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MyPyramid Intakes and Snacking Patterns of U.S. Adults

What We Eat in America, NHANES 2007-2008

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Highlights

- ▶ Ninety percent of adults snack at least once on any given day (including snacks comprised of plain water only). About one in six men and one in five women snack four or more times per day.
- ▶ Snacks provide from 7 to 38 percent of adults' total daily intakes of MyPyramid food groups, 17 percent of solid fats, and 41 percent of added sugars.
- ▶ Snacking more times in a day is associated with higher intakes of most MyPyramid food groups and components. However, these higher MyPyramid intakes by frequent snackers are mainly attributable to consuming more food, not making healthier choices.

The Dietary Guidelines for Americans (1) form the basis for Federal nutrition policy. To help consumers put the Dietary Guidelines into practice, MyPyramid translates them into food-based recommendations (2).

MyPyramid daily food intake patterns identify the types and amounts of foods to eat each day to meet nutrient needs, while putting limits on food components typically consumed in excess in the American diet (3). Dietary patterns that follow this guidance may help people reach and maintain a healthy weight, reduce the risk of chronic disease, and promote overall health (1).

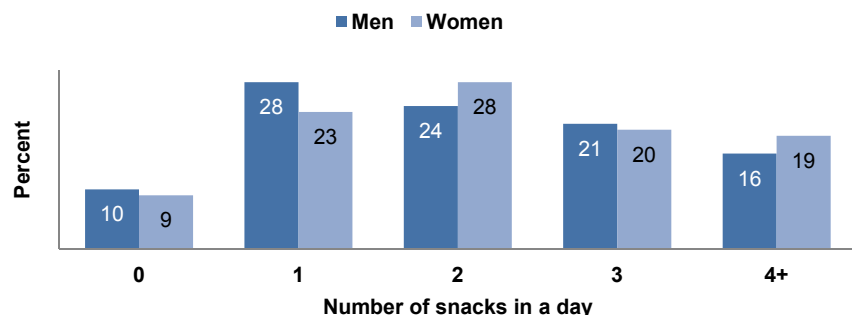
Snacking (*see definition on page 6*) is a dietary behavior that has increased in recent decades in the U.S. while the percentage of the population who are overweight and obese has also increased (4). Among adolescents, a higher frequency of snacking has been found to be associated with various MyPyramid components, such as higher intake of fruits and of added sugars (5). Some studies have found associations between snacking and nutrient intakes (6-7). However, little is known about whether snacking by adults impacts their MyPyramid intakes.

Using data from 5,334 adults age 20 years and over, the present study examines associations between snacking and intakes of MyPyramid food groups and components in the U.S. in 2007-2008.

How much are adults snacking?

Most adults (90 percent of men and 91 percent of women) have at least one snack on any given day. The pattern of individuals consuming a specified number of snacks in a day is similar for men and women, as shown in figure 1 below.

Figure 1. Percentages of men and women age 20 years and over consuming specified number of snacks in a day, 2007-2008



SOURCE: What We Eat in America, NHANES 2007-2008, Day 1 dietary intake data, weighted.



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How does snacking contribute to men's intakes of MyPyramid food groups and components?

For men, average intakes of fruits, vegetables, and dairy fall short of meeting even the minimum recommendations for those MyPyramid food groups (*see table 1*), whereas the average intake of calories from SoFAS (*see definition on page 6*) is far above even the highest recommended limit. Relative to the proportion of total calories they provide, men's snacks contribute higher amounts of fruits and SoFAS (primarily from added sugars), comparable amounts of oils and dairy, and lower amounts of vegetables, grains, and protein foods (*see figure 2*).

