Chronic Health Conditions and Biomarker Status

2020 Dietary Guidelines Advisory Committee Supplementary Data Analysis

Published date: July 15, 2020

U.S. Department of Agriculture
1400 Independence Avenue SW
Washington, DC 20250

U.S. Department of Health and Human Services
200 Independence Avenue SW
Washington, DC 20201

Data analysis was used by the 2020 Dietary Guidelines Advisory Committee to describe the current health and dietary intakes of Americans. The data analysis team supported the work of the 2020 Dietary Guidelines Advisory Committee by conducting the analyses. The team, which is comprised of Federal scientists with advanced degrees in nutrition, statistics, and epidemiology, included scientists from the following Departments and agencies:

United States Department of Agriculture (USDA)
Center for Nutrition Policy and Promotion; Food and Nutrition Service; Food, Nutrition, and Consumer Services
Agricultural Research Service; Research, Education, and Economics

United States Department of Health and Human Services (HHS)
Office of Disease Prevention and Health Promotion; Office of the Assistant Secretary for Health
National Cancer Institute; National Institutes of Health
National Center for Health Statistics; Centers for Disease Control and Prevention

The results of the data analyses for the 2020 Advisory Committee Project are available at: https://www.dietaryguidelines.gov/2020-advisory-committee-report/data-analysis. Data analyses were used to address topics and supporting scientific questions from USDA and HHS. The results should not be interpreted as dietary guidance. To view the results in the context of the 2020 Advisory Committee's Scientific Report visit: https://www.dietaryguidelines.gov/2020-advisory-committee-report.

Suggested citation for this data supplement: 2020 Dietary Guidelines Advisory Committee and Data Analysis Team. *Data Supplement for Chronic Health Conditions and Biomarker Status*. 2020 Dietary Guidelines Advisory Committee Project. Washington, DC: U.S. Department of Agriculture and U.S. Department of Health and Human Services.

Related citation: Dietary Guidelines Advisory Committee. 2020. *Scientific Report of the 2020 Dietary Guidelines Advisory Committee: Advisory Report to the Secretary of Agriculture and the Secretary of Health and Human Services*. U.S. Department of Agriculture, Agricultural Research Service, Washington, DC.

This data supplement is being published by the USDA. More information about the sources of the analysis is available at the bottom of each table of results. The contents of this document may be used and reprinted without permission. Endorsements by the USDA of derivative products developed from this work may not be stated or implied.

In accordance with Federal civil rights law and USDA civil rights regulations and policies, the USDA, its Agencies, offices, and employees, and institutions participating in or administering USDA programs are prohibited from discriminating based on race, color, national origin, religion, sex, gender identity (including gender expression), sexual orientation, disability, age, marital status, family/parental status, income derived from a public assistance program, political beliefs, or reprisal or retaliation for prior civil rights activity, in any program or activity conducted or funded by USDA (not all bases apply to all programs). Remedies and complaint filing deadlines vary by program or incident.

Persons with disabilities who require alternative means of communication for program information (e.g., Braille, large print, audiotape, American Sign Language, etc.) should contact the responsible Agency or USDA's TARGET Center at (202) 720-2600 (voice and TTY) or contact USDA through the Federal Relay Service at (800) 877-8339.

To file a program discrimination complaint, complete the USDA Program Discrimination Complaint Form, AD-3027, found online at How to File a Program Discrimination Complaint and at any USDA office or write a letter addressed to USDA and provide in the letter all of the information requested in the form. To request a copy of the complaint form, call (866) 632-9992. Submit your completed form or letter to USDA by: (1) mail: U.S. Department of Agriculture, Office of the Assistant Secretary for Civil Rights, 1400 Independence Avenue, SW, Washington, D.C. 20250-9410; (2) fax: (202) 690-7442; or (3) email: program.intake@usda.gov.

USDA is an equal opportunity provider, employer, and lender.

