodles, dumplings, similar grain products, non-whole grain	15.9	<b>20.0</b>	18.3	12.5	<u>0.6</u>
Rice, pasta, noodles, dumplings, similar grain products whole grain	0.1	0.1	0.1	<b>0.4</b>	<b>0.0</b>
Other grains, not-whole grain	0.0	0.0	0.0	0.0	0.0
Other grains, whole grain	1.4	1.5	<b>4.6</b>	1.9	<u>0.0</u>
Cereal, non-whole grain	12.7	13.6	<b>29.0</b>	17.3	<u>0.0</u>
Cereal, whole grain	5.8	7.5	<b>10.6</b>	7.7	<u>0.0</u>
Sweet breakfast foods/breads	16.8	<b>22.3</b>	11.7	12.9	<u>5.3</u>
Desserts (non-dairy)	26.7	<b>29.4</b>	24.8	<b>29.4</b>	<u>9.0</u>
Salty snacks	<b>17.5</b>	11.8	10.7	16.7	<u>6.8</u>
Meal replacement bars/products	1.0	1.6	3.0	<u>0.7</u>	<b>4.7</b>
Fruit, fresh, citrus	2.2	<b>5.4</b>	2.4	4.8	<u>0.0</u>
Fruit, fresh, melons and berries	<u>1.8</u>	3.3	3.4	1.9	<b>9.9</b>
Fruit, fresh, other	6.2	13.1	14.8	<b>16.3</b>	<u>2.3</u>
Fruit, canned or frozen	3.2	<b>6.3</b>	6.0	4.1	<u>0.0</u>
100% fruit juice	49.1	<b>89.5</b>	71.1	<u>27.6</u>	64.5
Fruit, dried	0.2	0.0	0.0	0.2	0.0
100% vegetable juice	0.1	<u>0.0</u>	0.1	<u>0.0</u>	<b>6.3</b>
Vegetables, raw and salad	12.6	9.0	<b>14.0</b>	9.8	<u>8.4</u>
Vegetables, cooked, not starchy, fried, creamed, w/cheese, or stuffed	9.3	13.3	<b>14.5</b>	7.7	<u>6.4</u>
Vegetables, cooked, starchy (not fried)	15.5	18.7	<b>31.1</b>	21.7	<u>0.6</u>
Vegetables, fried or creamed	<b>1.2</b>	0.6	0.7	0.4	<u>0.0</u>
Fried potatoes	31.8	<u>14.6</u>	15.3	21.4	<b>60.3</b>
Butter, margarine, and other added fats	<u>1.6</u>	2.7	1.8	<b>3.5</b>	2.2
Salad Dressings and mayo, regular, and added oils	2.9	<u>1.9</u>	2.0	2.7	<b>5.1</b>
Salad Dressings and Mayo, reduced fat/calorie, nonfat	<b>0.9</b>	0.4	0.5	<b>0.9</b>	<u>0.0</u>
Miscellaneous sugary foods	22.5	27.8	20.5	<b>42.2</b>	<u>5.3</u>
Chocolate candy	<b>7.2</b>	4.3	2.5	4.7	<u>2.0</u>
Coffee or tea (not sweetened)	12.0	<b>16.0</b>	10.9	4.2	<u>0.0</u>
Sugar-sweetened drinks (with calories), other than carbonated sodas	<u>86.3</u>	133.6	151.1	<b>955.1</b>	194.6
Sweetened drinks without calories (no calories or art. sweetener)	12.9	27.2	15.9	<u>5.9</u>	<b>276.9</b>
Carbonated soda (not diet)	<b>974.3</b>	<u>168.3</u>	200.4	179.1	399.8
Alcoholic drinks	10.1	4.0	<u>0.2</u>	1.9	<b>2204.4</b>
Condiments	<u>7.1</u>	<u>7.1</u>	7.4	10.6	<b>23.7</b>
Miscellaneous foods	2.1	<b>4.3</b>	1.8	0.2	<u>0.0</u>

Note: For each food or food group, the highest intake across clusters is in boldface and the lowest intake is underlined.



**Table G.8. Mean Grams Per Day from Selected Food Groups Across the 5 Dietary Patterns Identified in Cluster Analysis of Child Less- Healthy Eaters (Full List of Food Groups): Standard Errors**

Food or Food Group	Mean Grams Consumed Per Day				
	Cluster 1	Cluster 2	Cluster 3	Cluster 4	Cluster 5
	Soda and Pizza n = 559 SE	Sweets n = 1295 SE	High-Fat Milk n = 348 SE	Non-Carbonated Sugar- Sweetened Drinks n = 395 SE	Alcohol and Burgers n = 12 SE
Milk, high fat, not sweetened	13.3	6.4	17.5	22.4	86.9
Milk, high fat, sweetened	7.0	6.2	8.6	8.6	0.0
Milk, low-fat, reduced fat, nonfat, not sweetened	2.8	7.2	0.6	2.7	4.7
Milk, low-fat, reduced fat, nonfat, sweetened	4.7	4.5	5.2	5.4	0.0
Infant Formula	0.0	0.3	0.4	0.0	0.0
Dairy products (not milk), high fat	2.9	1.6	3.3	2.6	14.8
Dairy products (not milk), low-fat, reduced fat, nonfat	2.4	0.9	1.3	0.9	0.0
Dairy desserts and beverages, high fat	7.5	2.5	7.5	4.5	0.1
Dairy desserts and beverages, reduced-fat	1.9	0.8	2.4	2.5	0.0
Red meats, not fried	3.9	2.1	2.5	3.1	5.4
Chicken and turkey, not fried	2.4	1.0	1.8	2.8	22.5
Liver and organ meats	0.0	0.0	0.0	0.0	0.0
Processed meat	3.3	2.3	3.1	3.1	19.1
Fish and shellfish, not fried	0.4	0.6	0.2	0.4	0.0
Fried meat, poultry, or fish	1.9	1.6	2.5	2.1	1.0
Mixed dishes with meat (including organ meats and processed meat)	7.3	4.2	8.9	8.8	3.2
Mixed dishes with fish and shellfish	0.7	3.8	1.1	2.4	0.0
Mixed dishes with chicken and turkey	2.6	2.8	6.6	3.2	0.0
Mixed dishes, grain and vegetable (no meat)	3.6	7.9	8.2	6.5	0.0
Hamburgers and cheeseburgers	4.1	1.5	3.8	3.0	29.7
Pizza	8.4	4.3	8.8	7.2	42.2
Mexican dishes	4.2	2.8	3.5	5.9	17.0
Soups	8.1	5.1	9.7	16.3	21.0
Eggs and egg dishes	2.3	1.4	3.7	5.3	47.0
Beans and legumes, soy milk and soy products	0.1	0.3	0.2	0.1	0.0
Beans and legumes, beans, nuts, and seeds	1.4	1.5	4.2	4.6	4.8
White/non-whole-grain bread	2.1	1.9	3.1	3.4	28.1
Whole grain bread	0.1	0.2	0.1	0.0	0.0
Rice, pasta, noodles, dumplings, similar grain products, non-whole grain	5.7	2.9	5.6	3.4	0.6
Rice, pasta, noodles, dumplings, similar grain products whole grain	0.1	0.0	0.2	0.3	0.0
Other grains, not-whole grain	0.0	0.0	0.0	0.0	0.0
Other grains, whole grain	0.4	0.2	2.1	0.6	0.0
Cereal, non-whole grain	2.2	1.5	3.0	3.1	0.0
Cereal, whole grain	1.4	1.0	2.4	2.2	0.0
Sweet breakfast foods/breads	1.8	1.7	1.9	2.1	5.6
Desserts (non-dairy)	4.1	3.0	5.6	3.9	7.4
Salty snacks	2.1	1.2	1.7	2.5	5.9
Meal replacement bars/products	1.0	0.5	2.4	0.5	5.1
Fruit, fresh, citrus	1.0	2.4	1.0	3.2	0.0
Fruit, fresh, melons and berries	1.1	0.9	1.7	1.0	10.3
Fruit, fresh, other	1.6	1.9	3.7	4.1	2.4
Fruit, canned or frozen	1.6	1.2	1.9	2.0	0.0
100% fruit juice	9.3	6.0	14.0	5.6	39.6
Fruit, dried	0.2	0.0	0.0	0.2	0.0
100% vegetable juice	0.1	0.0	0.1	0.0	6.5
Vegetables, raw and salad	2.6	1.0	5.0	2.3	5.8
Vegetables, cooked, not starchy, fried, creamed, w/cheese, or stuffed	1.7	1.6	3.0	1.6	4.5
Vegetables, cooked, starchy (not fried)	2.2	2.7	7.0	4.6	0.7
Vegetables, fried or creamed	0.7	0.2	0.6	0.2	0.0
Fried potatoes	5.3	1.3	2.9	4.2	32.0
Butter, margarine, and other added fats	0.6	0.6	0.6	1.3	1.6
Salad Dressings and mayo, regular, and added oils	1.0	0.2	0.6	0.7	3.5
Salad Dressings and Mayo, reduced fat/calorie, nonfat	0.5	0.1	0.3	0.6	0.0
Miscellaneous sugary foods	3.5	2.4	4.1	15.2	2.2
Chocolate candy	1.5	0.7	0.6	1.4	2.1
Coffee or tea (not sweetened)	5.1	3.7	3.4	1.9	0.0
Sugar-sweetened drinks (with calories), other than carbonated sodas	10.4	6.1	15.6	23.5	110.9
Sweetened drinks without calories (no calories or art. sweetener)	7.3	8.9	6.2	2.8	189.0
Carbonated soda (not diet)	17.8	6.6	26.9	22.4	160.5
Alcoholic drinks	6.7	1.8	0.2	1.1	462.2
Condiments	0.9	0.6	1.4	1.7	15.3
Miscellaneous foods	1.1	2.5	0.7	0.2	0.0