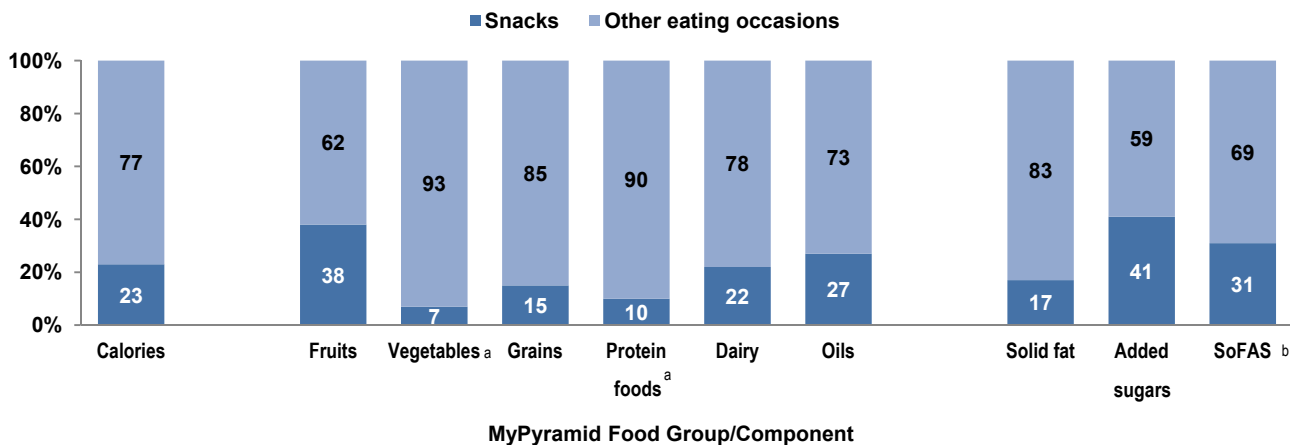
Table 1. MyPyramid patterns and mean intakes (total and from snacks) by men age 20 years and older, WWEIA, NHANES 2007-2008

| MyPyramid Food Intake Patterns | | Mean intake in 2007-2008 | |
|------------------------------------|--------------------------------------|--------------------------|-------------|
| Food/component | Range of recommended intake OR limit | Total | From snacks |
| Calories, total | 2,000 – 3,000 | 2,507 | 586 |
| Fruits (cups) | 2 – 2.5 | 1.1 | 0.4 |
| Vegetables (cups) ^a | 2.5 – 4 | 1.8 | 0.1 |
| Grains (oz-eq) | 6 – 10 | 7.7 | 1.2 |
| Protein foods (oz-eq) ^a | 5.5 – 7 | 8.0 | 0.8 |
| Dairy (cups) | 3 | 1.7 | 0.4 |
| Oils (tsp) | 6 – 10 | 4.6 | 1.0 |
| Calories from SoFAS ^b | 267 – 512 | 923 | 289 |

NOTES: ^aLegumes (dried beans and peas) are excluded from vegetables and included in protein foods in this analysis. ^bSoFAS (*see definition on page 6*) range is the maximum limit for each calorie pattern; includes solid fats, alcohol (if any), and added sugars.

SOURCE: What We Eat in America, NHANES 2007-2008, Day 1 dietary intake data, weighted; MyPyramid Food Intake Patterns available at http://www.mypyramid.gov/downloads/MyPyramid_Food_Intake_Patterns.pdf [accessed March 3, 2011].

Figure 2. Contributions by snacks and other eating occasions to intakes of calories and MyPyramid food groups/components, men 20 years and older, WWEIA, NHANES 2007-2008



NOTES: ^aLegumes (dried beans and peas) are excluded from vegetables and included in protein foods in this analysis. ^bSoFAS (*see definition on page 6*) includes solid fats, alcohol (if any), and added sugars.

SOURCE: What We Eat in America, NHANES 2007-2008, Day 1 dietary intake data, weighted.

How does snacking contribute to women's intakes of MyPyramid food groups and components?

Results for women parallel those for men. Average intakes of fruits, vegetables, and dairy by women fail to meet even the lowest recommended intakes (*see table 2*), but the average intake of calories from SoFAS is almost twice the highest recommended limit. Compared to the percentage of total calories they provide, women's snacking occasions are higher in fruits but also higher in added sugars (*see figure 3*).

