Formulating Dietary Guideline Recommendations: Eating Frequency and Added Sugars

February 25, 2021

Presenter:
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Member of the 2020 Dietary Guidelines Advisory Committee

Moderator:
Barbara J. Ivens, MS, RDN, FADA, FAND

Approved for 1 CPE (Level 2) by the Commission on Dietetic Registration

Bean Academy webinars

The Michigan Bean Commission (MBC) is pleased to offer a series of free accredited webinars, many with a plant-forward eating focus, that cover a broad range of contemporary nutrition and food topics.

Webinars are a blend of research, science and practice to help nutrition professionals stay informed on recent developments on relevant topics.

Webinars are funded as part of a 2020-2021 USDA grant to the Michigan Bean Commission.

Webinar logistics

- A Handout of the slides presented today is available at: https://MichiganBean.com/hp-webinar-mattes/
- The Continuing Education Credit certificate is available to download after the webinar: https://MichiganBean.com/hp-webinar-mattes/
- The presenter will answer questions at the end of this webinar. Please submit questions by using the 'Q&A' feature on your computer screen.

Today's Faculty

- **Richard D. Mattes, MPH, PhD, RDN**
  - Distinguished Professor of Nutrition Science, Purdue University
  - Member of the 2020 Dietary Guidelines Advisory Committee

- Moderator:
  Barbara J. Ivens, MS, RDN, FADA, FAND – Consultant, Michigan Bean Commission

Learning Objectives

- Describe the process for formulating national dietary recommendations
- Identify the contribution of added sugars and their moderation to meet dietary goals
- Discuss the trends in eating frequency and their health implications
- List and describe the fundamental dietary patterns identified by the Dietary Guidelines Committee that contribute to positive health outcomes

Formulating Dietary Recommendations: Eating Frequency and Added Sugars

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Disclosures

AFFILIATION/FINANCIAL INTERESTS (prior 12 months)	ENTITIES
Grants/Research Support	Almond Board of California; Welch's; Gelesis
Scientific Advisory Board/Consultant/Board of Directors	Grain Foods Foundation; Mars, Inc.
Speakers Bureau	
Stock Shareholder	
Employee	
Other	

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- **Identify the contribution of added sugars and their moderation to meet dietary goals**
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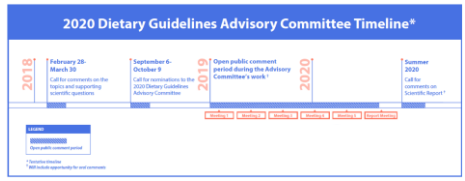
About the Dietary Guidelines for Americans

The *Dietary Guidelines for Americans* serves as the cornerstone of federal nutrition programs and policies, providing food-based recommendations to help prevent diet-related chronic diseases and promote overall health.

According to the National Nutrition Monitoring and Related Research Act of 1990, the *Dietary Guidelines* is mandated to reflect the preponderance of scientific evidence and is published jointly by USDA and HHS every five years.

Historically, the *Dietary Guidelines* has focused on 2 years of age and older. The 2014 Farm Bill mandated the addition of infants and toddlers and women who are pregnant.

Timeline



Public Comments to the Committee

The Committee received more than 62,000 written public comments from March 12, 2019 to June 10, 2020.

More than 125 oral comments were provided to the Committee at two oral comment sessions

Organization of the 2020 Dietary Guidelines Advisory Committee

Advisory Committee Review of Scientific Evidence

- Worked in 6 topic area subcommittees and one cross-cutting working group:

1. Pregnancy and Lactation
2. Birth to 24 Months
3. Dietary Patterns
4. Beverages and Added Sugars
5. Dietary Fats and Seafood
6. Frequency of Eating

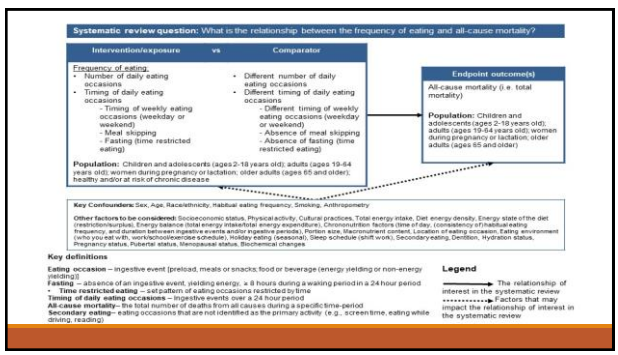
Data Analysis and Food Pattern Modeling

The Committee's Scientific Review

Data Analysis
More than 150 analyses of Federal data sets

Food Pattern Modeling
Several analyses across the life span – and representing, for the first time, 6- to 24-month life stage

NESR Systematic Review (Nutrition Evidence Systematic Review)
More than 270,000 citations screened and nearly 1,500 original research articles included in 33 original systematic reviews



NESR supported the 2020 Dietary Guidelines Advisory Committee in conducting systematic reviews

The 2020 Advisory Committee:

- Established all aspects of the protocol, including the inclusion and exclusion criteria
- Reviewed all studies that met the inclusion criteria
- Deliberated on the body of evidence for each question
- Wrote and graded the conclusion statements included in the scientific report the 2020 Committee submitted to USDA and HHS