ACKNOWLEDGEMENTS

Data Analysis and Food Pattern Modeling Cross-Cutting Working Group:

- Regan Bailey, PhD, MPH, RD, Purdue University, Working Group Chair
- Jamy Ard, MD, Wake Forest School of Medicine
- Teresa Davis, PhD, Baylor College of Medicine
- Timothy Naimi, MD, MPH, Boston University
- Jamie Stang, PhD, MPH, RD, University of Minnesota
- Barbara Schneeman, PhD, University of California, Davis, Chair of the 2020 Dietary Guidelines Advisory Committee

Data Analysis Team:

- TusaRebecca Pannucci, PhD, MPH, RD, Center for Nutrition Policy and Promotion, Food and Nutrition Service, U.S. Department of Agriculture (USDA), Team Lead
- Jaspreet Ahuja, Methods of Application of Food Composition Laboratory, Agricultural Research Service, USDA
- Joseph Goldman, MA, Food Surveys Research Group, Agricultural Research Service, USDA
- Heather C. Hamner, PhD, MS, MPH, Division of Nutrition, Physical Activity, and Obesity, Centers for Disease Control and Prevention, U.S. Department of Health and Human Services (HHS)
- Kirsten Herrick, PhD, MSc, National Cancer Institute, National Institutes of Health, HHS
- Hazel Hiza, PhD, RD, Center for Nutrition Policy and Promotion, Food and Nutrition Service, USDA
- Kristin Koegel, MBA, RD, Center for Nutrition Policy and Promotion, Food and Nutrition Service, USDA
- Kevin Kuczynski, MS, RD, Center for Nutrition Policy and Promotion, Food and Nutrition Service, USDA
- Alanna Moshfegh, MS, RD, Food Surveys Research Group, Agricultural Research Service, USDA
- Melissa Nickle, MS, Food Surveys Research Group, Agricultural Research Service, USDA
- Lauren O'Conner, PhD, MPH, National Cancer Institute, National Institutes of Health, HHS
- Cynthia Ogden, PhD, MRP, National Center for Health Statistics, Centers for Disease Control and Prevention, HHS
- Jill Reedy, PhD, MPH, RD, National Cancer Institute, National Institutes of Health, HHS
- Donna Rhodes, MS, RD, Food Surveys Research Group, Agricultural Research Service, USDA
- Marissa Shams-White, PhD, MS, MPH, National Cancer Institute, National Institutes of Health, HHS

- Cheyenne Swanson, MS (through February 2020), Panum Group
- Edwina Wambogo, PhD, MPH, RD, Office of Dietary Supplements, National Institutes of Health, HHS

Federal Liaison:

- Kellie O Casavale, PhD, RD, Center for Food Safety and Applied Nutrition, Office of Nutrition and Food Labeling, HHS

Project Leadership:

- Eve Stoody, PhD, Designated Federal Officer and Director, Office of Nutrition Guidance and Analysis, Center for Nutrition Policy and Promotion, Food and Nutrition Service, USDA
- Janet de Jesus, MS, RD, Nutrition Advisor, Office of Disease Prevention and Health Promotion, Office of the Assistant Secretary for Health, HHS

INTRODUCTION

The Data Supplement for Chronic Health Conditions and Biomarker Status includes the results of the data analyses conducted for the 2020 Dietary Guidelines Advisory Committee by the data analysis team. The findings are further summarized within Part D, Chapter 1 of the Scientific Report of the 2020 Dietary Guidelines Advisory Committee, available at: https://www.dietaryguidelines.gov/2020-advisory-committee-report.

The Advisory Committee, with support from Federal staff, developed a protocol, or plan, that described how the scientific questions would be addressed using data analysis. The protocol included an *analytic framework* that described the overall scope and the approach used to answer the question and an *analytic plan* that detailed the data and subsequent analysis to be considered. More information on the data analyses conducted for the 2020 Dietary Guidelines Advisory Committee, including the protocols, is available at: https://www.dietaryguidelines.gov/2020-advisory-committee-report/data-analysis.

The Committee examined a collection of analyses to answer these questions. Key nationally representative, Federal data sources included the National Health and Nutrition Examination Survey (NHANES), the National Health Interview Survey (NHIS), and Surveillance, Epidemiology and End Results (SEER). More information about the data source used in the analysis is included in each report within this data supplement.

The Committee developed conclusion statements for each question answered using data analysis. The conclusion statements describe the state of the science, based on the evidence considered, in order to answer the specific question examined. The conclusion statements are described in the 2020 Dietary Guidelines Advisory Committee's Scientific Report, available at: https://www.dietaryguidelines.gov/2020-advisory-committee-report.