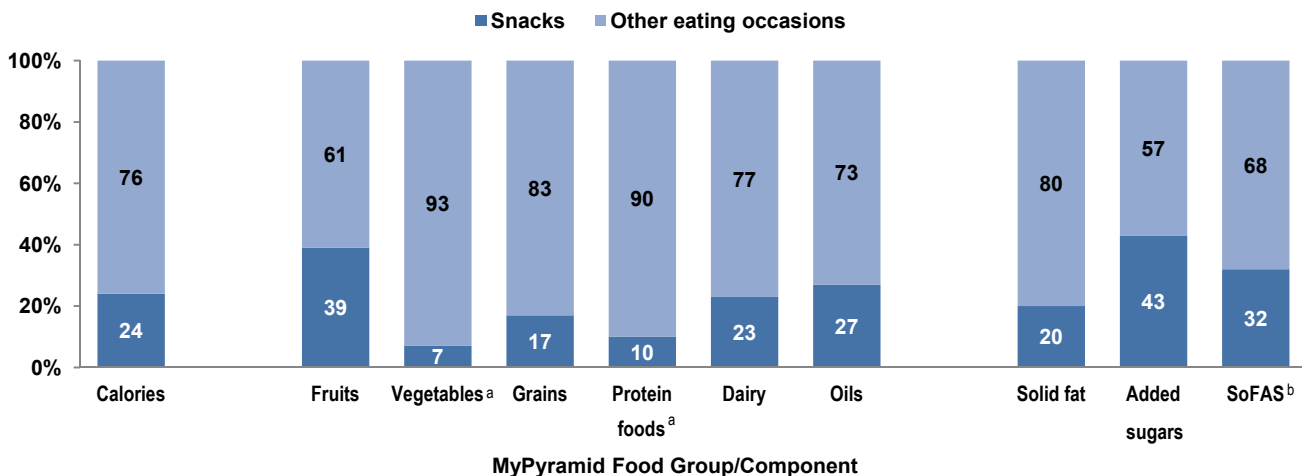
Table 2. MyPyramid patterns and mean intakes (total and from snacks) by women age 20 years and older, WWEIA, NHANES 2007-2008

| MyPyramid Food Intake Patterns | | Mean intake in 2007-2008 | |
|------------------------------------|--------------------------------------|--------------------------|-------------|
| Food/component | Range of recommended intake OR limit | Total | From snacks |
| Calories, total | 1,600 – 2,400 | 1,760 | 421 |
| Fruits (cups) | 1.5 - 2 | 1.0 | 0.4 |
| Vegetables (cups) ^a | 2 – 3 | 1.5 | 0.1 |
| Grains (oz-eq) | 5 – 8 | 5.6 | 0.9 |
| Protein foods (oz-eq) ^a | 5 – 6.5 | 4.9 | 0.5 |
| Dairy (cups) | 3 | 1.3 | 0.3 |
| Oils (tsp) | 5 – 7 | 3.6 | 1.0 |
| Calories from SoFAS ^b | 132 – 362 | 624 | 197 |

NOTES: ^aLegumes (dried beans and peas) are excluded from vegetables and included in protein foods in this analysis. ^bSoFAS (*see definition on page 6*) range is the maximum limit for each calorie pattern; includes solid fats, alcohol (if any), and added sugars.

SOURCE: What We Eat in America, NHANES 2007-2008, Day 1 dietary intake data, weighted; MyPyramid Food Intake Patterns available at http://www.mypyramid.gov/downloads/MyPyramid_Food_Intake_Patterns.pdf [accessed March 3, 2011].