NESR staff: Supported the Advisory Committee by facilitating, executing, and documenting the work necessary to ensure the reviews were done in accordance with the NESR methodology

Peer review by Federal Scientists: Completed after each systematic review was discussed by the full Committee at a public meeting; coordinated by USDA's ARS

Scientific Report of the 2020 Dietary Guidelines Advisory Committee

Committee's work culminated in release of the *Scientific Report of the 2020 Dietary Guidelines Advisory Committee* (835 pages)

Posted at DietaryGuidelines.gov on July 15, 2020

Charge to the Committee (Added Sugars)

Given:

Prevalence of obesity among adults in the U.S. population was 38.9 percent (95% CI: 37.0%, 40.7%) in 2013-2016, with the prevalence of severe obesity at 7.6 percent (95% CI: 6.8%, 8.6%)

Among U.S. youth ages 2 to 19 years, the prevalence of obesity and severe obesity during the same time period was 17.8 percent (95% CI: 16.1%, 19.6%), and 5.8 percent (95% CI: 4.8%, 6.9%), respectively

The Committee was asked to address a series of questions on diet and health outcomes assessing the relationship between consumption of added sugars and:

1) growth, size, body composition and risk of overweight and obesity, including gestational weight gain during pregnancy and postpartum weight loss during lactation,

2) risk of type 2 diabetes, and

3) risk of CVD

Definition of Added Sugars

Sugars that are either added during the processing of foods, or are packaged as such (e.g., a bag of sugar). Added sugars include sugars (free, mono-, and disaccharides), sugars from syrups and honey, and sugars from concentrated fruit or vegetable juices that are in excess of what would be expected from the same volume of 100% fruit or vegetable juices of the same type.

2016 U.S. Food and Drug Administration (FDA) guidance

Question 1. What is the relationship between beverage consumption and growth, size, body composition, and risk of overweight and obesity?

Approach to Answering Question: NESR systematic review of Sugar-Sweetened Beverages

- **Moderate evidence indicates that higher sugar-sweetened beverage intake is associated with greater adiposity in children.**
- **Limited evidence suggests that higher sugar-sweetened beverage intake is associated with greater adiposity in adults.**

Question 2. What is the relationship between added sugars consumption and risk of cardiovascular disease?

- **Limited evidence from prospective cohort studies that were based primarily on sugar-sweetened beverages suggests that higher consumption of added sugars in adulthood is associated with increased risk of cardiovascular disease mortality. Grade: Limited**
- **Insufficient evidence is available to determine the relationship between added sugars consumption and risk of cardiovascular disease in children. Grade: Grade Not Assignable**
- **Insufficient evidence is available to determine the relationship between added sugars intake in adulthood and cardiovascular disease risk profile. Grade: Grade Not Assignable**
- **Insufficient evidence is available to determine the relationship between added sugars intake in adulthood and risk of stroke. Grade: Grade Not Assignable**
- **Insufficient evidence is available to determine the relationship between added sugars intake in adulthood and incident ischemic cardiovascular disease events. Grade: Grade Not Assignable**
- **Insufficient evidence is available to determine the relationship between added sugars intake in adulthood and risk of peripheral artery disease. Grade: Grade Not Assignable**
- **Insufficient evidence is available to determine the relationship between added sugars intake in adulthood and risk of heart failure. Grade: Grade Not Assignable**

Intake of Added Sugars

The WHO, 2015 DGA and Healthy People 2020 recommend intake <10% Energy

48-50% of children 1-3 y/o consume > 10% of energy from added sugars

72-79% of children 4-18 y/o consume > 10% energy from added sugars

59% of men ≥ 19 consume > 10% energy from added sugars

62% of women ≥ 19 consume > 10% energy from added sugars

The Committee was asked to consider:

What is the relationship between added sugars consumption and achieving nutrient and food group recommendations using data analyses

What is the relationship between added sugars consumption and achieving nutrient and food group recommendations?

- In the U.S. population ages 1 year and older, mean usual consumption of added sugars was 13 percent of daily energy intake (range = 10 to 15 percent across age-sex groups)
- Intake of added sugars averaged 16.2 teaspoon equivalents on a given day for ages 2 and older in 2015-2016.
- At the 75th percentile of intake, men and women ages 19 to 70 years consume approximately 400 kcal (25 tsp eq; 20 percent of a 2,000 kcal diet) and 300 kcal (19 tsp eq; 15 percent of a 2,000 kcal diet) of added sugars, respectively.
- Nearly 70 percent of added sugars intake comes from 5 WWEIA, NHANES food categories: sweetened beverages, desserts and sweet snacks, coffee and tea (with their additions), candy and sugars, and breakfast cereals and bars

Table D12.1. Percent of energy from added sugars from the top 5 food category sources across individuals ages 2 years and older[1]

	Age Group (Years)[2]							
	2+	2-5	6-11	12-19	20-40	41-50	51-70	71+
Sweetened beverages	24.1	16.4	25.2	32.1	32.1	25.3	16.5	12.8
Desserts and sweet snacks	18.8	23.3	22.2	16.1	14.3	17.4	20.5	27.7
Coffee and tea (with their additions)	11.1	2.0	3.0	7.3	12.0	14.9	14.3	11.1
Candy and sugars	9.0	12.6	12.1	8.9	7.3	7.3	9.9	9.0
Breakfast cereals and bars	7.4	11.7	9.6	10.1	6.4	6.2	6.5	7.0
Total	**70.4**	**66.0**	**72.1**	**74.5**	**72.1**	**71.1**	**67.7**	**67.6**

[1]Source: National Cancer Institute, Top Sources of Food Group Intakes, NHANES 2013-2016 (Cat_DS)
[2]On average, these 5 food categories are the top contributors to added sugars intake, although there are variations within certain age groups.