The results of the data analyses for Chronic Health Conditions and Biomarker Status are contained in pages 7-20.

LIST OF TABLES

The Data Analysis Supplement for Chronic Health Conditions and Biomarker Status includes the following tables:

To access the analyses, click the section title(s) above.

Table 1. Prevalence of low high density lipoprotein cholesterol (HDL-C) among youths 12-19 years, by sex, age, race-Hispanic origin, and weight status: United States, 2013-2016

	Sample size[1]	Percent	Standard error	Lower 95% Confidence Interval	Upper 95% Confidence Interval
All					
Age (years)					
12-19	2355	15.5	1.3	12.9	18.4
12-15	1214	14.6	1.5	11.6	18.0
16-19	1141	16.6	1.4	13.8	19.7
Race-Hispanic origin[2]					
Non-Hispanic White	624	17.2	2.2	12.8	22.3
Non-Hispanic Black	525	8.2	1.1	6.0	10.9
Non-Hispanic Asian	235	9.3	1.7	5.9	13.8
Hispanic	834	16.1	1.2	13.6	18.7
Weight status					
Underweight, BMI <5th percentile	73	*	*	*	*
Normal weight, BMI 5th percentile-<85th percentile	1309	8.2	1.3	5.7	11.2
Overweight, BMI 85th-<95th percentile	437	12.9	2.5	8.1	19.0
Obesity, BMI >=95th percentile	510	38.0	2.3	33.3	42.8
Boys					
Age (years)					
12-19	1205	20.3	2.0	16.2	24.8
12-15	649	18.3	2.6	13.2	24.4
16-19	556	22.5	2.4	17.7	28.0
Race-Hispanic origin[2]					
Non-Hispanic White	347	22.8	3.1	16.7	30.0
Non-Hispanic Black	274	10.8	1.9	7.2	15.4
Non-Hispanic Asian	118	8.8	2.4	4.3	15.4
Hispanic	397	19.9	1.8	16.1	24.2
Weight status					
Underweight, BMI <5th percentile	46	*	*	*	*
Normal weight, BMI 5th percentile-<85th percentile	690	11.7	2.1	7.8	16.7
Overweight, BMI 85th-<95th percentile	211	17.9	4.3	9.9	28.6
Obesity, BMI >=95th percentile	254	47.5	3.7	39.8	55.4
Girls					
Age (years)					
12-19	1150	10.3	1.3	7.9	13.2
12-15	565	10.1	1.6	7.0	14.0
16-19	585	10.5	1.5	7.6	14.1
Race-Hispanic origin[2]					
Non-Hispanic White	277	10.8	2.3	6.5	16.5
Non-Hispanic Black	251	5.5	1.1	3.0	9.1
Non-Hispanic Asian	117	9.9	2.2	5.2	16.8
Hispanic	437	12.1	1.5	9.1	15.6
Weight status					
Underweight, BMI <5th percentile	27	*	*	*	*
Normal weight, BMI 5th percentile-<85th percentile	619	4.0	0.7	2.6	5.9
Overweight, BMI 85th-<95th percentile	226	8.2	2.4	4.0	14.4
Obesity, BMI >=95th percentile	256	28.4	3.6	21.3	36.4

Low HDL cholesterol is defined as HDL-C <40 mg/dL.

Weight status is based on body mass index (BMI) percentile cut points from the sex-specific BMI-for-age 2000 CDC Growth Charts.

[1]Number of youths with measured HDL-C.

[2]Non-Hispanic race categories reflect participants reporting only one race; non-Hispanic persons reporting more than one race are included in the total but are not reported separately.

*Estimate does not meet NCHS standards of reliability.

NOTE: Age is age at examination.

Sample size is unweighted; Estimates are weighted using fasting examination sample weights.

SOURCE: NCHS, National Health and Nutrition Examination Survey, 2013-2016.