## APPENDIX H

### ADDITIONAL CLUSTER ANALYSIS TABLES: TOTAL ENERGY CONTRIBUTED BY FOOD GROUP

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**Table H.1. Mean Percentage of Total Energy Contributed by Selected Food Groups Across the 4 Dietary Patterns Identified in Cluster Analysis of Adult Healthy Eaters**

<i>Food or Food Group</i>	Mean Percentage Contribution to 24-Hour Energy Intake			
	Cluster 1	Cluster 2	Cluster 3	Cluster 4
	Beverages n = 149 Mean	Plant-based n = 136 Mean	Breakfast and Sweets n = 61 Mean	Low-Fat Milk n = 51 Mean
Milk, high fat, not sweetened	6.1 <sup>a,b,c</sup>	2.5	2.9	1.2
Milk, high fat, sweetened	0.0	0.0	0.0	0.0
Milk, low-fat, reduced fat, nonfat, not sweetened	0.0 <sup>a,b,c</sup>	1.1 <sup>d,e</sup>	2.8 <sup>f</sup>	10.8
Milk, low-fat, reduced fat, nonfat, sweetened	0.1	0.0	0.1	0.1
Dairy products (not milk), high fat	0.6 <sup>a</sup>	1.4	2.0	0.7
Dairy products (not milk), low-fat, reduced fat, nonfat	0.9	0.9	0.7	0.7
Dairy desserts and beverages, high fat	0.5	1.1	1.1	0.4
Dairy desserts and beverages, reduced-fat	0.8	0.4 <sup>e</sup>	0.1	0.0
Red meats, not fried	1.7	1.5	1.2	2.3
Chicken and turkey, not fried	2.1	4.3	4.4	3.3
Liver and organ meats	0.0	0.0	0.0	0.0
Processed meat	1.0	1.0	1.5	0.8
Fish and shellfish, not fried	0.7	1.2	1.0	2.1
Fried meat, poultry, or fish	2.4	2.8	2.3	1.2
Mixed dishes with meat (including organ meats and processed meat)	3.5	2.2	2.8	1.2
Mixed dishes with fish and shellfish	0.3	2.6	1.6	2.0
Mixed dishes with chicken and turkey	2.8	1.7	2.7	3.4
Mixed dishes, grain and vegetable (no meat)	5.4 <sup>a,c</sup>	0.5	0.9	0.1
Hamburgers and cheeseburgers	0.2	0.0	0.0	0.0
Pizza	0.1	1.1	0.3	0.0
Mexican dishes	4.0	2.1	1.5	1.8
Soups	2.1	0.6	2.1	2.5
Eggs and egg dishes	1.0	2.2	1.2	4.7
Beans and legumes, soy milk and soy products	1.7	1.6	0.4	0.0
Beans and legumes, beans, nuts, and seeds	7.0	8.0	5.9	7.1
White/non-whole-grain bread	8.0	9.4	10.1	7.4
Whole grain bread	0.3	0.5	0.5	0.6
Rice, pasta, noodles, dumplings, similar grain products, non-whole grain	3.8	3.5	1.5	3.4
Rice, pasta, noodles, dumplings, similar grain products whole grain	0.5	0.3	0.0	0.6
Other grains, not-whole grain	0.0	0.0	0.0	0.0
Other grains, whole grain	0.6	0.7	1.6	0.1
Cereal, non-whole grain	1.3	1.0	3.4	4.0
Cereal, whole grain	3.5	5.6	5.8	5.1
Sweet breakfast foods/breads	1.6	2.4	3.9	3.4
Desserts (non-dairy)	3.3	3.7	3.8	6.5
Salty snacks	2.7	1.4 <sup>d</sup>	0.4	1.3
Meal replacement bars/products	0.3	1.3	0.0	0.0
Fruit, fresh, citrus	0.7	0.8	0.7	0.5
Fruit, fresh, melons and berries	0.4	1.1	0.2	0.5
Fruit, fresh, other	4.6	4.2	6.2	5.7
Fruit, canned or frozen	1.1	1.5	0.7	0.4
100% fruit juice	5.4	3.9	2.8	2.6
Fruit, dried	0.2	0.3	0.6	0.1
100% vegetable juice	0.0	0.1	0.0	0.0
Vegetables, raw and salad	0.7	1.5	1.1	1.0
Vegetables, cooked, not starchy, fried, creamed, w/cheese, or stuffed	1.6	2.3	1.2	1.7
Vegetables, cooked, starchy (not fried)	1.3	2.3	2.6	1.9
Vegetables, fried or creamed	0.1	0.3	0.0	0.0
Fried potatoes	1.5	0.3	1.9	0.8
Butter, margarine, and other added fats	0.4	1.1	1.0	0.7
Salad Dressings and mayo, regular, and added oils	3.7	2.4	4.3	1.3
Salad Dressings and Mayo, reduced fat/calorie, nonfat	0.1	0.3	0.5	0.1
Miscellaneous sugary foods	1.7	1.5 <sup>e</sup>	3.1 <sup>f</sup>	0.5
Chocolate candy	0.4	0.6	0.2	0.5
Coffee or tea (not sweetened)	0.1 <sup>a,b</sup>	0.9 <sup>e</sup>	1.2 <sup>f</sup>	0.2
Sugar-sweetened drinks (with calories), other than carbonated sodas	2.6	1.3	0.6	0.8
Sweetened drinks without calories (no calories or art. sweetener)	0.1	0.0	0.0	0.2
Carbonated soda (not diet)	1.9 <sup>b</sup>	1.7 <sup>d</sup>	0.1	1.0
Alcoholic drinks	0.1	0.7	0.1	0.1
Condiments	0.1	0.4	0.3	0.2
Miscellaneous foods	0.2	0.3	0.1	0.1