Figure 3. Contributions by snacks and other eating occasions to intakes of calories and MyPyramid food groups/components, women 20 years and older, WWEIA, NHANES 2007-2008



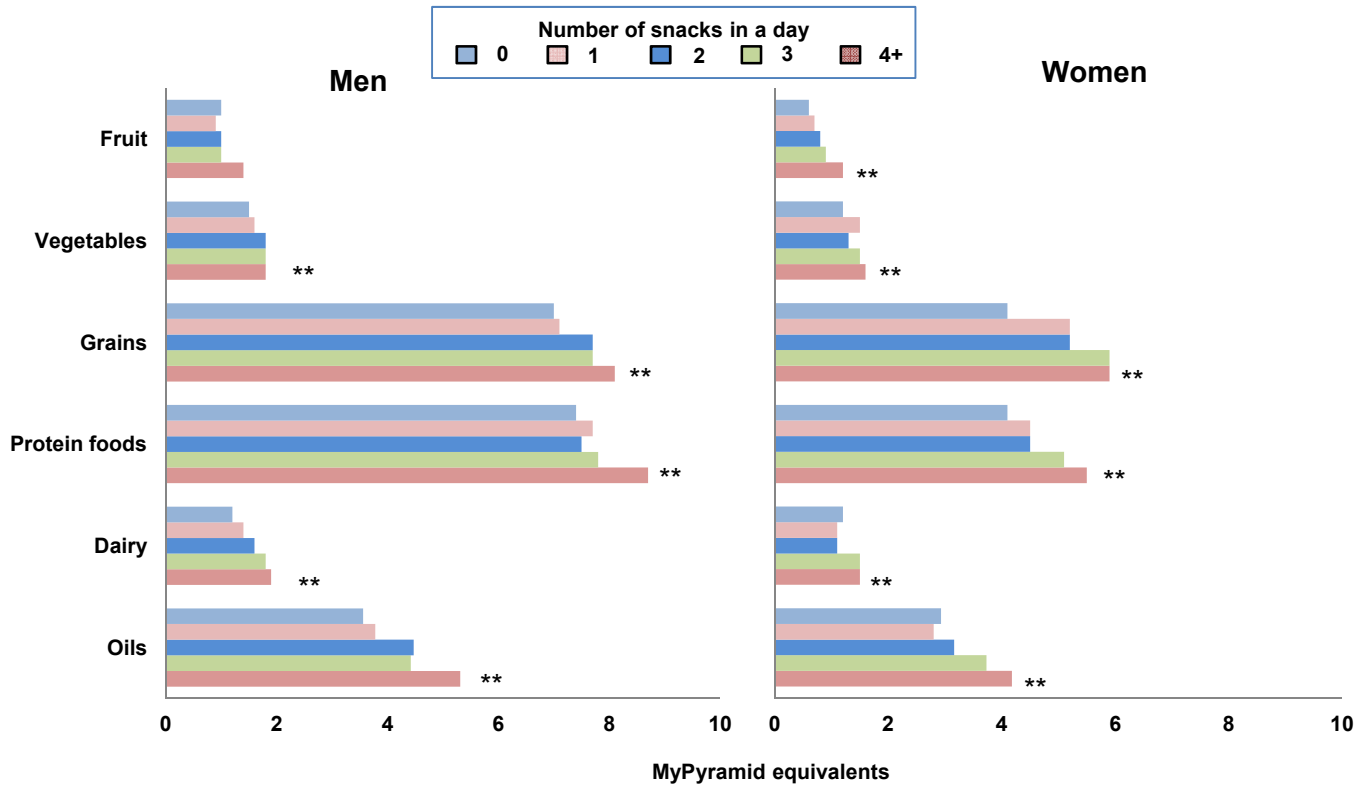
NOTE: ^aLegumes (dried beans and peas) are excluded from vegetables and included in protein foods in this analysis. ^bSoFAS (*see definition on page 6*) includes solid fats, alcohol (if any), and added sugars.

SOURCE: What We Eat in America, NHANES 2007-2008, Day 1 dietary intake data, weighted.

Do adults who snack more have higher total intakes of MyPyramid food groups and components?

Yes. Except for fruit intake by men and solid fats intake by women, adults' total intakes of all MyPyramid food groups and components in a day are significantly higher among those who consume more snacks on the intake day (see figure 4 and table 3).

