Part D. Chapter 1: Current Dietary Intakes and Prevalence of Nutrition-Related Chronic Health Conditions

Introduction

Chronic health conditions for which poor nutrition is a risk factor are prevalent in the United States. Conditions such as overweight and obesity, type 2 diabetes, heart disease, metabolic syndrome, and certain cancers present major public health challenges, but have the potential to be prevented or improved with a healthy diet as outlined by the *Dietary Guidelines for Americans, 2020-2025 (Dietary Guidelines)*. Consumption of nutrient-dense foods and beverages is critical for meeting nutrient needs that are essential for health throughout the lifespan, from growth and development during pregnancy and childhood through healthy aging during adulthood. The typical U.S. dietary pattern, however, is not aligned with the *Dietary Guidelines*, and many food groups, nutrients, and dietary components are underconsumed or overconsumed across the total population and/or specific groups by age, sex, and sociodemographic factors.

Evaluation of dietary intake data is complex, but necessary to assess the state of current U.S. diets and inform the starting point for dietary improvements. Social determinants of health, which include economic, environmental, social, educational, and structural factors, play a role in dietary intakes because they impact the ability of individuals and population groups to access healthy foods and achieve nutrition recommendations.[1] Moreover, dietary behaviors and food choices are shaped not by a single social factor, but by the complex interplay of intersecting social identities and the related systems of oppression and discrimination. These intersecting influences collectively impact access to resources, opportunities, and information, ultimately affecting individuals' ability to adopt and maintain healthy dietary patterns. Although federal data sources describe dietary intakes and patterns of defined sociodemographic groups, they do not capture the intersectionality and multidimensionality of the individuals within those groups. Nor do the group-specific intakes and patterns suggest causality (e.g., race and/or ethnicity does not cause the intake of the nutrient or dietary component examined). Additionally, because data are cross-sectional and provide information on dietary intake only at a single point in time, trends in intake over time cannot be determined.[2] Despite the cross-sectional design and complexity and intersectionality of these data, they provide valuable insights in understanding the role of social drivers that impact healthy eating. The Committee recognizes the importance of understanding and acknowledging these complex factors in the development and implementation of the *Dietary Guidelines*.

This chapter presents evidence on current dietary intakes and the prevalence of nutrition-related chronic health conditions in the United States from cross-sectional, nationally representative federal data sources. It also identifies nutrients and dietary components of public health concern, based on a framework developed specifically for that purpose, and identifies nutrients that pose special challenges (which are defined differently than nutrients of public health concern, as this chapter will discuss). The chapter also discusses and synthesizes findings from the data analyses and provides the Committee’s advice to the

Departments, based on the integration of results from the data analyses along with the Committee's systematic reviews and food pattern modeling efforts, for developing the *Dietary Guidelines for Americans, 2025-2030.*

In summary, U.S. dietary intakes of many food groups, nutrients, and dietary components continue to fall short of recommendations. As a result, dietary patterns—among the population as a whole and by each sociodemographic group examined (**Box D.1.1**)—do not align with the *Dietary Guidelines.* This overarching finding and the conclusion statements supporting it are consistent with those of the 2020 Committee.

Box D.1.1: Representation in Data Analysis

This Committee's data analysis work expanded on the life stage approach used by the 2020 Dietary Guidelines Advisory Committee by applying a health equity lens to broaden representation of sociodemographic groups—as defined and captured by the data sources—in the evidence it considered. The Committee carried forward the same variables by which the 2020 Committee evaluated population dietary intakes—age/life stage, sex, race and/or ethnicity, and poverty to income ratio—and expanded that list of variables to analyze dietary and chronic health condition data by household food security category, current household participation in the Supplemental Nutrition Assistance Program (SNAP), and current child participation in the Special Supplemental Nutrition Program for Women, Infants, and Children (WIC). Additional sociodemographic variables were examined in select published analyses when available; these variables included detailed race and/or ethnicity, education, family income, birth in or outside of the United States, health insurance status, disability status, geographic/metropolitan location, body mass index (BMI) status, and diabetes status. Health equity considerations that were applied across the Committee's work, including for data analysis, are further described in **Part C. Methodology.**

List of Questions

1. What are the current patterns of food and beverage intake?
2. What are the current intakes of food groups, nutrients, and dietary components?
3. What is the current prevalence of nutrition-related chronic health conditions?
4. Which nutrients and/or dietary components present a substantial public health concern because of underconsumption or overconsumption?

To access the data analyses examined for these questions, visit: https://www.dietaryguidelines.gov/2025-advisory-committee-report/data-analysis.