<sup>a</sup> Difference between Cluster 1 and Cluster 2 is statistically significant at the p < .05 level.

<sup>b</sup> Difference between Cluster 1 and Cluster 3 is statistically significant at the p < .05 level.

<sup>c</sup> Difference between Cluster 1 and Cluster 4 is statistically significant at the p < .05 level.

<sup>d</sup> Difference between Cluster 2 and Cluster 3 is statistically significant at the p < .05 level.

<sup>e</sup> Difference between Cluster 2 and Cluster 4 is statistically significant at the p < .05 level.

<sup>f</sup> Difference between Cluster 3 and Cluster 4 is statistically significant at the p < .05 level.



Table H.2. Mean Percentage of Total Energy Contributed by Selected Food Groups Across the 4 Dietary Patterns Identified in Cluster Analysis of Adult Healthy Eaters: Standard Errors

Food or Food Group	Mean Percentage Contribution to 24-Hour Energy Intake			
	Cluster 1	Cluster 2	Cluster 3	Cluster 4
	Beverages	Plant-based	Breakfast and Sweets	Low-Fat Milk
	n = 149 SE	n = 136 SE	n = 61 SE	n = 51 SE
Milk, high fat, not sweetened	0.8	0.5	0.8	1.1
Milk, high fat, sweetened	0.0	0.0	0.0	0.0
Milk, low-fat, reduced fat, nonfat, not sweetened	0.0	0.3	0.7	0.8
Milk, low-fat, reduced fat, nonfat, sweetened	0.1	0.0	0.1	0.1
Dairy products (not milk), high fat	0.2	0.3	0.6	0.4
Dairy products (not milk), low-fat, reduced fat, nonfat	0.3	0.3	0.2	0.4
Dairy desserts and beverages, high fat	0.3	0.5	0.5	0.3
Dairy desserts and beverages, reduced-fat	0.6	0.1	0.1	0.0
Red meats, not fried	0.4	0.6	0.5	0.9
Chicken and turkey, not fried	0.5	0.8	1.2	0.9
Liver and organ meats	0.0	0.0	0.0	0.0
Processed meat	0.4	0.3	0.3	0.3
Fish and shellfish, not fried	0.4	0.4	0.5	1.1
Fried meat, poultry, or fish	0.7	0.7	1.1	0.7
Mixed dishes with meat (including organ meats and processed meat)	0.8	0.7	1.1	0.6
Mixed dishes with fish and shellfish	0.2	0.9	1.1	1.5
Mixed dishes with chicken and turkey	1.1	0.6	1.6	1.5
Mixed dishes, grain and vegetable (no meat)	1.9	0.2	0.6	0.1
Hamburgers and cheeseburgers	0.2	0.0	0.0	0.0
Pizza	0.1	0.7	0.3	0.0
Mexican dishes	1.3	0.8	0.6	0.8
Soups	0.6	0.3	0.7	1.1
Eggs and egg dishes	0.3	0.6	0.5	3.4
Beans and legumes, soy milk and soy products	1.3	0.9	0.2	0.0
Beans and legumes, beans, nuts, and seeds	1.9	1.5	1.3	1.7
White/non-whole-grain bread	1.0	0.8	1.8	1.5
Whole grain bread	0.2	0.3	0.3	0.4
Rice, pasta, noodles, dumplings, similar grain products, non-whole grain	0.9	0.6	0.6	1.3
Rice, pasta, noodles, dumplings, similar grain products whole grain	0.3	0.2	0.0	0.5
Other grains, not-whole grain	0.0	0.0	0.0	0.0
Other grains, whole grain	0.4	0.4	1.1	0.1
Cereal, non-whole grain	0.4	0.3	1.2	1.3
Cereal, whole grain	0.7	1.0	1.3	1.6
Sweet breakfast foods/breads	0.6	0.5	1.4	1.0
Desserts (non-dairy)	0.7	0.7	0.9	1.4
Salty snacks	1.0	0.5	0.3	0.6
Meal replacement bars/products	0.1	0.8	0.0	0.0
Fruit, fresh, citrus	0.2	0.3	0.3	0.2
Fruit, fresh, melons and berries	0.1	0.3	0.1	0.3
Fruit, fresh, other	0.4	0.4	0.7	0.8
Fruit, canned or frozen	0.5	0.8	0.3	0.2
100% fruit juice	0.8	0.8	0.8	0.8
Fruit, dried	0.1	0.2	0.3	0.1
100% vegetable juice	0.0	0.1	0.0	0.0
Vegetables, raw and salad	0.1	0.4	0.3	0.3
Vegetables, cooked, not starchy, fried, creamed, w/cheese, or stuffed	0.3	0.4	0.4	0.4
Vegetables, cooked, starchy (not fried)	0.4	0.4	0.7	0.7
Vegetables, fried or creamed	0.1	0.2	0.0	0.0
Fried potatoes	0.7	0.2	1.0	0.5
Butter, margarine, and other added fats	0.2	0.2	0.3	0.3
Salad Dressings and mayo, regular, and added oils	0.9	0.5	1.4	0.6
Salad Dressings and Mayo, reduced fat/calorie, nonfat	0.1	0.1	0.3	0.1
Miscellaneous sugary foods	0.7	0.3	0.8	0.1
Chocolate candy	0.2	0.4	0.2	0.4
Coffee or tea (not sweetened)	0.1	0.2	0.1	0.1
Sugar-sweetened drinks (with calories), other than carbonated sodas	1.1	0.5	0.3	0.3
Sweetened drinks without calories (no calories or art. sweetener)	0.0	0.0	0.0	0.1
Carbonated soda (not diet)	0.4	0.5	0.1	0.6
Alcoholic drinks	0.1	0.3	0.1	0.1
Condiments	0.0	0.1	0.1	0.1
Miscellaneous foods	0.2	0.2	0.1	0.1

**Table H.3. Mean Percentage of Total Energy Contributed by Selected Food Groups Across the 4 Dietary Patterns Identified in Cluster Analysis of Adult Less-Healthy Eaters**