Table 2. Prevalence of high low-density lipoprotein cholesterol (LDL-C) among youths 12-19 years, by sex, age, race-Hispanic origin, and weight status: United States, 2013-2016

	Sample size[1]	Percent	Standard error	Lower 95% Confidence Interval	Upper 95% Confidence Interval
All	989	5.4	0.9	3.7	7.6
Sex					
Boys	488	5.8	1.3	3.4	9.3
Girls	501	5.0	1.2	2.7	8.2
Age group					
12-15 years	493	6.0	1.5	3.3	10.0
16-19 years	496	4.8	1.1	2.9	7.5
Race-Hispanic origin[2]					
Non-Hispanic White	260	6.9	1.6	4.1	10.9
Non-Hispanic Black	241	*	*	*	*
Non-Hispanic Asian	101	*	*	*	*
Hispanic	339	2.1	0.7	0.8	4.2
Weight status					
Underweight, BMI <5th percentile	23	*	*	*	*
Normal weight, BMI 5th percentile-<85th percentile	564	3.2	1.0	1.5	6.0
Overweight, BMI 85th-<95th percentile	157	*	*	*	*
Obesity, BMI >=95th percentile	235	10.6	2.7	5.7	17.6

High LDL cholesterol is defined as LDL-C >=130 mg/dL.
Weight status is based on body mass index (BMI) percentile cut points from the sex-specific BMI-for-age 2000 CDC Growth Charts.
[1]Number of youths examined in the morning who fasted at least 8 ½ hours but less than 24 hours prior to venipuncture and with calculated LDL-C.
[2]Non-Hispanic race categories reflect participants reporting only one race; non-Hispanic persons reporting more than one race are included in the total but are not reported separately.
*Estimate does not meet NCHS standards of reliability.
NOTE: Age is age at examination.
Sample size is unweighted; Estimates are weighted using fasting examination sample weights.
SOURCE: NCHS, National Health and Nutrition Examination Survey, 2013-2016.

Table 3. Age adjusted prevalence of metabolic syndrome among adults 20 years and over, by sex, age, and race-Hispanic origin: United States, 2013-2016

	Sample size	Percent	Standard error	Lower 95% Confidence Interval	Upper 95% Confidence Interval
All					
Age (years)					
20 and over[1]	4329	34.9	1.1	32.6	37.3
20-39	1371	19.5	1.5	16.4	22.8
40-59	1526	40.7	1.9	36.7	44.8
60 and over	1432	52.2	2.0	48.1	56.3
Race-Hispanic origin[1,2]					
Non-Hispanic White	1714	35.4	1.4	32.4	38.4
Non-Hispanic Black	825	33.7	1.2	30.5	37.0
Non-Hispanic Asian	502	22.7	2.2	18.1	27.9
Hispanic	1164	38.1	1.7	34.5	41.9
Men					
Age (years)					
20 and over[1]	2111	35.5	1.5	32.5	38.6
20-39	682	22.0	2.4	17.3	27.2
40-59	718	42.5	2.4	37.6	47.5
60 and over	711	47.5	2.3	42.7	52.3
Race-Hispanic origin[1,2]					
Non-Hispanic White	857	36.7	2.1	32.4	41.2
Non-Hispanic Black	391	30.6	2.1	26.1	35.5
Non-Hispanic Asian	252	25.5	2.1	20.2	31.4
Hispanic	544	36.7	2.1	32.4	41.3
Women					
Age (years)					
20 and over[1]	2218	34.2	1.5	31.0	37.5
20-39	689	16.8	1.5	14.0	20.1
40-59	808	38.9	3.0	32.9	45.3
60 and over	721	56.2	2.6	50.7	61.7
Race-Hispanic origin[1,2]					
Non-Hispanic White	857	33.9	1.8	30.1	37.9
Non-Hispanic Black	434	35.9	2.1	31.2	40.8
Non-Hispanic Asian	250	20.4	3.0	14.2	27.9
Hispanic	620	39.2	2.4	34.0	44.5

Pregnant females and participants with missing data for one or more measurements were excluded.
Metabolic syndrome is defined as having three or more of the following measurements:

- Abdominal obesity (Waist circumference of 40 inches or 102cm or greater in men, and 35 inches or 88cm or greater in women)
- Triglyceride level of 150 milligrams per deciliter of blood (mg/dL) or greater
- HDL cholesterol of less than 40 mg/dL in men or less than 50 mg/dL in women
- Systolic blood pressure of 130 millimeters of mercury (mm Hg) or greater, or diastolic blood pressure of 85 mm Hg or greater or taking high blood pressure medication.
- Fasting plasma glucose of 100 mg/dL or greater or taking medication to control diabetes (insulin or pills)

Fasting plasma glucose values for 2015-2016 were adjusted for compatibility with 2013-2014 values using the backward regression equation provided in NHANES documentation.