Methodology

This section briefly highlights key details of the methodology for the data analyses presented in this chapter. An overview of the data analysis methodology is also provided in **Part C. Methodology,** and detailed methodologies for the 4 data analysis questions are available in the Federal Data Analysis Reports.[3-7]

Food and beverage patterns are broadly described using the Healthy Eating Index (HEI), which provides a score (up to 100) indicating dietary adherence with the overall diet quality recommendations outlined by the *Dietary Guidelines*. All analyses for HEI applied the Markov Chain Monte Carlo method to What We Eat in America (WWEIA), National Health and Nutrition Examination Survey (NHANES) 2011-2018 data, with the exception of the HEI scores for individuals who are pregnant or lactating which used the population ratio method with WWEIA, NHANES 2013-2018 data. Beverage patterns are further described based on intake data for the types, amounts, and frequency of specific beverages. Detailed food pattern information includes evidence of engaging in specific eating occasions (including snacking, late evening consumption, and breakfast); this information is found in **Part D. Chapter 6: Frequency of Meals and/or Snacking** and Data Analysis Supplements.[8-10]

Intakes of food groups (e.g., Vegetables) and subgroups (e.g., Beans, Peas, and Lentils), nutrients (including macronutrients, vitamins, and minerals), and dietary components (i.e., fiber, added sugars, saturated fat) contribute to overall food and beverage patterns. Thus, these intakes are examined on their own, in comparison to recommended amounts, and by the foods and beverages from which they are obtained (e.g., vegetables as a contributor to daily dietary fiber intakes). Recommended amounts are based on the *Dietary Guidelines* and National Academies of Sciences, Engineering, and Medicine's (NASEM) Dietary Reference Intakes (DRIs), which are a set of nutrient reference values that include Estimated Average Requirements (EAR), Adequate Intakes (AI), Chronic Disease Risk Reduction Intakes (CDRR), Tolerable Upper Intake Levels (UL), Acceptable Macronutrient Distribution Ranges (AMDR), and Estimated Energy Requirements (EER).[11-18] (Note: Recommended Dietary Allowances (RDAs) for nutritional adequacy in individuals were not used, as the data analysis approach examined population-level data.)

Nutrients and dietary components of public health concern were identified using a 3-pronged framework that was developed by the 2020 Committee and is described in other publications and in the Data Analysis Reports.[4,5,7,19] The framework considers evidence on dietary intake, biological and clinical indicators, and clinical health consequences measured through validated surrogate measures. Nutrients of public health concern are those that are underconsumed or overconsumed and, if available, have 1) supporting evidence that the inadequacy or excess is directly related to a specific health condition and 2) evidence of risk supported by biological or chemical indicator. Nutrients that pose special challenges are defined as those for which it was difficult to identify at-risk groups or for which dietary guidance to meet recommended intake levels was challenging to develop. Not all nutrients that are underconsumed or overconsumed compared to recommended amounts rise to the level of public health concern or special challenges according to the framework.

Review of the Science

Question 1. What are the current patterns of food and beverage intake?

Approach to Answering Question: Data Analysis

Conclusion Statements

Dietary Patterns

Among individuals ages 1 year and older, dietary intake patterns, as assessed by the Healthy Eating Index-2020 (HEI-2020) and HEI-Toddlers-2020, fail to align with the *Dietary Guidelines for Americans, 2020-2025* in the life stages or sociodemographic groups examined. The mean HEI-2020 score for the total population ages 2 years and older is 56 out of 100. The mean HEI-Toddlers-2020 score for young children ages 12 through 23 months is 63 out of 100.

Beverage Patterns

Among adults and older adults, beverages contribute to daily energy, nutrient, and dietary component intakes, with added sugars, vitamin C, vitamin D, calcium, and magnesium being the top 5 nutrients provided by the totality of daily beverage intake.

Among individuals ages 2 years and older, water is the most consumed beverage, both in mean volume (fluid ounces) and the percent reporting intake at least once in a day. Intakes of water based on 2017-2018 data are significantly higher compared to 2007-2008 data. Older children and adolescents (ages 6 through 11 years and ages 12 through 19 years, respectively) consume a significantly higher volume of water compared to younger children (ages 2 through 5 years), and older adults (ages 60 years and older) consume a significantly lower volume compared to younger adults (ages 20 through 39 years and ages 40 through 59 years).

Based on mean volume consumed, sugar-sweetened beverages, milk, and 100% juice are other top beverages for children and adolescents (ages 2 through 19 years). Alcoholic beverages, coffee and tea, and sugar-sweetened beverages are other top beverages for adults and older adults. Compared to 2007-2008 data, during 2017-2018 a significantly lower percentage of individuals ages 2 years and older consumed sugar-sweetened beverages, milk, and 100% juice in a day. Nonetheless, sugar-sweetened beverages are the top food category contributor to added sugars intake.