Across all age categories, beverages (not including milk and 100% juice) contribute 37.1 percent to total added sugars intake. Among children ages 2 to 19 years, sweetened beverages alone contribute 16.4 to 32.1 percent of added sugars intake.

What is the relationship between added sugars consumption and achieving nutrient and food group recommendations?

- The estimated proportion of the population that consumed greater than 10 percent of energy from added sugars has decreased from **70%** in 2007-2010, to **63%** in 2013-2016
- Total energy consumption remained stable (2,065 kcal 2007-2010 vs 2,058 kcal 2013-2016) as the small reduction in consumption of added sugars, was largely offset by a small increase (11.1 to 11.4 percent of total energy) in saturated fat intake.

What is the relationship between added sugars consumption and achieving nutrient and food group recommendations?

The 5 top food category sources of added sugars contribute:

- 17.3% of total grain intake for individuals ages 2 years and older
- >40% of whole grains intake across the population ages 2 years and older
- ≥20% of dairy intake on a given day comes from these food sources
- 15 – 18% to total intakes of calcium, potassium, dietary fiber, and vitamin D in both children and adults

Question 3. How much added sugars can be accommodated in a healthy diet while still meeting food group and nutrient needs?

Approach to Answering Questions: Food Pattern Modeling

Food Pattern Modeling

Exercise 1 estimated the energy that could come from added sugars for individuals ages 2 years and older for a given energy intake.

Exercise 2 sought to demonstrate how reducing added sugars intake from current levels of consumption could provide an opportunity to increase intake of more nutrient-dense foods that help meet components of the USDA Food Patterns and specific nutrient goals for age-sex groups.

Exercise 3 estimated excess energy from added sugars and solid fats if the USDA Food Patterns were developed with typical choices rather than nutrient-dense representative foods.

Table D12.2. Essential calories and limit on solid fats and added sugars across energy levels in the Healthy U.S.-Style Food Patterns for ages 2 years and older

	Essential Calories[1]	Percent Essential Calories[1]	Energy Limit for Solid Fats and Added Sugars[2]	Energy Assigned to Solid Fats[3]	Energy Assigned to Added Sugars[3]	Grams of Solid Fats[4]	Grams of Added Sugars[4]	Percent Energy Added Sugars
Level	kcal	% kcal	kcal	kcal	kcal	g	g	%
1,000	868	87	132	72	59	9	15	6
1,200	1120	93	80	44	36	5	9	3
1,400	1310	94	90	49	40	6	10	3
1,600	1496	94	104	57	47	7	12	3
1,800	1657	92	143	79	65	9	16	4
2,000	1759	88	241	133	109	16	27	5
2,200	1947	88	253	139	114	17	29	5
2,400	2079	87	321	176	144	21	36	6
2,600	2251	87	349	192	157	23	39	6
2,800	2431	87	369	203	166	24	41	6
3,000	2559	85	441	243	199	29	50	7
3,200	2620	82	580	319	261	38	65	8

[1] The energy associated with the foods and beverages ingested to meet nutritional goals through choices that align with the USDA Food Patterns in forms with the least amounts of saturated fat, added sugars and sodium.
[2] Calculated from pattern calorie level minus essential calories.
[3] Calculated as 55 percent of energy from solid fats and 45 percent from added sugars, based on mean population intakes (NCI Usual Intakes data for NHANES 2013-2016).
[4] Calculated using caloric values of 9 kcal per 1 gram of solid fats and 4 kcal per 1 gram of added sugars.

Table D12.3. Example distributions of solid fats and added sugars with sample food amounts in the 2,000 kcal level in the Healthy U.S.-Style Food Pattern

Level	Energy Limit for Solid Fats and Added Sugars[1,2] kcal	Energy Assigned to Solid Fats[3] kcal (%)	Energy Assigned to Added Sugars[3] kcal (%)	Grams of Solid Fats[4] g	Sample food equivalent (Butter) Tbsp	Grams of Added Sugars[4] g	Sample food equivalent (Regular soda) ~Oz.	Percent Energy Added Sugars %
2,000	241	0 (0)	241 (100)	0	N/A	60	Soda: 20	12
2,000	241	60 (25)	181 (75)	7	Butter: 0.5	45	Soda: 16	9
2,000	241	109 (45)	133 (55)	12	Butter: 1.1	33	Soda: 12	6
2,000[5]	241	133 (55)	109 (45)	16	Butter: 1.2	27	Soda: 9	5
2,000	241	181 (75)	60 (25)	20	Butter: 1.7	15	Soda: 5	3
2,000	241	241 (100)	0 (0)	27	Butter: 2.4	0	N/A	0