<i>Food or Food Group</i>	Mean Percentage Contribution to 24-Hour Energy Intake			
	Cluster 1	Cluster 2	Cluster 3	Cluster 4
	Soda and Pizza n = 443 Mean	Alcohol n = 177 Mean	Non-Carbonated Sugar-Sweetened Drinks n = 1443 Mean	Coffee n = 185 Mean
Milk, high fat, not sweetened	1.7 <sup>b,c</sup>	1.0 <sup>d,e</sup>	2.9	3.6
Milk, high fat, sweetened	0.3	0.1	0.4 <sup>f</sup>	0.1
Milk, low-fat, reduced fat, nonfat, not sweetened	0.2	0.0 <sup>d</sup>	0.4 <sup>f</sup>	0.1
Milk, low-fat, reduced fat, nonfat, sweetened	0.1	0.1	0.2	0.0
Dairy products (not milk), high fat	3.0 <sup>a,c</sup>	1.6 <sup>d,e</sup>	3.2 <sup>f</sup>	4.5
Dairy products (not milk), low-fat, reduced fat, nonfat	0.2	0.1 <sup>d</sup>	0.2	0.3
Dairy desserts and beverages, high fat	1.8 <sup>a</sup>	0.6 <sup>d,e</sup>	2.6	3.2
Dairy desserts and beverages, reduced-fat	0.1 <sup>b</sup>	0.4	0.4	0.3
Red meats, not fried	3.5	3.4	3.9	2.4
Chicken and turkey, not fried	1.4	1.5	1.5 <sup>f</sup>	0.4
Liver and organ meats	0.0	0.0	0.0	0.0
Processed meat	3.0 <sup>b,c</sup>	2.8 <sup>d,e</sup>	4.3	5.1
Fish and shellfish, not fried	0.3	0.2	0.3	0.2
Fried meat, poultry, or fish	3.1	3.9	3.6	3.0
Mixed dishes with meat (including organ meats and processed meat)	3.9	3.0	4.1	5.7
Mixed dishes with fish and shellfish	0.2	0.6	0.6	1.1
Mixed dishes with chicken and turkey	1.6	1.6	1.5	1.4
Mixed dishes, grain and vegetable (no meat)	1.2	1.3	1.9	1.2
Hamburgers and cheeseburgers	2.9	1.9	2.3	2.6
Pizza	5.8	2.6	3.8	3.8
Mexican dishes	3.5	4.3	3.7 <sup>f</sup>	1.7
Soups	0.7 <sup>b</sup>	1.2	1.4	1.4
Eggs and egg dishes	1.7	2.4	2.9	2.2
Beans and legumes, soy milk and soy products	0.1	0.0	0.0	0.0
Beans and legumes, beans, nuts, and seeds	1.5	1.3	1.3	0.9
White/non-whole-grain bread	5.2 <sup>b,c</sup>	4.3 <sup>d,e</sup>	7.1	8.7
Whole grain bread	0.0 <sup>b</sup>	0.0 <sup>d</sup>	0.1	0.4
Rice, pasta, noodles, dumplings, similar grain products, non-whole grain	1.7	1.4	1.9	1.2
Rice, pasta, noodles, dumplings, similar grain products whole grain	0.0	0.0	0.0	0.0
Other grains, not-whole grain	0.0	0.0	0.0	0.0
Other grains, whole grain	0.3 <sup>a,b</sup>	0.0 <sup>d</sup>	0.5	0.5
Cereal, non-whole grain	0.7 <sup>b</sup>	0.3 <sup>d</sup>	1.2	0.7
Cereal, whole grain	0.4 <sup>a,b</sup>	0.1 <sup>d,e</sup>	0.8	0.8
Sweet breakfast foods/breads	3.3 <sup>a</sup>	1.2 <sup>d,e</sup>	3.9	4.5
Desserts (non-dairy)	3.6 <sup>a,b,c</sup>	2.0 <sup>d,e</sup>	6.1	6.2
Salty snacks	2.2	1.3	1.7	2.7
Meal replacement bars/products	0.1 <sup>b</sup>	0.0	0.3 <sup>f</sup>	0.1
Fruit, fresh, citrus	0.0	0.1	0.1	0.0
Fruit, fresh, melons and berries	0.0	0.0 <sup>d</sup>	0.1 <sup>f</sup>	0.0
Fruit, fresh, other	0.4	0.3	0.7	0.6
Fruit, canned or frozen	0.0 <sup>b</sup>	0.1	0.2	0.2
100% fruit juice	0.6 <sup>b</sup>	0.8	1.1	0.9
Fruit, dried	0.0	0.0	0.0	0.0
100% vegetable juice	0.0	0.0	0.0	0.0
Vegetables, raw and salad	0.2	0.3	0.4	0.3
Vegetables, cooked, not starchy, fried, creamed, w/cheese, or stuffed	0.3 <sup>b</sup>	0.3 <sup>d</sup>	0.6	0.5
Vegetables, cooked, starchy (not fried)	1.0 <sup>b</sup>	1.4	2.3	1.8
Vegetables, fried or creamed	0.2 <sup>a</sup>	0.0 <sup>d,e</sup>	0.2	0.2
Fried potatoes	3.0	2.4	2.7	2.7
Butter, margarine, and other added fats	0.5 <sup>b,c</sup>	0.4 <sup>d,e</sup>	1.1	1.1
Salad Dressings and mayo, regular, and added oils	0.9	1.4	1.2	1.0
Salad Dressings and Mayo, reduced fat/calorie, nonfat	0.0	0.0 <sup>d</sup>	0.1	0.0
Miscellaneous sugary foods	2.0 <sup>c</sup>	1.2 <sup>d,e</sup>	2.4 <sup>f</sup>	5.4
Chocolate candy	1.3	0.8	1.5	1.7
Coffee or tea (not sweetened)	0.1 <sup>b,c</sup>	0.3 <sup>e</sup>	0.3 <sup>f</sup>	1.9
Sugar-sweetened drinks (with calories), other than carbonated sodas	1.6 <sup>b,c</sup>	1.2 <sup>d</sup>	4.7 <sup>f</sup>	0.6
Sweetened drinks without calories (no calories or art. sweetener)	0.0 <sup>b</sup>	0.0	0.1	0.1
Carbonated soda (not diet)	27.1 <sup>a,b,c</sup>	6.2	6.4 <sup>f</sup>	8.1
Alcoholic drinks	1.5 <sup>a</sup>	35.9 <sup>d,e</sup>	2.1	1.6
Condiments	0.3	0.2	0.4	0.3
Miscellaneous foods	0.0 <sup>b</sup>	0.1	0.2	0.3

<sup>a</sup> Difference between Cluster 1 and Cluster 2 is statistically significant at the p < .05 level.

<sup>b</sup> Difference between Cluster 1 and Cluster 3 is statistically significant at the p < .05 level.

<sup>c</sup> Difference between Cluster 1 and Cluster 4 is statistically significant at the p < .05 level.

<sup>d</sup> Difference between Cluster 2 and Cluster 3 is statistically significant at the p < .05 level.

<sup>e</sup> Difference between Cluster 2 and Cluster 4 is statistically significant at the p < .05 level.

<sup>f</sup> Difference between Cluster 3 and Cluster 4 is statistically significant at the p < .05 level.