Figure 4. Total intakes of MyPyramid food groups and oils in a day by snacking frequency, adults 20 years of age and older, WWEIA, NHANES 2007-2008



NOTES: Fruits, vegetables, and dairy are presented in cup equivalents, grains and protein foods in ounce equivalents, and oils in teaspoons. Legumes (dried beans and peas) are excluded from vegetables and included in protein foods in this analysis. Adjusted to remove the effects of age, race/ethnicity, percentage of poverty threshold, presence/absence of three-meal pattern, physical activity, and body mass index (see definitions on page 6). **Statistically significant trend (p<0.01). SOURCE: What We Eat in America, NHANES 2007-2008, Day 1 dietary intake data, weighted.

Table 3. Total intakes of SoFAS, added sugars, and solid fats in a day by snacking frequency, adults 20 years of age and older, WWEIA, NHANES 2007-2008

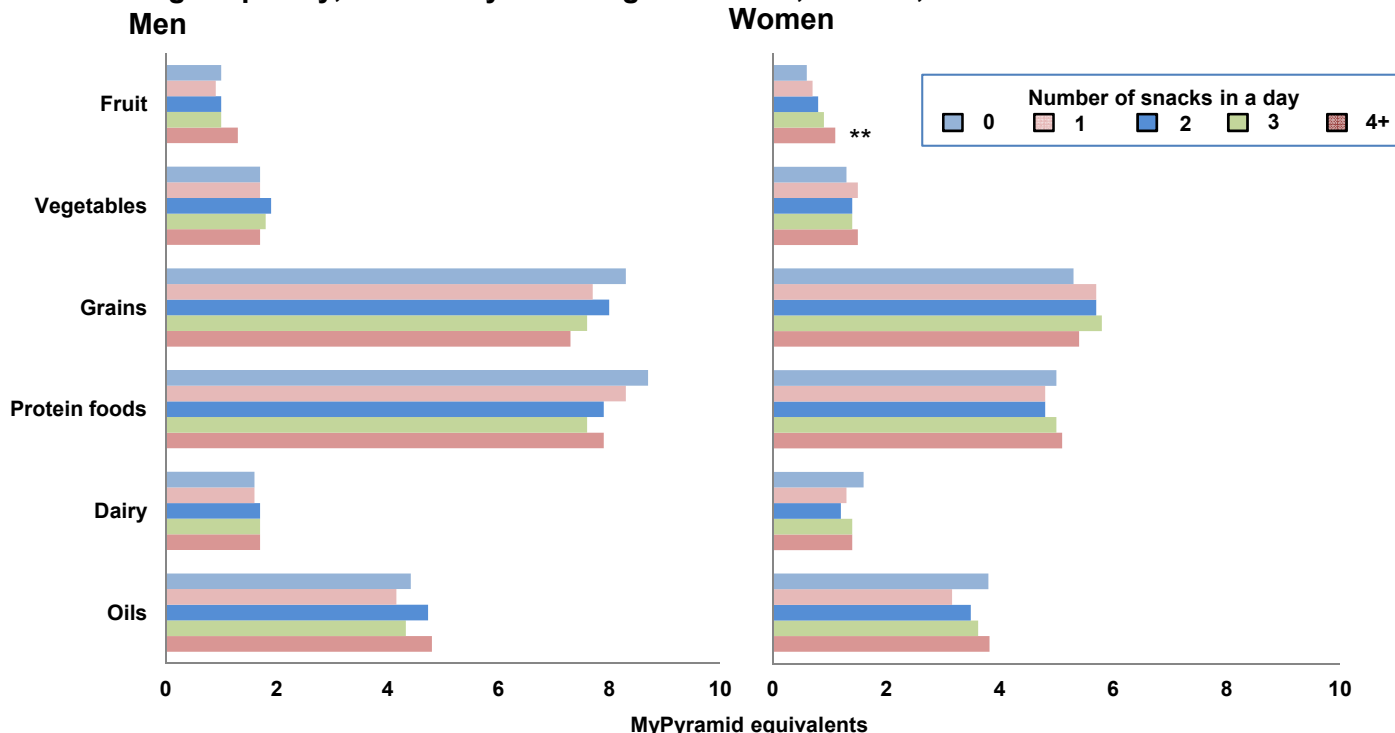
| MyPyramid component | Sex | Number of snacks on intake day | | | | |
|----------------------------------|-------|--------------------------------|------|------|------|---------|
| | | 0 | 1 | 2 | 3 | 4+ |
| Calories from SoFAS ^a | Men | 673 | 846 | 831 | 964 | 1,057** |
| | Women | 479 | 605 | 595 | 636 | 665** |
| Added sugars (tsp) | Men | 13.2 | 18.2 | 17.9 | 21.7 | 25.3** |
| | Women | 10.5 | 14.3 | 15.3 | 14.4 | 16.3** |
| Solid fats (gm) | Men | 47.7 | 50.8 | 50.2 | 55.2 | 60.2** |
| | Women | 30.2 | 36.0 | 34.9 | 40.5 | 39.7 |