[1] Calculated from pattern energy level minus essential calories
[2] The energy limit for solid fats and added sugars assumes consumption of nutrient-dense foods that meet nutritional goals through choices that align with the USDA Food Patterns in forms with the least amounts of saturated fat, added sugars and sodium.
[3] Based on mean population intakes (NCI Usual Intakes data for NHANES 2013-2016)
[4] Calculated using caloric values of 8.4 kcal per 1 gram of solid fats and 4 kcal per 1 gram of added sugars
[5] As shown in table D 12.2, the remaining energy for added sugars and solid fats is assigned in a 55:45 ratio based on mean population-level intakes

TABLE 1: Redistribution of Calories from Added Sugars: Males 4-8 years[1], assigned 1400 calorie pattern

Mean intakes of added sugars (kcal)	253 kcal		
Top 5 sources of added sugars[2]	Sweetened Beverages, Desserts and Sweet Snacks, Candy and Sugars, Breakfast Cereals and Bars, Burgers and Sandwiches		
Percent contribution to added sugars intake from top 5 sources[2,3]	71-77 percent		
Energy from top 5 sources of added sugars[2,4]	179-195 kcal		
	Per Day Recommended USDA Food Pattern Amounts	Per Day Mean Intakes of USDA Food Pattern Amounts	Modeled Shift in Energy from Added Sugars: USDA Food Pattern Amounts (kcal)
FRUITS (cup eq.)	1.5	1.1	0.4 (38) ☆
VEGETABLES (cup eq)			
Dark green	0.14	0.1	0.2 (8) ☆
Red Orange	0.43	0.3	0.2 (9) ☆
Legumes	0.07	0.1	n/a
Starchy	0.50	0.3	0.2 (36) ☆
Other	0.36	0.3	n/a
GRAINS[5] (oz eq)	5.0	6.7	n/a
PROTEIN FOODS (oz eq)	4	3.9	n/a
DAIRY (cup eq)	2.5	2.2	0.3 (26) ☆

Table 2. Redistribution of Calories from Added Sugars: Females 4-8 years[1], assigned 1200 calorie pattern

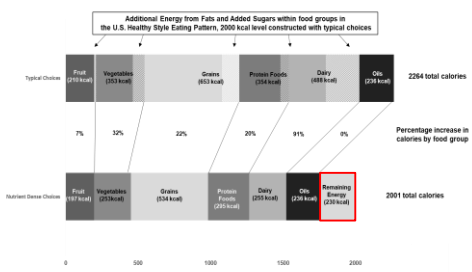
Mean intakes of added sugars (kcal)	222 kcal		
Top 5 sources of added sugars[2]	Sweetened Beverages, Desserts and Sweet Snacks, Candy and Sugars, Breakfast Cereals and Bars, Higher Fat Milk and Yogurt (ages 2-5), Burgers and Sandwiches (ages 6-11)		
Percent contribution to added sugars intake from top 5 sources[2,3]	74-75 percent		
Energy from top 5 sources of added sugars[2,4]	164-167 kcal		
	Per Day Recommended USDA Food Pattern Amounts	Per Day Mean Intakes of USDA Food Pattern Amounts	Modeled Shift in Energy from Added Sugars: USDA Food Pattern Amounts (kcal)
FRUITS (cup eq.)	1	1	n/a
VEGETABLES (cup eq)			
Dark green	0.14	0.1	n/a
Red Orange	0.43	0.1	0.3 (13) ☆
Legumes	0.07	0.1	n/a
Starchy	0.50	0.3	0.2 (38) ☆
Other	0.36	0.2	0.2 (37) ☆
GRAINS[5] (oz eq)	4.0	6.2	n/a
PROTEIN FOODS (oz eq)	3	3.6	n/a
DAIRY (cup eq)	2.5	1.9	0.6 (49) ☆

Redistributing Energy from Top Sources of Added Sugars

The redistribution of energy from food categories with added sugars to under-consumed food groups and nutrients could have a significant positive impact on overall diet quality and nutrient status

Estimating Excess Energy from Added Sugars with Typical vs Nutrient-Dense Choices

If consumers choose to eat the recommended quantities from each food group or subgroup, but do not choose nutrient-dense foods lower in added sugars, total energy will exceed daily needs.



Summary

Positive energy balance is a major public health problem in the US

Added sugars provide energy, often with limited nutrient content

~70% of added sugars are derived from 5 food categories, SSB it the largest contributor

Based on nutrient-dense food choices, added sugars should contribute <6% of energy

Based on customary food choices, added sugars would increase positive energy balance

Redistributing the energy from added sugars as more nutrient dense sources could improve diet quality

Added sugars contribute to food palatability, dietary adherence and quality of life

Frequency of Eating

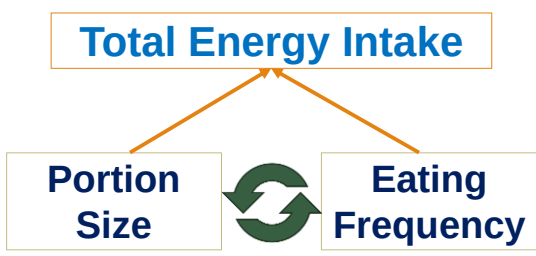
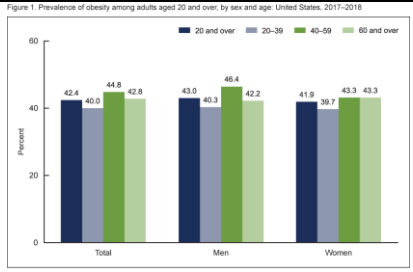