**Table H.4. Mean Percentage of Total Energy Contributed by Selected Food Groups Across the 4 Dietary Patterns Identified in Cluster Analysis of Adult Less- Healthy Eaters: Standard Errors**

<i>Food or Food Group</i>	Mean Percentage Contribution to 24-Hour Energy Intake			
	Cluster 1	Cluster 2	Cluster 3	Cluster 4
	Soda and Pizza	Alcohol	Non-Carbonated Sugar-Sweetened Drinks	Coffee
	n = 443 SE	n = 177 SE	n = 1443 SE	n = 185 SE
Milk, high fat, not sweetened	0.3	0.3	0.2	0.5
Milk, high fat, sweetened	0.2	0.1	0.1	0.0
Milk, low-fat, reduced fat, nonfat, not sweetened	0.1	0.0	0.1	0.1
Milk, low-fat, reduced fat, nonfat, sweetened	0.1	0.1	0.1	0.0
Dairy products (not milk), high fat	0.3	0.4	0.2	0.6
Dairy products (not milk), low-fat, reduced fat, nonfat	0.1	0.0	0.0	0.1
Dairy desserts and beverages, high fat	0.3	0.2	0.3	0.9
Dairy desserts and beverages, reduced-fat	0.1	0.2	0.1	0.2
Red meats, not fried	0.4	0.7	0.3	0.5
Chicken and turkey, not fried	0.3	0.4	0.2	0.2
Liver and organ meats	0.0	0.0	0.0	0.0
Processed meat	0.3	0.5	0.3	0.7
Fish and shellfish, not fried	0.1	0.1	0.1	0.1
Fried meat, poultry, or fish	0.6	0.7	0.3	0.7
Mixed dishes with meat (including organ meats and processed meat)	0.5	0.7	0.3	1.2
Mixed dishes with fish and shellfish	0.1	0.3	0.1	0.8
Mixed dishes with chicken and turkey	0.4	0.5	0.2	0.6
Mixed dishes, grain and vegetable (no meat)	0.4	0.4	0.2	0.3
Hamburgers and cheeseburgers	0.5	0.7	0.4	0.8
Pizza	1.1	0.8	0.6	1.3
Mexican dishes	0.6	0.9	0.6	0.5
Soups	0.2	0.5	0.1	0.5
Eggs and egg dishes	0.4	0.6	0.3	0.4
Beans and legumes, soy milk and soy products	0.0	0.0	0.0	0.0
Beans and legumes, beans, nuts, and seeds	0.2	0.5	0.2	0.2
White/non-whole-grain bread	0.3	0.4	0.3	0.8
Whole grain bread	0.0	0.0	0.0	0.4
Rice, pasta, noodles, dumplings, similar grain products, non-whole grain	0.4	0.4	0.3	0.5
Rice, pasta, noodles, dumplings, similar grain products whole grain	0.0	0.0	0.0	0.0
Other grains, not-whole grain	0.0	0.0	0.0	0.0
Other grains, whole grain	0.1	0.0	0.1	0.2
Cereal, non-whole grain	0.2	0.2	0.1	0.3
Cereal, whole grain	0.1	0.1	0.1	0.2
Sweet breakfast foods/breads	0.4	0.3	0.3	1.0
Desserts (non-dairy)	0.4	0.5	0.5	0.9
Salty snacks	0.3	0.3	0.2	0.6
Meal replacement bars/products	0.1	0.0	0.1	0.1
Fruit, fresh, citrus	0.0	0.1	0.0	0.0
Fruit, fresh, melons and berries	0.0	0.0	0.0	0.0
Fruit, fresh, other	0.1	0.1	0.1	0.1
Fruit, canned or frozen	0.0	0.1	0.1	0.2
100% fruit juice	0.1	0.3	0.1	0.2
Fruit, dried	0.0	0.0	0.0	0.0
100% vegetable juice	0.0	0.0	0.0	0.0
Vegetables, raw and salad	0.0	0.1	0.1	0.1
Vegetables, cooked, not starchy, fried, creamed, w/cheese, or stuffed	0.1	0.1	0.1	0.3
Vegetables, cooked, starchy (not fried)	0.1	0.5	0.2	0.4
Vegetables, fried or creamed	0.1	0.0	0.1	0.1
Fried potatoes	0.4	0.5	0.3	0.6
Butter, margarine, and other added fats	0.1	0.1	0.1	0.2
Salad Dressings and mayo, regular, and added oils	0.2	0.3	0.1	0.2
Salad Dressings and Mayo, reduced fat/calorie, nonfat	0.0	0.0	0.0	0.0
Miscellaneous sugary foods	0.4	0.2	0.2	0.7
Chocolate candy	0.3	0.3	0.3	0.4
Coffee or tea (not sweetened)	0.0	0.1	0.0	0.2
Sugar-sweetened drinks (with calories), other than carbonated sodas	0.2	0.3	0.4	0.2
Sweetened drinks without calories (no calories or art. sweetener)	0.0	0.0	0.0	0.0
Carbonated soda (not diet)	0.7	1.2	0.4	0.6
Alcoholic drinks	0.4	1.3	0.2	0.3
Condiments	0.0	0.1	0.1	0.1
Miscellaneous foods	0.0	0.1	0.1	0.2

Table H.5. Mean Percentage of Total Energy Contributed by Selected Food Groups Across the 4 Main Dietary Patterns Identified in Cluster Analysis of Child Healthy Eaters