Summary of the Evidence

The body of evidence for these conclusion statements includes data on patterns of food and beverage intake from What We Eat in America (WWEIA), National Health and Nutrition Examination Survey (NHANES), National Immunization Survey-Child (NIS-Child), and National Vital Statistics System (NVSS). The evidence is summarized in the following paragraphs by life stage and sociodemographic group. Meaningful differences are described when there is a 5- to 6-point variation between total HEI scores, which constitutes a meaningful difference based on the effect size and standard deviation of the usual distribution.[20] Component scores are described as being close to the maximum score when they fall within

0.1 to 0.2 points of the maximum score, and standard errors are provided in the complete data tables. Full data analysis methods, summaries, and tables are available in the Federal Data Analysis Reports and Data Analysis Supplements.[3,5,21-23]

Dietary Patterns

Infants Birth through Age 11 Months

The Healthy People 2030 target for exclusive human milk feeding through age 6 months is 42 percent and at age 12 months is 54 percent. The prevalence of human milk feeding initiation during birth hospitalization is 84 percent, according to birth certificate estimates of planned feeding by families. Among birth parent racial and/or ethnic groups, initiation of human milk feeding ranges from 75 percent among those who are Black (single-race) to 90 percent among those who are Asian (single-race). However, the overall prevalence of exclusive human milk feeding through age 6 months is 25 percent. When examining data by birth parent age, infant race and/or ethnicity, poverty income ratio, and birth parent education, no sociodemographic groups meet the Healthy People goal through 6 months.

The prevalence of infants receiving any human milk at 12 months is 38 percent, which also falls short of the Healthy People 2030 goal. Among sociodemographic groups for birth parent age, race and/or ethnicity, educational attainment, family income, geographic location, and country of birth, the Healthy People 2030 goal through 12 months is met only by birth parents who are born outside of the United States (62 percent).

Young Children Ages 12 through 23 Months

Dietary intakes among young children ages 12 through 23 months fail to align with the *Dietary Guidelines*, with a mean total HEI-Toddlers-2020 score of 63 out of 100. Of all components, no scores are close to achieving maximum component scores. However, scores for total Fruits (4.6 out of 5) and whole fruits (4.7 out of 5) are approaching that threshold as they fall within 0.5 points of their maximum component scores. When examining total HEI-Toddlers-2020 scores by sex and race and/or ethnicity, meaningful differences in total mean scores are observed between non-Hispanic Asian males (total HEI score: 66) and females (total HEI score: 65) and males of other racial and/or ethnic groups (total HEI score: 60).

Children and Adolescents Ages 2 through 18 Years

Dietary intakes among children and adolescents ages 2 through 18 years fail to align with the *Dietary Guidelines*. The mean total and component HEI-2020 scores vary by age-sex group, with total HEI scores ranging from a low of 48 among males ages 14 through 18 years to a high of 59 among females ages 2 through 4 years. The total HEI score for males ages 2 through 4 years is 58. Among children ages 5 through 8 years, the total HEI-2020 scores are 53 for males and 54 for females. These scores are meaningfully lower than those for ages 2 through 4 years.

Of particular concern are children ages 9 through 13 years and adolescents ages 14 through 18 years. The total HEI-2020 score for ages 9 through 13 years is 50 among males and 52 among females. Among adolescents ages 14 through 18 years, the total HEI-2020 score is 48 for males and 51 for females.

Among children and adolescents ages 2 through 18 years, meaningful differences exist in total mean HEI-2020 scores by race and/or ethnicity. Total scores range from 50 among males of other race and/or ethnicity groups to 57 among males who are non-Hispanic Asian. Total scores range from 51 among females who are non-Hispanic Black to 57 among females who are non-Hispanic Asian. No meaningful differences are present among children by household food security status and poverty to income ratio (PIR).

No sociodemographic groups for children and adolescents meet or are close to meeting the maximum component scores for any HEI components.

Adults and Older Adults Ages 19 Years and Older

Dietary intakes among adults and older adults ages 19 years and older fail to align with the *Dietary Guidelines*. Meaningful differences exist in total HEI-2020 scores across groups for age, race and/or ethnicity, and (for females only) household food security status, and variation is also noted among groups by sex and PIR.

When considered across age-sex groups, total HEI-2020 scores for individuals ages 19 through 30 years are 52 for males and 56 for females. In contrast, the mean total HEI-2020 scores for older adults ages 60 years and older are meaningfully higher (total HEI score: 58 among males and 61 among females). All age groups are close to meeting the maximum component score for total Protein Foods, except for females ages 19 through 30 years.

When considered across racial and/or ethnic and sex groups for adults ages 19 years and older, the mean total HEI-2020 scores are meaningfully higher among non-Hispanic Asian males (total HEI score: 64) and females (total HEI score: 64) than all other groups examined (non-Hispanic White, non-Hispanic Black, Hispanic, other races and/or ethnicities). Non-Hispanic Asian females are 0.3 to 1.0 points away from the maximum scores for whole fruits, greens and beans, and total Vegetables. Several race and/or ethnicity and sex groups have seafood and plant proteins scores within 1.0 point of the maximum component score, including both males and females who are non-Hispanic Asian or Hispanic, and females who are non-Hispanic White, non-Hispanic Black, or other races and/or ethnicities. No racial and/or ethnic groups achieve close to the maximum score for any other component except for total Protein Foods, for which all racial and/or ethnic and sex groups except for non-Hispanic White females are within 0.1 to 0.2 points of the maximum component score.