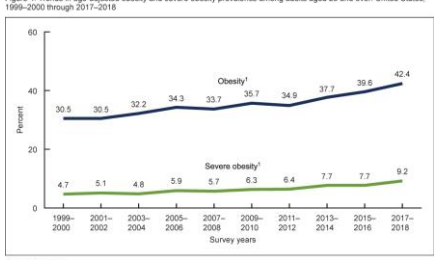
Figure 1. Prevalence of obesity among adults aged 20 and over, by sex and age: United States, 2017–2018



NOTES: Estimates for adults aged 20 and over were age adjusted by the direct method to the 2000 U.S. Census population using the age groups 20–39, 40–59, and 60 and over. Crude estimates are 42.5% for total, 43.0% for men, and 42.1% for women. Access data table for Figure 1 at: https://www.cdc.gov/nchs/data/databriefs/db360_tables-508.pdf#1.
SOURCE: NCHS, National Health and Nutrition Examination Survey, 2017–2018.

Hales et al., NCHS Data Brief No. 360, Feb 2020

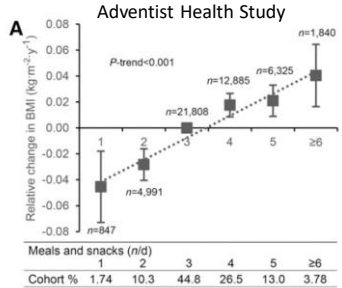
Figure 4. Trends in age-adjusted obesity and severe obesity prevalence among adults aged 20 and over: United States, 1999–2000 through 2017–2018



¹Significant linear trend.
NOTES: Estimates were age adjusted by the direct method to the 2000 U.S. Census population using the age groups 20–39, 40–59, and 60 and over. Access data table for Figure 4 at: https://www.cdc.gov/nchs/data/databriefs/db360_tables-508.pdf#4.
SOURCE: NCHS, National Health and Nutrition Examination Survey, 1999–2018.

Hales et al., NCHS Data Brief No. 360, Feb 2020

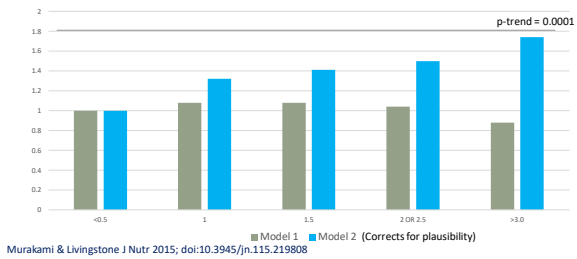
Adventist Health Study



Kahleova et al., J Nutr 2017;147:1722-1728

NHANES 2003-2012

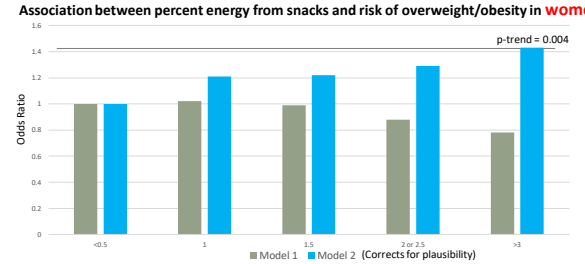
Association between percent energy from snacks and risk of overweight/obesity in men



Murakami & Livingstone J Nutr 2015; doi:10.3945/jn.115.219808

NHANES 2003-2012

Association between percent energy from snacks and risk of overweight/obesity in women



Murakami & Livingstone J Nutr 2015; doi:10.3945/jn.115.219808

Rationale

Eating more or less frequently might influence the types or amounts of foods eaten or alter digestive and metabolic processes. Thus, changes in frequency of eating could lead to changes in a person's health status.

Charge to the Committee (Frequency of Eating)

LIST OF QUESTIONS

1. What is the relationship between the frequency of eating and achieving nutrient and food group recommendations?
2. What is the relationship between the frequency of eating and growth, size, body composition, and risk of overweight and obesity?
3. What is the relationship between the frequency of eating and all-cause mortality?
4. What is the relationship between the frequency of eating and risk of cardiovascular disease?
5. What is the relationship between the frequency of eating and risk of type 2 diabetes?

Rationale

- Should meals and snacks be examined separately?
- Should an eating occasion include instances where no energy is consumed (e.g., water intake or low or no energy beverage intake alone)?
- Should energy, nutrients, or type of food be considered?
- Should caloric beverage intake be considered an eating occasion when occurring alone?
- When does one eating occasion stop and another start?
- What time duration or interval is needed to accurately assess eating frequency?
- Should the time of the eating occasion (e.g., morning or first eating occasion, late night) and/or the time interval between eating occasions (e.g., time-restricted eating, intermittent fasting) be considered?

Definition of Frequency of Eating

The number of daily eating occasions

Eating occasions included (solid food or beverage, including water) that is either energy yielding or non-energy yielding."

Examination of Different Definitions of Snack Frequency and Associations with Weight Status Among U.S. Adults

Sample: NHANES 2013-2016; ≥ 20y/o; N=9,711

Table 1. Snacking definitions.