Food or Food Group	Mean Percentage Contribution to 24-Hour Energy Intake			
	Cluster 1	Cluster 2	Cluster 4	Cluster 5
	Sweet Milk	Dairy Desserts	High-Fat Milk	100% Fruit Juice
	n = 50	n = 41	n = 25	n = 27
	Mean	Mean	Mean	Mean
Milk, high fat, not sweetened	2.7 <sup>a,b</sup>	15.9 <sup>d,e</sup>	16.2	8.3
Milk, high fat, sweetened	1.9	0.0	0.0	1.3
Milk, low-fat, reduced fat, nonfat, not sweetened	1.0	0.0	0.0	1.2
Milk, low-fat, reduced fat, nonfat, sweetened	0.8	0.1	0.1	0.0
Infant Formula	0.0	0.0	0.0	0.0
Dairy products (not milk), high fat	2.5 <sup>b</sup>	0.9	0.3	0.3
Dairy products (not milk), low-fat, reduced fat, nonfat	0.5	0.3	0.1	1.2
Dairy desserts and beverages, high fat	0.6	3.6	0.4	1.0
Dairy desserts and beverages, reduced-fat	0.1	0.1	0.1	0.1
Red meats, not fried	2.5	1.8 <sup>e</sup>	2.0 <sup>f</sup>	0.3
Chicken and turkey, not fried	1.6	3.5	1.7	1.8
Liver and organ meats	0.0	0.0	0.0	0.0
Processed meat	2.7	0.3	0.2	0.9
Fish and shellfish, not fried	0.0	0.0	0.0	0.6
Fried meat, poultry, or fish	0.8	1.4	1.3	0.8
Mixed dishes with meat (including organ meats and processed meat)	2.3	1.2 <sup>d</sup>	6.4 <sup>f</sup>	1.4
Mixed dishes with fish and shellfish	4.9 <sup>c</sup>	1.9	0.0	0.2
Mixed dishes with chicken and turkey	3.8	2.6	4.4	10.8
Mixed dishes, grain and vegetable (no meat)	4.5	1.5	1.1	1.4
Hamburgers and cheeseburgers	0.1	0.5	0.3	0.0
Pizza	1.3	0.2	0.4	4.8
Mexican dishes	2.2	2.7	6.0	0.6
Soups	0.4	3.7	1.5	0.3
Eggs and egg dishes	1.1	0.6	2.4	1.9
Beans and legumes, soy milk and soy products	0.6	0.7	0.0	1.5
Beans and legumes, beans, nuts, and seeds	6.4	7.2	2.6	4.5
White/non-whole-grain bread	10.9	4.9	12.4	5.3
Whole grain bread	0.0	0.4	0.0	0.0
Rice, pasta, noodles, dumplings, similar grain products, non-whole grain	5.1	2.8	9.2	1.1
Rice, pasta, noodles, dumplings, similar grain products whole grain	0.1	0.0	0.0	0.0
Other grains, not-whole grain	0.0	0.0	0.0	0.0
Other grains, whole grain	0.2	0.4	0.0	0.3
Cereal, non-whole grain	5.1	3.0	1.9	1.3
Cereal, whole grain)	4.5	6.3	3.4	5.0
Sweet breakfast foods/breads	1.8	1.1	2.1	0.6
Desserts (non-dairy)	1.9	2.0	0.4	1.5
Salty snacks	3.9	1.9	1.9	2.4
Meal replacement bars/products	0.1	0.0	0.0	0.0
Fruit, fresh, citrus	1.0	0.8	0.4	0.0
Fruit, fresh, melons and berries	0.3	0.2	0.9	1.3
Fruit, fresh, other	4.9 <sup>b</sup>	9.7 <sup>d,e</sup>	0.7	1.9
Fruit, canned or frozen	0.6 <sup>b</sup>	0.0 <sup>d</sup>	3.3	1.6
100% fruit juice	2.3 <sup>a,b,c</sup>	7.2 <sup>e</sup>	6.4 <sup>f</sup>	22.0
Fruit, dried	0.0	0.0	0.0	0.0
100% vegetable juice	0.0	0.0	0.0	0.0
Vegetables, raw and salad	0.4	0.5	0.0	0.1
Vegetables, cooked, not starchy, fried, creamed, w/cheese, or stuffed	1.1	0.1	0.4	1.1
Vegetables, cooked, starchy (not fried)	0.5	0.1	1.2	0.5
Vegetables, fried or creamed	0.1	0.0	0.0	0.0
Fried potatoes	0.3	3.2	0.7	0.9
Butter, margarine, and other added fats	1.4	0.1 <sup>d</sup>	0.8 <sup>f</sup>	0.1
Salad Dressings and mayo, regular, and added oils	1.7	0.7	0.1	0.3
Salad Dressings and Mayo, reduced fat/calorie, nonfat	0.1	0.0	0.0	0.0
Miscellaneous sugary foods	1.5	1.3	2.6	3.3
Chocolate candy	0.2	0.2	0.2	0.0
Coffee or tea (not sweetened)	0.0	0.0	0.2	0.1
Sugar-sweetened drinks (with calories), other than carbonated sodas	2.9	1.1	0.3	0.4
Sweetened drinks without calories (no calories or art. sweetener)	0.0	0.0	0.0	0.0
Carbonated soda (not diet)	1.1 <sup>a</sup>	0.3 <sup>d,e</sup>	2.9	3.1
Alcoholic drinks	0.0	0.0	0.0	0.0
Condiments	0.5	0.2	0.1	0.4
Miscellaneous foods	0.0	0.4	0.0	0.1

<sup>a</sup> Difference between Cluster 1 and Cluster 2 is statistically significant at the p < .05 level.

<sup>b</sup> Difference between Cluster 1 and Cluster 4 is statistically significant at the p < .05 level.

<sup>c</sup> Difference between Cluster 1 and Cluster 5 is statistically significant at the p < .05 level.

<sup>d</sup> Difference between Cluster 2 and Cluster 4 is statistically significant at the p < .05 level.

<sup>e</sup> Difference between Cluster 2 and Cluster 5 is statistically significant at the p < .05 level.

<sup>f</sup> Difference between Cluster 4 and Cluster 5 is statistically significant at the p < .05 level.



**Table H.6. Mean Percentage of Total Energy Contributed by Selected Food Groups Across the 4 Main Dietary Patterns Identified in Cluster Analysis of Child Healthy Eaters: Standard Errors**

	Mean Percentage Contribution to 24-Hour Energy Intake			
	Cluster 1	Cluster 2	Cluster 4	Cluster 5
	Sweet Milk n = 50 SE	Dairy Desserts n = 41 SE	High-Fat Milk n = 25 SE	100% Fruit Juice n = 27 SE
<i>Food or Food Group</i>				
Milk, high fat, not sweetened	1.2	1.7	1.9	2.9
Milk, high fat, sweetened	1.0	0.0	0.0	0.9
Milk, low-fat, reduced fat, nonfat, not sweetened	0.6	0.0	0.0	0.7
Milk, low-fat, reduced fat, nonfat, sweetened	0.4	0.1	0.1	0.0
Infant Formula	0.0	0.0	0.0	0.0
Dairy products (not milk), high fat	0.7	0.6	0.3	0.2
Dairy products (not milk), low-fat, reduced fat, nonfat	0.3	0.3	0.1	1.1
Dairy desserts and beverages, high fat	0.5	1.7	0.4	0.6
Dairy desserts and beverages, reduced-fat	0.1	0.1	0.2	0.1
Red meats, not fried	1.3	0.5	0.5	0.2
Chicken and turkey, not fried	1.0	1.7	1.2	1.0
Liver and organ meats	0.0	0.0	0.0	0.0
Processed meat	1.3	0.3	0.2	0.6
Fish and shellfish, not fried	0.0	0.0	0.0	0.6
Fried meat, poultry, or fish	0.5	0.6	1.1	0.6
Mixed dishes with meat (including organ meats and processed meat)	1.4	1.1	1.5	1.0
Mixed dishes with fish and shellfish	1.8	1.7	0.0	0.2
Mixed dishes with chicken and turkey	2.1	1.7	1.7	5.2
Mixed dishes, grain and vegetable (no meat)	1.9	1.0	0.9	1.1
Hamburgers and cheeseburgers	0.1	0.6	0.3	0.0
Pizza	0.9	0.2	0.4	4.2
Mexican dishes	0.7	0.9	1.6	0.4
Soups	0.2	1.5	0.9	0.3
Eggs and egg dishes	0.6	0.3	0.6	0.8
Beans and legumes, soy milk and soy products	0.5	0.7	0.0	1.8
Beans and legumes, beans, nuts, and seeds	2.7	3.4	1.8	2.7
White/non-whole-grain bread	2.1	1.8	4.5	0.9
Whole grain bread	0.0	0.4	0.0	0.0
Rice, pasta, noodles, dumplings, similar grain products, non-whole grain	2.1	1.0	3.5	0.7
Rice, pasta, noodles, dumplings, similar grain products whole grain	0.1	0.0	0.0	0.0
Other grains, not-whole grain	0.0	0.0	0.0	0.0
Other grains, whole grain	0.2	0.3	0.0	0.3
Cereal, non-whole grain	2.3	0.8	1.2	0.7
Cereal, whole grain	2.1	2.5	2.4	1.2
Sweet breakfast foods/breads	1.1	0.5	0.6	0.5
Desserts (non-dairy)	0.6	0.8	0.3	0.9
Salty snacks	1.1	0.9	1.2	1.5
Meal replacement bars/products	0.1	0.0	0.0	0.0
Fruit, fresh, citrus	0.4	0.4	0.3	0.0
Fruit, fresh, melons and berries	0.2	0.1	0.4	0.8
Fruit, fresh, other	1.1	2.3	0.4	0.9
Fruit, canned or frozen	0.4	0.0	0.6	0.8
100% fruit juice	0.7	1.3	1.0	1.7
Fruit, dried	0.0	0.0	0.0	0.0
100% vegetable juice	0.0	0.0	0.0	0.0
Vegetables, raw and salad	0.2	0.2	0.0	0.1
Vegetables, cooked, not starchy, fried, creamed, w/cheese, or stuffed	0.7	0.1	0.2	0.4
Vegetables, cooked, starchy (not fried)	0.4	0.1	0.5	0.3
Vegetables, fried or creamed	0.1	0.0	0.0	0.0
Fried potatoes	0.2	1.8	0.5	0.7
Butter, margarine, and other added fats	0.5	0.1	0.2	0.1
Salad Dressings and mayo, regular, and added oils	0.7	0.5	0.1	0.2
Salad Dressings and Mayo, reduced fat/calorie, nonfat	0.1	0.0	0.0	0.0
Miscellaneous sugary foods	0.8	0.5	0.6	1.0
Chocolate candy	0.1	0.2	0.2	0.0
Coffee or tea (not sweetened)	0.0	0.0	0.1	0.0
Sugar-sweetened drinks (with calories), other than carbonated sodas	1.3	0.6	0.3	0.3
Sweetened drinks without calories (no calories or art. sweetener)	0.0	0.0	0.0	0.0
Carbonated soda (not diet)	0.6	0.2	0.7	1.0
Alcoholic drinks	0.0	0.0	0.0	0.0
Condiments	0.3	0.1	0.1	0.2
Miscellaneous foods	0.0	0.3	0.0	0.06