Meaningful differences in mean total HEI-2020 scores also exist between adult females who are food secure compared to those who are food insecure. Total scores are 60 for females in food secure households and 54 for females in food insecure households.

When considered across PIR and sex groups, mean total HEI-2020 scores ranged from 53 among adult males with a PIR ≤1.85, to 60 among adult females with a PIR >1.85. Males with a PIR >1.85 meet the maximum component score for total Protein Foods, while all other PIR-sex groups are close to achieving the maximum component score. Seafood and plant proteins scores among males and females with PIR >1.85 are also within 1 point of the maximum component score.

Individuals Ages 20 through 44 Years who are Pregnant and Lactating

Dietary intakes for individuals ages 20 through 44 years who are pregnant or lactating fail to align with the *Dietary Guidelines*. The mean total HEI-2020 score is 63 among individuals who are pregnant and 62 among individuals who are lactating, which is meaningfully different than the mean total HEI-2020 score of 53 for females ages 20 through 44 years who are not pregnant, or lactating. Individuals who are pregnant and individuals who are lactating achieve the maximum component score for total Protein Foods, while only individuals who are pregnant achieve the maximum score for whole fruits. They also are within 0.2 to 0.6 points of the maximum scores for seafood and plant proteins and for greens and beans.

Beverage Patterns

Infants Ages 6 through 11 Months

For infants ages 6 through 11 months, mean daily energy intake from beverages is 504 kcal. Most daily energy intake from beverages is contributed by infant formula (375 kcal) and human milk (103 kcal). The contribution from beverages other than human milk or infant formula is small (25 kcal, or 8 percent of total daily energy), and top sources include whole milk, 100% juice, reduced-fat, low-fat, or non-fat milk, and/or sugar-sweetened beverages. Beverage intakes, mostly in the form of sugar-sweetened beverages, contribute 19 percent, or 0.2 teaspoons, of mean daily added sugars for this age group.

Young Children Ages 12 through 23 Months

Beverages contribute 30 percent of mean daily energy intake among young children ages 12 through 23 months, along with certain nutrients and dietary components. Sugar-sweetened beverages provide 3 percent of mean daily energy intake and 24 percent of mean added sugars intake, but do not contribute to nutrient intakes. Whole milk contributes largely to mean daily intakes of energy (17 percent), protein (22 percent), total fat (24 percent), vitamin D (55 percent), calcium (38 percent), and potassium (24 percent). Of all energy contributed from intakes of beverages other than human milk or infant formula, the top sources are whole milk; 100% juice; reduced-fat, low-fat, or non-fat milk; and sugar-sweetened beverages. The Committee notes that infant formula is designed to meet nutritional needs from birth through age 11 months and is not recommended for young children ages 12 through 23 months.[24]

Children and Adolescents Ages 2 through 19 Years

Among children and adolescents, water is the most consumed beverage, based on both the mean volume and the percent reporting consumption at least once in a day. Milk, sugar-sweetened beverages, and 100% juice are top beverage sources of energy intake and beverages contribute 14 percent of mean daily energy intake and 43 percent of mean daily added sugars intake.

The percent contribution from each beverage source shifts across age groups. Milk provides significantly different contributions to daily energy intake from beverages between ages 2 through 5 years (56 percent), ages 6 through 11 years (42 percent), and ages 12 through 19 years (25 percent). Sugar-sweetened beverages have significantly different contributions to daily energy intake from beverages between ages 2 through 5 years (18 percent), ages 6 through 11 years (37 percent), and ages 12 through 19 years (46 percent). Finally, 100% juice contributes 22 percent of energy intake from beverages among

ages 2 through 5 years, 14 percent among ages 6 through 11 years, and 9 percent among ages 12 through 19 years.

Compared to 10 years ago (2017-2018 vs. 2007-2008), a significantly higher percentage consume water (84 percent vs. 74 percent), and a significantly lower percentage consume sweetened beverages (54 percent vs. 66 percent), milk (44 percent vs. 53 percent), and 100% fruit and vegetable juices (26 percent vs. 33 percent) in a day. Additionally, the contribution of beverage intakes to mean daily intakes is significantly lower (in 2017-2018 vs. 2007-2008) for energy (14 percent vs. 19 percent), carbohydrates (21 percent vs. 28 percent), added sugars (43 percent vs. 51 percent), vitamin C (43 percent vs 58 percent), vitamin D (40 percent vs. 53 percent), and calcium (31 percent vs. 37 percent).

Adults and Older Adults Ages 20 Years and Older

Among adults and older adults, water is the most consumed beverage based on both the mean volume and the percent reporting at least once in a day. The daily volume of water consumed is significantly different between ages 20 through 39 years (59 fluid ounces), ages 40 through 59 years (51 fluid ounces), and ages 60 years and older (42 fluid ounces). Beverages other than water contribute 17 percent of mean daily energy intake and 54 percent of mean daily added sugars intake. Sugar-sweetened beverages account for one-third of daily energy from beverages among both males and females. Among adults ages 19 years and older, sugar-sweetened beverages and coffee and tea are two of the top food category sources of added sugars in males (contributing 26.0 percent and 12.7 percent, respectively) and females (contributing 20.6 percent and 14.1 percent, respectively). Females (27 percent) consume a significantly higher amount of beverage energy from coffee and tea compared to males (18 percent). Males consume a significantly higher percent of beverage energy from alcoholic beverages (31 percent) compared to females (22 percent).