Abbreviation	Snacking Definition
1. Snacks	Any event defined by the reporter as a "snack"
2. Snacks, ≥50 kcal	Any event defined by the reporter as a "snack" that contributed **≥50 kcal**
3. Snacks + other eating between meals[1]	Any event outside of a typical meal time (i.e. other than breakfast, lunch, dinner, super, brunch)
4. Snacks + other eating between meals, ≥50 kcal[1]	Any event outside of a typical meal time (i.e. other than breakfast, lunch, dinner, super, brunch) that contributed **≥50 kcal**

[1] These definitions include both eating and drinking events that meet these criteria. Described as eating for the purposes of simplicity.

Cowan et al. PLOS One https://doi.org/10.1371/journal.pone.0234355 June 17, 2020

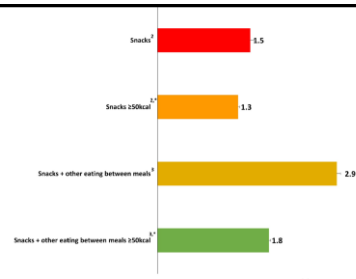
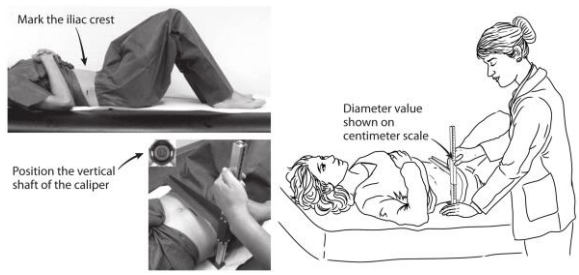


Fig 1. Mean number of snacks per day by snack definition among U.S. Adults (≥20y), NHANES 2013–2016[1,3]. Values are means unless otherwise indicated. An asterisk "*" denotes a snack defined as an event that contributed ≥ 50 kcal. [2] Snack defined as an event defined by the reporter as a "snack." [3] Snack defined as an event outside of a typical mealtime.

Cowan et al. PLOS One https://doi.org/10.1371/journal.pone.0234355 June 17, 2020

Sagittal Abdominal Diameter (SAD)



Kann et al. PLOS One 9(10): e108707 https://doi.org/10.1371/journal.pone.0108707

Table 5. Odds ratio of overweight or obesity (BMI ≥ 25 kg/m^2), Waist Circumference (WC) >102cm, and Sagittal Abdominal Diameter (SAD) >25cm with snacking frequency among U.S. adult women (>20y), NHANES 2013–2016[1,3].

		BMI		WC		SAD	
Daily Occasions	n	OR (95% CI)	P	OR (95% CI)	P	OR (95% CI)	P
Snacks[1]							
0	1047	1.00 (Ref)	-	1.00 (Ref)	-	1.00 (Ref)	-
1	1617	1.03 (0.71, 1.50)	0.85	1.20 (0.86, 1.67)	0.28	1.09 (0.86, 1.39)	0.46
2	1305	0.88 (0.55, 1.40)	0.57	1.00 (0.68, 1.47)	0.99	1.08 (0.82, 1.41)	0.58
3	609	0.76 (0.45, 1.28)	0.29	0.94 (0.63, 1.38)	0.73	0.96 (0.63, 1.48)	0.85
4+	329	0.73 (0.42, 1.27)	0.26	0.92 (0.53, 1.57)	0.74	1.53 (1.05, 2.21)	0.03
Snacks, ≥50 kcal occasions[4,5]							
0	1289	1.00 (Ref)	-	1.00 (Ref)	-	1.00 (Ref)	-
1	1889	0.91 (0.67, 1.23)	0.53	0.94 (0.69, 1.29)	0.70	1.11 (0.83, 1.48)	0.47
2	1160	0.77 (0.48, 1.23)	0.27	0.88 (0.58, 1.33)	0.52	1.05 (0.75, 1.49)	0.76
3	418	0.72 (0.45, 1.16)	0.17	0.92 (0.54, 1.56)	0.74	1.35 (0.83, 2.20)	0.22
4+	151	0.63 (0.35, 1.15)	0.13	0.58 (0.31, 1.08)	0.08	2.05 (1.08, 3.89)	0.03

Cowan et al. PLOS One https://doi.org/10.1371/journal.pone.0234355 June 17, 2020

Question 1. What is the relationship between the frequency of eating and achieving nutrient and food group recommendations?

- Answered using **data analysis**. Data were derived from nationally representative federal datasets (e.g., WWEIA, NHANES).
- On average, the U.S. population reports **5.7 eating occasions per day**, occurring most often at noon or "evening."
- Most of the U.S. population report consuming 3 meals (64 percent of the population) or 2 meals (28 percent of the population) per day.
- 2 to 3 snacking events are reported on average per day.

Question 1. What is the relationship between the frequency of eating and achieving nutrient and food group recommendations?

- Snacking is ubiquitous, occurring in **93 percent of the U.S. population**.
- Snacks provide **22 percent to 23 percent of total energy consumed**
- Late-night eating events often include alcohol intake (in adults), and intakes of added sugars, sodium, and saturated fats in adolescents and adults.
- Snacks alone provide as much as **35 percent of total added sugars among children**.

Questions 2-5

Answered by conducting systematic reviews with support from USDA's Nutrition Evidence Systematic Review (NESR) team. Studies were included if they were published from January 2000 to June 2019. In addition, the Committee applied unique inclusion and exclusion criteria for eating frequency data collection and size of study groups, as follows:

A minimum of 3, 24-hour periods or a questionnaire that covered at least 3 days.