**Table H.7. Mean Percentage of Total Energy Contributed by Selected Food Groups Across the 4 Main Dietary Patterns Identified in Cluster Analysis of Child Less- Healthy Eaters**

<i>Food or Food Group</i>	Mean Percentage Contribution to 24-Hour Energy Intake			
	Cluster 1	Cluster 2	Cluster 3	Cluster 4
	Soda and Pizza n = 559 Mean	Sweets n = 1295 Mean	High-Fat Dairy n = 348 Mean	Non-Carbonated Sugar-Sweetened Drinks n = 395 Mean
Milk, high fat, not sweetened	3.6 <sup>b</sup>	4.0 <sup>d</sup>	21.4 <sup>h</sup>	4.4
Milk, high fat, sweetened	0.6 <sup>a</sup>	2.6 <sup>d,e</sup>	1.1	1.3
Milk, low-fat, reduced fat, nonfat, not sweetened	0.1	0.6	0.0	0.1
Milk, low-fat, reduced fat, nonfat, sweetened	0.3 <sup>a</sup>	1.0 <sup>d,e</sup>	0.4	0.3
Infant Formula	0.0	0.0	0.0	0.0
Dairy products (not milk), high fat	2.4	3.2	2.5	2.9
Dairy products (not milk), low-fat, reduced fat, nonfat	0.3	0.3	0.3	0.2
Dairy desserts and beverages, high fat	2.4	3.0	3.5	2.4
Dairy desserts and beverages, reduced-fat	0.3	0.3	0.6	0.4
Red meats, not fried	3.0	2.9 <sup>d</sup>	1.6 <sup>h</sup>	2.8
Chicken and turkey, not fried	1.9	1.4	1.0	1.5
Liver and organ meats	0.0	0.0	0.0	0.0
Processed meat	3.2	4.7	3.0	3.8
Fish and shellfish, not fried	0.1	0.2	0.1	0.1
Fried meat, poultry, or fish	1.4	1.9	1.0	1.3
Mixed dishes with meat (including organ meats and processed meat)	3.7	4.5	3.8	4.4
Mixed dishes with fish and shellfish	0.1	0.8	0.2	0.4
Mixed dishes with chicken and turkey	0.9	1.5	1.3	1.3
Mixed dishes, grain and vegetable (no meat)	1.4 <sup>a</sup>	3.4	2.8	2.2
Hamburgers and cheeseburgers	3.1	1.8	1.4	1.8
Pizza	8.9	5.6	6.9	5.1
Mexican dishes	2.3	3.1 <sup>d</sup>	1.5	3.0
Soups	0.8	1.5	1.5	1.7
Eggs and egg dishes	1.0	1.5	1.1	1.5
Beans and legumes, soy milk and soy products	0.0	0.1	0.0	0.0
Beans and legumes, beans, nuts, and seeds	0.7	0.9	1.1	0.8
White/non-whole-grain bread	4.7 <sup>a</sup>	7.1	5.6	6.1
Whole grain bread	0.0	0.1	0.0	0.0
Rice, pasta, noodles, dumplings, similar grain products, non-whole grain	1.0	1.5 <sup>e</sup>	1.3	0.7
Rice, pasta, noodles, dumplings, similar grain products whole grain	0.0	0.0	0.0	0.0
Other grains, not-whole grain	0.0	0.0	0.0	0.0
Other grains, whole grain	0.4	0.5	1.2	0.5
Cereal, non-whole grain	2.0 <sup>b</sup>	2.4 <sup>d</sup>	5.5 <sup>h</sup>	3.1
Cereal, whole grain	0.9	1.2	1.6	1.5
Sweet breakfast foods/breads	2.7 <sup>a,b</sup>	4.5 <sup>d,e</sup>	1.8	2.1
Desserts (non-dairy)	4.5	6.6 <sup>d</sup>	4.3	5.5
Salty snacks	4.6 <sup>b</sup>	3.5	2.6	4.2
Meal replacement bars/products	0.0	0.2	0.2	0.1
Fruit, fresh, citrus	0.0	0.2	0.1	0.1
Fruit, fresh, melons and berries	0.0	0.1	0.0	0.0
Fruit, fresh, other	0.3	0.5	0.5	0.6
Fruit, canned or frozen	0.1	0.3	0.2	0.1
100% fruit juice	1.0 <sup>a</sup>	2.5 <sup>d,e</sup>	1.6 <sup>h</sup>	0.6
Fruit, dried	0.0	0.0	0.0	0.0
100% vegetable juice	0.0	0.0	0.0	0.0
Vegetables, raw and salad	0.2	0.1	0.1	0.1
Vegetables, cooked, not starchy, fried, creamed, w/cheese, or stuffed	0.2 <sup>a</sup>	0.3 <sup>e</sup>	0.2	0.1
Vegetables, cooked, starchy (not fried)	0.9	1.2	1.6	1.1
Vegetables, fried or creamed	0.1	0.1	0.0	0.0
Fried potatoes	5.0	2.5	2.1	3.1
Butter, margarine, and other added fats	0.3	0.5	0.4	0.5
Salad Dressings and mayo, regular, and added oils	0.6	0.5	0.5	0.6
Salad Dressings and Mayo, reduced fat/calorie, nonfat	0.0	0.0	0.0	0.1
Miscellaneous sugary foods	2.5 <sup>a</sup>	3.5 <sup>d</sup>	2.0	3.5
Chocolate candy	1.6	1.2 <sup>d</sup>	0.6	1.0
Coffee or tea (not sweetened)	0.1	0.0 <sup>e</sup>	0.0	0.0
Sugar-sweetened drinks (with calories), other than carbonated sodas	1.5 <sup>a,b,c</sup>	3.3 <sup>e</sup>	3.1 <sup>h</sup>	17.0
Sweetened drinks without calories (no calories or art. sweetener)	0.0	0.0	0.0	0.0
Carbonated soda (not diet)	20.8 <sup>a,b,c</sup>	4.2	3.9	3.4
Alcoholic drinks	0.6	0.2	0.0	0.0
Condiments	0.3	0.3	0.3	0.4
Miscellaneous foods	0.2	0.0	0.1	0.0