Among adults and older adults, compared to 10 years ago (2017-2018 vs. 2007-2008), a significantly higher percentage consume coffee and tea (72 percent vs. 66 percent), and a significantly lower percentage consume diet beverages (11 percent vs. 20 percent), sweetened beverages (42 percent vs. 48 percent), milk (16 percent vs. 23 percent), and 100% fruit and vegetable juices (13 percent vs. 21 percent) in a day. Additionally, the contribution of beverage intakes to mean daily intakes is significantly lower for vitamin C (34 percent vs 44 percent), vitamin D (28 percent vs. 35 percent), and calcium (28 percent vs. 31 percent). No significant difference exists during that time period in contributions to daily intake of added sugars.

Individuals Ages 20 through 44 Years who are Pregnant or Lactating

Shifts occur in the beverage types consumed in a day among individuals ages 20 through 44 years who are pregnant or lactating, compared to females of the same ages who are not pregnant or lactating. For example, during pregnancy, 56 percent consume sugar-sweetened beverages at least once per day, compared to 43 percent during lactation and 46 percent among females who are not pregnant or lactating. During pregnancy, 41 percent of individuals consume coffee or tea at least once per day, compared to 57 percent of individuals during lactation and 63 percent among females who are not pregnant or lactating. Beverages contribute 48 percent of mean daily added sugars intake during pregnancy and 44 percent of

daily added sugars intake during lactation. Many estimates of other beverages consumed by individuals who are pregnant or lactating are less reliable than estimates for other life stages and are not reported here.

Question 2. What are the current intakes of food groups, nutrients, and dietary components?

Approach to Answering Question: Data Analysis

Conclusion Statements

Food Group and Subgroup Intakes

In general, food group and subgroup intakes for individuals ages 1 year and older do not align with *Dietary Guidelines for Americans, 2020-2025* recommendations.

For the majority of individuals ages 1 year and older, intakes of the following food groups and subgroups are generally below *Dietary Guidelines* recommendations (Healthy U.S.-Style Dietary Pattern): total Vegetables (including all subgroups, i.e., Dark-Green Vegetables; Red and Orange Vegetables; Beans, Peas, and Lentils; Starchy Vegetables; Other Vegetables); Fruits; Dairy and Fortified Soy Alternatives; Seafood; Nuts, Seeds, and Soy Products; and Whole Grains.

For the majority of individuals ages 1 year and older, intakes of the following food groups and subgroups are generally at or above *Dietary Guidelines* recommendations (Healthy U.S. Style Dietary Pattern): total Grains; Refined Grains; total Protein Foods; and (for ages 2 years and older) Meat, Poultry, and Eggs.

Many of the top sources of food groups are consumed in forms that are high in nutrients to limit: added sugars, saturated fat, and sodium.

Nutrient and Dietary Component Intakes

Nutrient intakes do not align with recommendations for nutrients and dietary components.

For individuals ages 1 year and older, many nutrients are underconsumed. Many individuals consume below the nutrient intake requirements for dietary protein, dietary fiber, calcium, potassium, magnesium, iron, zinc, copper, phosphorus, vitamin A, thiamin, vitamin B6, folate (dietary folate equivalent [DFE]), vitamin B12, vitamin C, vitamin D, vitamin E, and vitamin K.

Many individuals consume above the nutrient intake recommendations for added sugars, saturated fat, and sodium.

The proportion of individuals who meet or exceed nutrient intake recommendations varies within population groups by age, sex, race and/or ethnicity, and socioeconomic position.

Many of the top food sources of nutrients are consumed in forms with lower nutrient density.

Summary of the Evidence

The body of evidence for these conclusion statements includes data from WWEIA, NHANES. The evidence is summarized in the following paragraphs by life stage and sociodemographic group. Full data

analysis methods, summaries, and tables are available in the Federal Data Analysis Reports and Data Analysis Supplements.[5,6,22,25-58]

Food Group and Subgroup Intakes

Vegetables

The Healthy U.S.-Style Dietary Pattern (HUSS) recommendations for total Vegetables intake (including Beans, Peas, and Lentils) are 1 to 4 cup equivalents (cup eq) per day for individuals ages 2 years and older, depending on energy intake level. Among all individuals ages 1 year and older, mean intake is 1.5 cup eq per day, with 22 percent at or above the recommendations. Most individuals also consume below the recommended amounts for the Vegetables Subgroups: 79 percent are below recommended intakes for Dark-Green Vegetables, 93 percent for Red and Orange Vegetables, 83 percent for Beans, Peas, and Lentils, 86 percent for Starchy Vegetables, and 65 percent for Other Vegetables.