NOTES: Adjusted to remove the effects of age, race/ethnicity, percentage of poverty threshold, presence/absence of three-meal pattern, physical activity, and body mass index (see definitions on page 6). ^aSoFAS (see definition on page 6) includes solid fats, alcohol (if any), and added sugars. **Statistically significant trend (p<0.01). SOURCE: What We Eat in America, NHANES 2007-2008, Day 1 dietary intake data, weighted.

Are total MyPyramid intakes higher for adults who snack more because they make better food/beverage choices, or is it simply because they eat more?

For the most part, it's because they eat more. Among adults, higher snacking is associated with higher total calorie intake (8). To determine whether associations between snacking and MyPyramid food group intakes are due to better food choices or merely to eating more, a statistical adjustment was applied to account for the impact of differences in calorie intake. In this way, it is possible to determine whether an effect of snacking on MyPyramid intakes would be seen if calorie intakes had been the same at the different snacking levels. After this adjustment, few relationships remain between snacking frequency and total intakes of MyPyramid groups and components in a day (see figure 5 and table 4). Two exceptions are that, for women, more frequent snacking is associated with (a) higher intakes of fruit and (b) lower intakes of solid fats.

Figure 5. Calorie-adjusted total intakes of MyPyramid food groups and oils in a day by snacking frequency, adults 20 years of age and older, WWEIA, NHANES 2007-2008



NOTES: Fruits, vegetables, and dairy are presented in cup equivalents, grains and protein foods in ounce equivalents, and oils in teaspoons. Legumes (dried beans and peas) are excluded from vegetables and included in protein foods in this analysis. Adjusted to remove the effects of energy (calories), age, race/ethnicity, percentage of poverty threshold, presence/absence of three-meal pattern, physical activity, and body mass index (see definitions on page 6). **Statistically significant trend (p<0.01). SOURCE: What We Eat in America, NHANES 2007-2008, Day 1 dietary intake data, weighted.

Table 4. Calorie-adjusted total intakes of SoFAS, added sugars, and solid fats in a day by snacking frequency, adults 20 years of age and older, WWEIA, NHANES 2007-2008

| MyPyramid Component | Sex | Number of snacks on intake day | | | | |
|----------------------------------|-------|--------------------------------|------|------|------|--------|
| | | 0 | 1 | 2 | 3 | 4+ |
| Calories from SoFAS ^a | Men | 899 | 945 | 898 | 943 | 920 |
| | Women | 652 | 674 | 660 | 614 | 592 |
| Added sugars (tsp) | Men | 17.9 | 20.3 | 19.3 | 21.3 | 22.4 |
| | Women | 14.2 | 15.8 | 16.7 | 13.9 | 14.7 |
| Solid fat (gm) | Men | 61.1 | 56.6 | 54.2 | 54.0 | 52.1 |
| | Women | 40.4 | 40.1 | 38.8 | 39.2 | 35.4** |

NOTES: Adjusted to remove the effects of energy (calories), age, race/ethnicity, percentage of poverty threshold, presence/absence of three-meal pattern, physical activity, and body mass index (see definitions on page 6). ^aSoFAS (see definition on page 6) includes solid fats, alcohol (if any), and added sugars. **Statistically significant trend (p<0.01).