<sup>a</sup> Difference between Cluster 1 and Cluster 2 is statistically significant at the p < .05 level.

<sup>b</sup> Difference between Cluster 1 and Cluster 3 is statistically significant at the p < .05 level.

<sup>c</sup> Difference between Cluster 1 and Cluster 4 is statistically significant at the p < .05 level.

<sup>d</sup> Difference between Cluster 2 and Cluster 3 is statistically significant at the p < .05 level.

<sup>e</sup> Difference between Cluster 2 and Cluster 4 is statistically significant at the p < .05 level.

<sup>f</sup> Difference between Cluster 3 and Cluster 4 is statistically significant at the p < .05 level.

**Table H.8. Mean Percentage of Total Energy Contributed by Selected Food Groups Across the 4 Main Dietary Patterns Identified in Cluster Analysis of Child Less- Healthy Eaters: Standard Errors**

<i>Food or Food Group</i>	Percentage Contribution to Total Energy Intake			
	Cluster 1	Cluster 2	Cluster 3	Cluster 4
	Soda and Pizza	Sweets	High-Fat Dairy	Non-Carbonated Sugar-Sweetened Drinks
	n = 559 SE	n = 1295 SE	n = 348 SE	n = 395 SE
Milk, high fat, not sweetened	0.4	0.3	0.7	0.6
Milk, high fat, sweetened	0.2	0.4	0.3	0.5
Milk, low-fat, reduced fat, nonfat, not sweetened	0.1	0.2	0.0	0.1
Milk, low-fat, reduced fat, nonfat, sweetened	0.2	0.2	0.2	0.2
Infant Formula	0.0	0.0	0.0	0.0
Dairy products (not milk), high fat	0.4	0.3	0.4	0.6
Dairy products (not milk), low-fat, reduced fat, nonfat	0.1	0.1	0.1	0.1
Dairy desserts and beverages, high fat	0.5	0.3	0.8	0.5
Dairy desserts and beverages, reduced-fat	0.1	0.1	0.3	0.2
Red meats, not fried	0.7	0.4	0.2	0.3
Chicken and turkey, not fried	0.3	0.2	0.2	0.4
Liver and organ meats	0.0	0.0	0.0	0.0
Processed meat	0.5	0.5	0.5	0.6
Fish and shellfish, not fried	0.0	0.1	0.0	0.0
Fried meat, poultry, or fish	0.2	0.3	0.3	0.3
Mixed dishes with meat (including organ meats and processed meat)	0.5	0.5	0.8	1.0
Mixed dishes with fish and shellfish	0.0	0.3	0.1	0.2
Mixed dishes with chicken and turkey	0.2	0.4	0.5	0.3
Mixed dishes, grain and vegetable (no meat)	0.4	0.8	0.6	0.6
Hamburgers and cheeseburgers	0.6	0.3	0.5	0.4
Pizza	1.3	0.8	1.3	1.1
Mexican dishes	0.5	0.5	0.4	0.7
Soups	0.3	0.2	0.3	0.5
Eggs and egg dishes	0.2	0.2	0.3	0.5
Beans and legumes, soy milk and soy products	0.0	0.1	0.0	0.0
Beans and legumes, beans, nuts, and seeds	0.2	0.1	0.3	0.2
White/non-whole-grain bread	0.3	0.4	0.6	0.6
Whole grain bread	0.0	0.0	0.0	0.0
Rice, pasta, noodles, dumplings, similar grain products, non-whole grain	0.3	0.2	0.4	0.2
Rice, pasta, noodles, dumplings, similar grain products whole grain	0.0	0.0	0.0	0.0
Other grains, not-whole grain	0.0	0.0	0.0	0.0
Other grains, whole grain	0.1	0.1	0.6	0.2
Cereal, non-whole grain	0.4	0.2	0.6	0.7
Cereal, whole grain	0.2	0.1	0.4	0.5
Sweet breakfast foods/breads	0.3	0.4	0.3	0.4
Desserts (non-dairy)	0.7	0.7	0.8	0.7
Salty snacks	0.6	0.3	0.4	0.7
Meal replacement bars/products	0.0	0.1	0.1	0.1
Fruit, fresh, citrus	0.0	0.1	0.0	0.1
Fruit, fresh, melons and berries	0.0	0.0	0.0	0.0
Fruit, fresh, other	0.1	0.1	0.1	0.2
Fruit, canned or frozen	0.1	0.1	0.1	0.1
100% fruit juice	0.2	0.2	0.3	0.1
Fruit, dried	0.0	0.0	0.0	0.0
100% vegetable juice	0.0	0.0	0.0	0.0
Vegetables, raw and salad	0.1	0.0	0.1	0.0
Vegetables, cooked, not starchy, fried, creamed, w/cheese, or stuffed	0.0	0.0	0.0	0.0
Vegetables, cooked, starchy (not fried)	0.1	0.2	0.4	0.2
Vegetables, fried or creamed	0.1	0.0	0.0	0.0
Fried potatoes	1.0	0.2	0.4	0.6
Butter, margarine, and other added fats	0.1	0.1	0.1	0.1
Salad Dressings and mayo, regular, and added oils	0.2	0.1	0.1	0.1
Salad Dressings and Mayo, reduced fat/calorie, nonfat	0.0	0.0	0.0	0.0
Miscellaneous sugary foods	0.3	0.3	0.2	0.8
Chocolate candy	0.3	0.2	0.2	0.3
Coffee or tea (not sweetened)	0.1	0.0	0.0	0.0
Sugar-sweetened drinks (with calories), other than carbonated sodas	0.2	0.2	0.4	0.6
Sweetened drinks without calories (no calories or art. sweetener)	0.0	0.0	0.0	0.0
Carbonated soda (not diet)	0.6	0.2	0.5	0.5
Alcoholic drinks	0.5	0.1	0.0	0.0
Condiments	0.0	0.0	0.1	0.1
Miscellaneous foods	0.1	0.0	0.1	0.0

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