Vegetables intake varies across age-sex and sociodemographic groups. For example, adolescents ages 14 through 18 years have low intake of Vegetables, with 1 to 2 percent at or above the recommendations. Across race and/or ethnicity, 21 percent of non-Hispanic Asian individuals are at or above recommendations for total Vegetables and Dark-Green Vegetables compared to 12 percent of the total population ages 1 year and older. Similarly, 45 percent of Hispanic and/or Latino individuals are at or above the recommendations for Beans, Peas, and Lentils, whereas 17 percent of the total population ages 1 year and older are at or above the recommendations.

Among individuals ages 2 years and older, the top 3 food sources of Vegetables are vegetables (including beans, peas and lentils, excluding starchy vegetables), starchy vegetables, and burgers and sandwiches (including tacos and burritos). Rice, pasta, and other grain-based mixed dishes, and meat, poultry, and seafood mixed dishes also contribute to Vegetable intakes for some groups.

The HUSS recommendations for Vegetables intake (including Beans, Peas, and Lentils) are ⅔ to 1 cup eq per day for young children ages 12 through 23 months. Mean intake is 0.6 cup eq per day, with 38 percent of males and females at or above the recommendations.

Quantitative recommendations for Vegetables do not exist among infants ages 6 through 11 months, and mean intake is 0.4 cup eq per day. Most infants (79 percent) consume Vegetables from complementary foods and beverages daily, including 65 percent consuming Red and Orange Vegetables daily, 41 percent consuming Starchy Vegetables, and 28 percent consuming Other Vegetables. The top food sources of Vegetables among infants are baby food, vegetables, and starchy vegetables.

Vegetable intake is significantly different for 1 age group since 2003-2004. Among adolescents ages 12 through 19 years, mean intake in 2017-2018 is significantly lower (1.0 cup eq per day) compared to 2003-2004 (1.3 cup eq per day).

Fruits

The HUSS recommendations for total Fruits intake are 1.0 to 2.5 cup equivalents (cup eq) per day for individuals ages 2 years and older, depending on energy intake level. Twenty percent of individuals ages 1 year and older are at or above the recommended daily Fruits intake, and the mean intake is 1.0 cup eq per

day. Among individuals ages 2 years and older, approximately half of Fruits intake is from fruit not including 100% juices, followed by top contributions from 100% fruit juice and sugar-sweetened and diet beverages.

Fruits intake varies by age-sex groups, with 50 to 90 percent of individuals ages 1 through 8 years at or above recommendations, compared to 11 to 23 percent of individuals ages 9 years and older.

Fruit juice intake is significantly different in 2017-2018 compared to 2005-2006. Mean intake of 100% fruit juice is significantly lower among children (ages 6 through 11 years), adolescents, and adults compared to intake of fruit juice in 2005-2006.

The HUSS recommendations for Fruits intake are 0.5 to 1.0 cup eq per day for ages 12 through 23 months, and mean Fruits intake is 1.3 cup eq per day for both males and females, with approximately 90 percent at or above the recommendations.

Quantitative recommendations for daily Fruits intake do not exist for infants ages 6 through 11 months, and mean intake is 0.7 cup eq per day. Most infants (84 percent) consume Fruits from complementary foods and beverages daily, including 35 percent consuming 100% fruit juice daily.

Grains

The HUSS recommendations for total Grains intake are 3 to 10 ounce equivalents (oz eq) per day for individuals ages 2 years and older, depending on energy intake level. The mean intake is 6.6 oz eq per day among individuals ages 1 year and older, and 60 percent are at or above the recommendations.

However, the HUSS also recommends that at least 50 percent of Grains be consumed as Whole Grains, and 2 percent of individuals ages 1 year and older are at or above this recommendation. On average, Whole Grains contribute 0.9 oz eq per day to total Grain intake, while 5.7 oz eq of Grains per day are in the form of Refined Grains. Ninety-three percent of individuals ages 1 year and older are at or above the recommendations for Refined Grains.

Among individuals ages 2 years and older, burgers and sandwiches are the top food subcategory contributor of Refined Grains (26 percent for females, 30 percent for males) and the second top contributor of whole grains (21 percent for females and males). The top contributor of Whole Grains is breakfast cereals and bars (37 percent for females, 36 percent for males). Other top contributors of Refined Grains are rice, pasta, and other grain-based mixed dishes, and desserts and sweet snacks.

Among young children ages 12 through 23 months, the HUSS recommendations for total Grains intake are 3 to 4 oz eq per day. Most young children ages 12 through 23 months surpass the recommended intake of Refined Grains, with mean intakes of 2.9 oz eq per day for females and 3.3 oz eq per day for males.

Quantitative recommendations for Grains do not exist for infants ages 6 through 11 months, and mean intake is 0.3 oz eq per day. Most infants (79 percent) report consumption of Refined Grains and 60 percent report consumption of Whole Grains daily from complementary foods and beverages.