SOURCE: What We Eat in America, NHANES 2007-2008, Day 1 dietary intake data, weighted.

Definitions

BMI (body mass index): Based on an individual's height and weight, this number is a reliable indicator of body fatness for most people (9). Calculated by dividing a person's weight (in kilograms) by the square of his/her height (in meters). The equation for calculating BMI based on weight in pounds and height in inches is the following: $\text{weight (lb)} / [\text{height (in)}]^2 \times 703$

MyPyramid: Food guidance system developed by USDA. Based on the *Dietary Guidelines for Americans 2005*, it recommends amounts of grains, fruits, vegetables, dairy, protein, and oils to eat (by age, gender, and activity level) in order to meet nutrient needs. MyPyramid also puts limits on food components typically consumed in excess in the American diet – solid fats, added sugars, and alcohol. The units used for grains and protein are “ounce equivalents.” For lists of ounce equivalents, see http://www.mypyramid.gov/pyramid/grains_counts.html and http://www.mypyramid.gov/pyramid/meat_counts.html.

Poverty thresholds: Percentage of poverty level is based on family income, family size, and composition using U.S. Census Bureau poverty thresholds. The poverty threshold categories are related to Federal Nutrition Assistance Programs. See www.fns.usda.gov.

Physical activity: Using data from the NHANES Physical Activity and Physical Fitness Questionnaire (http://www.cdc.gov/nchs/data/nhanes/nhanes_07_08/paq07_08_eng.pdf), total minutes of moderate physical activity per week was calculated for each adult. Each minute of vigorous activity was considered to be the equivalent of 2 minutes of moderate activity (10).

Snack, snacking occasion: Snacking occasions were reported as distinct eating occasions during the dietary interview and consisted of one or more food and beverage items, including plain water. Survey respondents selected the name of all eating occasions from a fixed list that was provided during the interview. All reports of “snack,” “drink,” or “extended consumption” (items that were consumed over a long period of time) were included as snacking occasions. Spanish language interviewers used Spanish language snacking occasion names: “merienda,” “entre comida,” “bocadillo,” “tentempie,” and “bebida.”

SoFAS: Acronym used to refer to the sum of calories from Solid Fats and Added Sugars (11), as well as any calories from alcohol. Limits for the amount of calories from SoFAS are included in the USDA food patterns.

Three-meal pattern: This pattern was present when an individual's dietary intake included at least one eating occasion from each of three categories (including both English and equivalent Spanish names for these meals): (1) breakfast, desayuno, or almuerzo; (2) lunch, brunch, or comida; and (3) dinner, supper, or cena.

Data Source

Estimates in this report are based on one-day of dietary intake data collected in What We Eat in America (WWEIA), the dietary intake interview component of the National Health and Nutrition Examination Survey (NHANES), in 2007-2008. A total of 5,420 men and women age 20 years and older provided complete and reliable dietary intake data. Pregnant and lactating females (n=86) were excluded from this report, yielding a final sample of 5,334 adults (2,662 males and 2,672 females). Sample weights were applied in all analyses to produce nationally representative estimates.

During the 24-hour dietary recall, the name of each eating occasion was reported by the respondent. Nutrient intakes were based only on intakes of foods and beverages and do not include nutrient contributions from supplements. The MyPyramid Equivalents Database for USDA Food Codes (MPED) 2003-3004 Version 2.0 was used to disaggregate foods into their ingredients, assign the components to the appropriate MyPyramid food groups, and convert gram amounts to MyPyramid units of measure.

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