[1]Overall and race-Hispanic origin estimates are age adjusted by the direct method to the 2000 projected US population using age groups: 20-39, 40-59, and 60 years and over.

[2]Non-Hispanic race categories reflect participants reporting only one race; non-Hispanic persons reporting more than one race are included in the total but are not reported separately.

Sample size is unweighted; Estimates are weighted using fasting examination sample weights.
SOURCE: NCHS, National Health and Nutrition Examination Survey, 2013-2016.

Table 4. Age adjusted prevalence of reduced muscle strength among adults 60 years and over, by age, sex, and race-Hispanic origin: United States, 2013-2014

	Sample size	Percent	Standard error	Lower 95% Confidence Interval	Upper 95% Confidence Interval
Age (years)					
60 and over[1]	1610	19.2	1.2	16.7	22.0
60-79	1334	10.9	1.0	8.9	13.1
80 and over	276	48.6	3.6	40.8	56.4
Sex and age					
Males					
60 and over[1]	782	19.0	1.9	14.9	23.5
60-79	642	10.7	1.9	7.0	15.5
80 and over	140	47.1	5.1	35.9	58.4
Females					
60 and over[1]	828	19.4	1.7	15.8	23.4
60-79	692	11.0	1.1	8.8	13.6
80 and over	136	49.7	5.7	37.1	62.4
Race-Hispanic origin[1,2]					
Non-Hispanic White	805	17.9	1.1	15.2	20.8
Non-Hispanic Black	350	18.8	4.3	11.2	28.5
Non-Hispanic Asian	127	31.4	4.0	21.6	42.6
Hispanic	309	30.4	3.1	25.0	36.2

Reduced muscle strength is defined as a value of maximum hand grip strength <32 kg for men or <20 kg for women.
[1]Overall and race-Hispanic origin estimates are age adjusted by the direct method to the 2000 projected US population using age groups: 60-69, 70-79, and 80 years and over.
[2]Non-Hispanic race categories reflect participants reporting only one race; non-Hispanic persons reporting more than one race are included in the total but are not reported separately.
Sample size is unweighted; Estimates are weighted using examination sample weights.
SOURCE: NCHS, National Health and Nutrition Examination Survey, 2013-2014.

Table 5. Prevalence of high serum ferritin concentration (>150 ng/ml) among women aged 12-19 years: United States, 2015-2016

	Sample Size	Percent	Standard Error	Lower 95% Confidence Interval	Upper 95% Confidence Interval
Women 12-19 years	540	0.3	0.2	0	1.3

Sample size is unweighted; Estimates are weighted using examination sample weights.
SOURCE: National Health and Nutrition Examination Survey, 2015-2016

Table 6. Prevalence of high serum ferritin concentration (>150 ng/ml) among women aged 20-49 years: United States, 2015-2016

	Sample Size	Percent	Standard Error	Lower 95% Confidence Interval	Upper 95% Confidence Interval
Women 20-49 years	1,393	4.9	0.6	3.7	6.4

Sample size is unweighted; Estimates are weighted using examination sample weights.
SOURCE: National Health and Nutrition Examination Survey, 2015-2016

Table 7. Prevalence of low serum ferritin concentration (<15 ng/ml) among women aged 12-19 years: United States, 2015-2016

	Sample Size	Percent	Standard Error	Lower 95% Confidence Interval	Upper 95% Confidence Interval
Women 12-19 years	540	20.8	1.9	16.8	25.3

Sample size is unweighted; Estimates are weighted using examination sample weights.
SOURCE: National Health and Nutrition Examination Survey, 2015-2016

Table 8. Prevalence of low serum ferritin concentration (<15 ng/ml) among women aged 20-49 years: United States, 2015-2016

	Sample size	Percent	Standard Error	Lower 95% Confidence Interval	Upper 95% Confidence Interval
Women 20-49 years	1,393	15.9	1.4	12.9	19.2

Sample size is unweighted; Estimates are weighted using examination sample weights.
SOURCE: National Health and Nutrition Examination Survey, 2015-2016