Whole Grains intake is significantly different for 2 age groups in 2017-2018 compared to 2003-2004. For adolescents ages 12 through 19 years, Whole Grain intake is significantly higher (0.8 oz eq per day)

compared to 2003-2004 (0.4 oz eq per day). For adults ages 20 years and older, Whole Grain intake is also significantly higher (0.8 oz eq per day) compared to 2003-2004 (0.6 oz eq per day). Both age groups have significantly lower intakes of Refined Grains compared to 2003-2004.

Dairy and Fortified Soy Alternatives

The HUSS recommendations for Dairy and Fortified Soy Alternatives intake are 2 to 3 cup eq per day for individuals ages 2 years and older, depending on energy intake level. Among all individuals ages 1 year and older, mean intake of Dairy and Fortified Soy Alternatives is 1.7 cup eq per day, with 12 percent at or above the recommendations. Mean intake of milk is 0.8 cup eq per day, of cheese is 0.8 cup eq per day, and of yogurt is 0.1 cup eq per day.

Intake of Dairy and Fortified Soy Alternatives varies across age-sex and sociodemographic groups. For example, 6 percent of adolescent females ages 14 through 18 years have intakes at or above recommendations, while 24 percent of males ages 14 through 18 years are at or above recommendations. Data also show that at least 21 percent of individuals ages 1 through 13 years are at or above recommendations, and 15 percent or less of individuals ages 19 and older are at or above recommendations. Across race and/or ethnicity, 4 percent of non-Hispanic Black individuals and 6 percent of non-Hispanic Asian individuals are at or above the recommendations for Dairy and Fortified Soy Alternatives.

Among individuals ages 2 years and older the top food subcategories contributing to Dairy and Fortified Soy Alternatives include burgers and sandwiches (16 percent for females, 22 percent for males), higher-fat milk/yogurt (12 percent for females, 13 percent for males), and breakfast cereals and bars (12 percent for females, 11 percent for males). Cheese and lower-fat milk/yogurt each contribute to approximately 5 percent of Dairy and Fortified Soy Alternatives intake.

The HUSS recommendations for Dairy and Fortified Soy Alternatives intake for young children ages 12 through 23 months are ⅔ to 2 cup eq per day. The mean intake for young children is 2.2 cup eq per day for males and 2.0 cup eq per day for females, with 70 percent and 62 percent at or above recommendations, respectively. Nearly all young children ages 12 through 23 months (98 percent) consume Dairy and Fortified Soy Alternatives at least daily, with 96 percent consuming daily fluid milk and fortified soymilk, 68 percent consuming cheese, and 24 percent consuming yogurt.

Quantitative recommendations for Dairy and Fortified Soy Alternatives do not exist for infants ages 6 through 11 months and mean intake is 0.4 cup eq per day for males and 0.3 cup eq per day for females. About half (46 percent) of infants consume Dairy and Fortified Soy Alternatives daily from complementary foods and beverages.

Dairy and Fortified Soy Alternatives intake is significantly different for 2 age groups in 2017-2018 compared to 2003-2004. Mean intake in 2017-2018 is significantly lower compared to 2003-2004 among adolescents ages 12 through 19 years (1.7 cup eq per day vs. 2.2 cup eq per day) and adults ages 20 years and older (1.5 cup eq per day vs. 1.6 cup eq per day).

Protein Foods

The HUSS recommendations for Protein Foods intake are 2 to 7 oz eq per day for individuals ages 2 years and older, depending on energy intake level. Among all individuals ages 1 year and older, mean intake of Protein Foods is 5.7 oz eq per day, with 57 percent at or above the recommended level. Across age-sex groups, however, the proportion of individuals meeting recommended intakes varies. For example, 78 percent of females ages 14 through 18 years do not meet recommended daily protein intakes, while more than half of adult males consume at or above the recommended intakes.

Intake of Protein Foods varies by subgroups. For individuals ages 1 year and older, mean intake of Meat, Poultry and Eggs is 4.4 oz eq per day and 70 percent of individuals ages 2 years and older have intake at or above the weekly recommendations. Across all age groups starting at age 2 years, the percentage of females who have intakes of Meat, Poultry, and Eggs at or above the recommendations ranges from 46 percent to 77 percent, and for males, intakes range from 62 percent to 86 percent at or above the recommendations. Among non-Hispanic Asian individuals, 56 percent are at or above the recommendations for Meat, Poultry, and Eggs, while at least 68 percent of other race and/or ethnicity groups are at or above the recommendations.

Mean intake of Seafood is 0.5 oz eq per day for individuals ages 1 year and older and 89 percent have intakes below the weekly recommendations. Ten percent to 21 percent of adults ages 31 years and older have intakes at or above the recommendations while 10 percent or less of individuals ages 1 through 30 years have intakes at or above the recommendations. Additionally, 34 percent of non-Hispanic Asian individuals are at or above the recommendations for Seafood compared to 11 percent of the total population ages 1 year and older.