For intervention studies, at least 15 participants for studies using within-subject analyses, or 30 participants for studies using between-subject analysis, or a power calculation included was required

For intervention studies, data collection had to occur on at least 2 occasions, including baseline and during or after the intervention.

Question 2. What is the relationship between the frequency of eating and growth, size, body composition, and risk of overweight and obesity?

This review included 6 studies published between January 2000 and September 2019 that met the inclusion criteria : 1 randomized controlled trial (RCT) and 5 prospective cohort studies (PCSs)

Conclusion: Insufficient evidence is available to determine the relationship between the frequency of eating and growth, size, body composition, and risk of overweight and obesity.

Grade: Grade Not Assignable

Question 3. What is the relationship between the frequency of eating and all-cause mortality?

Conclusion: No evidence is available to determine the relationship between the frequency of eating and all cause mortality.

Grade: Grade Not Assignable.

This review identified 0 studies published between January 2000 and June 2019 that met the inclusion criteria for this systematic review

Question 4. What is the relationship between the frequency of eating and risk of cardiovascular disease?

Conclusion: Insufficient evidence is available to determine the relationship between the frequency of eating and cardiovascular disease.

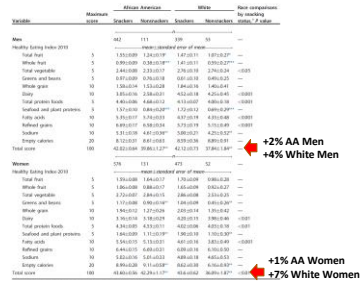
Grade: Grade Not Assignable

Question 5. What is the relationship between the frequency of eating and risk of type 2 diabetes?

Conclusion: Insufficient evidence is available to determine the relationship between the frequency of eating and type 2 diabetes.

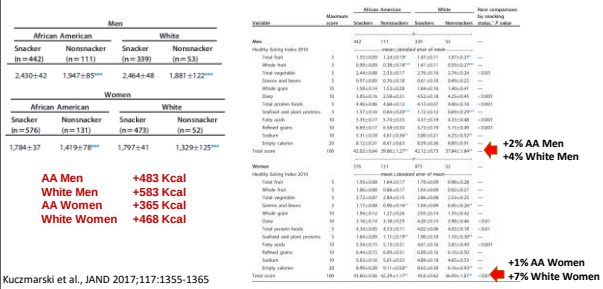
Grade: Grade Not Assignable

Healthy Aging in Neighborhoods of Diversity Across the Lifespan Study (N=2177)



Kuczmarski et al., JAND 2017;117:1355-1365

Healthy Aging in Neighborhoods of Diversity Across the Lifespan Study (N=2177)



Men

African American		White	
Snacker (n=442)	Nonsnacker (n=111)	Snacker (n=339)	Nonsnacker (n=53)
2,430±42	1,947±85***	2,464±48	1,881±122***

Women

African American		White	
Snacker (n=576)	Nonsnacker (n=131)	Snacker (n=473)	Nonsnacker (n=52)
1,784±37	1,419±78***	1,797±41	1,329±125***

AA Men **+483 Kcal**
White Men **+583 Kcal**
AA Women **+365 Kcal**
White Women **+468 Kcal**

Kuczmarski et al., JAND 2017;117:1355-1365

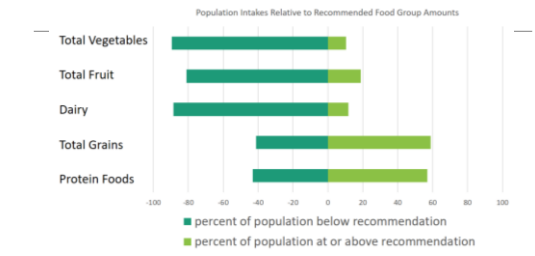
Summary

- Overweight/obesity are prevalent and increasing and stem from positive energy balance
- Snacking is ubiquitous, occurring in 93 percent of the U.S. population.
- 2 to 3 snacking events are reported on average per day.
- Snacks provide 22 percent to 23 percent of total energy consumed
- DGAC - Insufficient evidence is available to determine the relationship between the frequency of eating and growth, size, body composition, and risk of overweight and obesity.
- Nevertheless, snacks are a popular target for management of energy intake
- **Snacks contribute to diet acceptability, quality of life and potentially increased nutrient content**

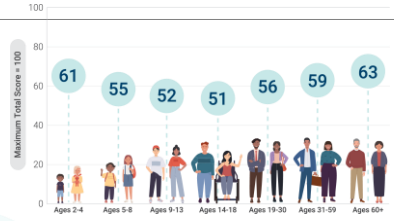
Major Themes

- **Life stage**: Healthy eating is important at each stage of life and has a cumulative effect on health over the lifespan.
- **Dietary patterns**: The core elements of a healthy dietary pattern described in the current Dietary Guidelines remain, with some refinements and more evidence supporting the recommendations.

Percent of Population Below or Above Recommended Food Group Amounts



Most Americans Do Not Follow the *Dietary Guidelines*



NOTE: HEI-2015 total scores are out of 100 possible points. A score of 100 indicates that recommendations on average were met or exceeded. A higher total score indicates a higher quality diet.