Table 9. Prevalence of low serum ferritin concentration (<12 ng/ml) among children aged 1-5 years: United States, 2015-2016

	Sample Size	Percent	Standard Error	Lower 95% Confidence Interval	Upper 95% Confidence Interval
Children 1-5 years	751	3.8	0.8	2.3	5.8
Sex					
Boys	393	4.5	1.2	2.4	7.7
Girls	358	3.1	0.9	1.4	5.6

Sample size is unweighted; Estimates are weighted using examination sample weights.
SOURCE: National Health and Nutrition Examination Survey, 2015-2016

Table 10. Prevalence of high serum soluble transferrin receptor concentration (> 4.4 mg/L) among women aged 12-49 years, by age: United States, 2015-2016

Age (years)	Sample Size	Percent	Standard Error	Lower 95% Confidence Interval	Upper 95% Confidence Interval
12-19	532	19.6	2.3	14.9	25.1
20-49	1,368	18.5	1.9	14.6	23.1

Sample size is unweighted; Estimates are weighted using examination sample weights.
SOURCE: NCHS, National Health and Nutrition Examination Survey, 2015-2016

Table 11. Prevalence of low red blood cell folate concentration (<95 ng/mL) among adults aged 20 years and over by sex and age: Untied States, 2013-2016

	Sample size	Percent	Standard error	Lower 95% Confidence Interval	Upper 95% Confidence Interval
All	10,512	0.07	0.03	0.02	0.15
Sex					
Males	5,037	0.03	0.02	0.00	0.14
Females	5,475	0.10	0.05	0.03	0.25
Age group (years)					
20-39	3,541	0.01	0.01	0.00	0.13
40-59	3,552	0.08	0.04	0.02	0.24
60 and over	3,419	0.12	0.09	0.01	0.46

Sample size is unweighted; Estimates are weighted using examination sample weights.
SOURCE: National Health and Nurtition Examination Survey, 2013-2016

Table 12. Prevalence of low red blood cell folate concentration (<95 ng/mL) among children aged 1-19 years by sex and age: United States, 2013-2016

	Sample size	Percent	Standard error
All	6,047	0 †	0

† The numerator (number of youth aged 1-19 years with low red blood cell folate concentration) was 0.
Sample size is unweighted; Estimates are weighted using examination sample weights.
SOURCE: National Health and Nurtition Examination Survey, 2013-2016.

Table 13. Prevalence of low serum folate concentration (< 2 ng/mL) among persons aged 1 year and over, by age: United States, 2013-2016

Age (years)	Sample Size	Percent	Standard Error	Lower 95% Confidence Interval	Upper 95% Confidence Interval
1 - 19	5,979	0 †	0	0.00	0.06
20 and over	10,520	0.03	0.02	0.00	0.13

† The numerator (number of youth aged 1-19 years with low serum folate concentration) was 0.
Sample size is unweighted; Estimates are weighted using examination sample weights.
SOURCE: NCHS, National Health and Nutrition Examination Survey, 2013-2016

Table 14. Prevalence of low serum vitamin B12 concentration (<200 pg/mL) among adults aged 19 and over, by sex and age: United States, 2013-2014

Sex and Age (Years)	Sample Size	Percent	Standard Error	Lower 95% Confidence Interval	Upper 95% Confidence Interval
Adults					
19 and over	5,447	1.8	0.3	1.2	2.7
19-39	1,928	1.2	0.2	0.8	1.8
40-59	1,831	1.5	0.4	0.7	2.8
60 and over	1,688	3.2	1.0	1.5	6.0
Men					
19 and over	2,589	1.6	0.4	0.9	2.7
19-39	926	0.4	0.2	0.1	1.2
40-59	859	0.9	0.4	0.2	2.4
60 and over	804	4.6 *	1.4 *	2.1 *	8.6 *
Women					
19 and over	2,858	2.0	0.3	1.3	2.8
19-39	1,002	2.0	0.5	1.1	3.2
40-59	972	2.0	0.7	0.8	4.0
60 and over	884	2.0	0.7	0.8	4.0

* Estimate does not meet NCHS standards of reliability.
Sample size is unweighted; Estimates are weighted using examination sample weights.
SOURCE: National Health and Nutrition Examination Survey, 2013-2014