Data Source: Analysis of What We Eat in America, NHANES 2015-2016, ages 2 and older, day 1 dietary intake data, weighted.

Example of findings from systematic reviews Committee Findings: Dietary Patterns (Chapter 8, p 39-40)

Table D8.1. Dietary pattern components in the Committee's Conclusion Statements that are associated with the health outcomes of interest.[1a]

Health Outcome of interest	All-cause mortality	Cardiovascular disease[a]	Growth, size, body composition and risk of overweight and obesity[a]	Type 2 diabetes[a]	Bone health[a]	Colorectal Cancer[a]	Breast Cancer (Post-menopausal) [a]	Lung Cancer[a]	Neurocognitive health
Grade:	*Strong (adults)*	*Strong (adults); Limited (children)*	*Moderate (adults); Limited (children)*	*Moderate (adults)*	*Moderate (adults)*	*Moderate (adults)*	*Moderate (adults)*	*Limited (adults)*	*Limited (adults)*
Lower risk of disease: Dietary patterns associated with lower risk of disease consistently included the following components.									
Components									
Fruits	X	X	X	X	X	X	X	X	X
Vegetables	X	X	X	X	X	X	X	X	X
Whole grains/cereal	X	X	X	X	X	X	X	X	
Legumes	X	X	X (adults)		X	X		X	X
Nuts	X	X (adults)			X				X
Low-fat dairy	X	X	X		X	X		X	
Fish and/or seafood	X	X	X (adults)		X	X		X	X
Unsaturated vegetable oils	X	X	X (adults)						X
Lean meat	X					X		X	
Poultry	X								

Example of findings from systematic reviews Committee Findings: Dietary Patterns (Chapter 8)

Table D8.1. Dietary pattern components in the Committee's Conclusion Statements that are associated with the health outcomes of interest.**

Health Outcome of interest	All-cause mortality	Cardiovascular disease[a]	Growth, size, body composition and risk of overweight and obesity[a]	Type 2 diabetes[a]	Bone health[a]	Colorectal Cancer[a]	Breast Cancer (Post-menopausal)[a]	Lung Cancer[a]	Neurocognitive health
Grade:	Strong (adults)	Strong (adults); Limited (children)	Moderate (adults); Limited (children)	Moderate (adults)	Moderate (adults)	Moderate (adults)	Moderate (adults)	Limited (adults)	Limited (adults)
Higher risk of disease: Dietary patterns associated with higher risk of disease consistently included the following components.									
Red meat	X	X (adults)	X (adults)	X		X			
Processed meat	X	X	X	X	X	X			
High-fat meat								X	
High-fat dairy	X			X					
Animal-source foods							X		
Sugar-sweetened beverages and/or foods	X	X	X	X	X	X			
Refined grains	X	X	X	X			X		
Fried potatoes/ French fries and potatoes			X (children)			X			
Added sugars			X (children)						
Sodium		X (adults)	X (adults)						

Example of findings from systematic reviews Committee Findings: Dietary Patterns (Chapter 8)

- Dietary pattern associated with beneficial outcomes: higher intake of vegetables, fruits, legumes, whole grains, low- or non-fat dairy, lean meat and poultry, seafood, nuts and unsaturated vegetable oils, and low consumption of red and processed meats, sugar-sweetened foods and drinks, and refined grains.
- Dietary patterns associated with adverse or detrimental outcomes included higher intake of red and processed meats, sugar-sweetened foods and beverages, and refined grains.

References

2015 DGAC report - https://health.gov/sites/default/files/2019-09/Scientific-Report-of-the-2015-Dietary-Guidelines-Advisory-Committee.pdf

2020 DGAC report - https://www.dietaryguidelines.gov/2020-advisory-committee-report

2020-2025 Dietary Guidelines - https://www.dietaryguidelines.gov/sites/default/files/2020-12/Dietary_Guidelines_for_Americans_2020-2025.pdf

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Questions?

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Formulating Dietary Guideline Recommendations: Eating Frequency and Added Sugars

This webinar covered:

- The process for formulating national dietary recommendations
- The contribution of added sugars and their moderation to meet dietary goals
- The trends in eating frequency and their health implications
- Fundamental dietary patterns identified by the Dietary Guidelines Committee that contribute to positive health outcomes

MBC Bean Academy webinar details

- Continuing Education Credit certificate is available at: https://MichiganBean.com/hp-webinar-mattes/
- A recording of today's webinar will be available to download at: https://MichiganBean.com/hp-webinar-mattes/
- For questions: MBC.BeanAcademy@gmail.com

Next **MBC Bean Academy** Webinar

Building a Foundation for Closing the Dietary Fiber Gap: Improving Gut Health through a Diverse Diet

Henry J. Thompson, PhD
Professor and Director of the Cancer Prevention Laboratory
Colorado State University

Date: April 22, 2021
2-3 pm EDT/1-2 pm CDT/noon MDT
Approved for 1 CPE (Level 2) by the Commission on Dietetic Registration

Michigan Bean Commission

How are we doing?

- Stay on the line for a brief survey about this **MBC Bean Academy** webinar:

Formulating Dietary Guideline Recommendations: Eating Frequency and Added Sugars

Thank you!

Michigan Bean Commission