Mean intake of Nuts, Seeds, and Soy Products is 0.8 oz eq per day for individuals ages 1 year and older, and 60 percent have intakes below the weekly recommendations. Intake varies across sociodemographic groups. For example, 49 percent of individuals with a PIR >1.85 are at or above recommendations for Nuts, Seeds, and Soy Products compared to 28 percent of those with a PIR ≤1.85.

Among individuals ages 2 years and older, the top 3 food subcategory sources of Protein Foods for most sociodemographic groups are burgers and sandwiches (including tacos and burritos) (27 percent for females, 32 percent for males); meat, poultry, and seafood mixed dishes (15 percent for females, 13 percent for males); and poultry (not including deli and mixed dishes) (12 percent for females and males). Nuts, seeds, and soy contribute 4 to 5 percent of Protein Foods intakes, and deli/cured products contribute to approximately 4 percent.

The HUSS recommendations for Protein Foods are 2 oz eq per day for young children ages 12 through 23 months, and mean intake is 2.5 oz eq per day for males and 2.3 oz eq per day for females. Sixty-four percent of males and 53 percent of females are at or above the recommendations. Almost all young children in this age group consume Protein Foods daily.

Quantitative recommendations for Protein Foods do not exist for infants ages 6 through 11 months, and mean intakes are 0.6 oz eq per day for males and 0.5 oz eq per day for females. About half (48 percent) of infants consume Protein Foods daily.

Oils

The HUSS recommendations for Oils are 15 to 51 g per day of Oils for individuals ages 2 years and older, and mean intake is 26.5 g per day, with 54 percent of individuals at or above the recommendations.

Among ages 2 years and older, the top 3 food subcategory sources of Oils for most sociodemographic groups are burgers and sandwiches (including tacos and burritos); chips, crackers, and savory snacks; and vegetables (both starchy and non-starchy).

The HUSS recommendations for Oils are 9 to 13 g per day for young children ages 12 through 23 months, and mean intakes are 12.2 g per day for males and 11.7 g per day for females, with 71 percent and 67 percent at or above the recommendations, respectively.

Quantitative recommendations for Oils do not exist for infants ages 6 through 11 months, and mean intakes are 2.3 g per day for males and 2.2 g per day for females. About half of infants (56 percent) consume Oils from complementary foods and beverages daily.

Nutrient and Dietary Component Intakes

Based on dietary intake data, the following nutrients are *underconsumed* (5 percent or more below the EAR or 5 percent or less above the AI) by individuals ages 1 year and older and/or by some age-sex groups, but do not rise to the level of a nutrient of public health concern or special challenge:

- Dietary protein, vitamin A, thiamin (vitamin B1), riboflavin (vitamin B2),[a] niacin (vitamin B3),[b] vitamin B6, folate,[c] vitamin B12, vitamin C, vitamin E, copper, iron, magnesium, phosphorous, zinc, vitamin K, iodine

The following nutrients are *overconsumed* (i.e., intakes that exceed the UL) by some age-sex groups ages 1 year and older, but do not rise to the level of a nutrient of public health concern or special challenge:

- Children ages 1 through 3 years (compared to the UL): copper,[d] retinol, zinc, selenium
- Males ages 4 through 8 years (compared to the UL): zinc

Intakes of nutrients and dietary components from foods and beverages and comparisons to DRI recommendations are summarized in the following paragraphs.[11-13,15-18,59] Data on the designation of nutrients of public health concern are found with the evidence for Question 4 in this chapter.

For infants ages 6 through 11 months, most nutrients rely on an AI to determine adequacy, which is largely based on human milk composition. Due to the lack of current and accurate data on human milk volume and composition, this Committee assessed adequacy by comparing data on mean intakes from

[a]Riboflavin is underconsumed by males and females ages 14 through 30 years, males ages 51 years and older, and females ages 71 years and older.
[b]Niacin is underconsumed by females ages 14 through 18 years.
[c]Folate rises to the level of a nutrient of public health concern for individuals who are pregnant during the first trimester.
[d]Copper is overconsumed by males, according to available data. Estimates are unreliable for females.

complementary foods and beverages (CFB) (not intakes from milk) compared to the proportion of the AI contribution from CFB (not the total AI). In many cases, the value for the AI contribution from CFB is set by extrapolating up from the AI for infants ages 0 through 6 months, extrapolating down from adult requirements, or a combination of both. For example, mean intakes of calcium from CFB (234 mg per day) were compared to the proportion of the AI contribution from CFB (140 mg per day), which was calculated by using the estimated content of 0.6 L of human milk and adding the amount provided by solid foods. When nutrients have an EAR for infants, data on the percent consuming below the EAR are reported.

For individuals ages 1 year and older, nutrient intake is reported by comparing intakes to DRI recommendations. Data on top food subcategory sources of nutrient and dietary component intake across sociodemographic groups are also summarized. Some of the food category sources are not notable contributors to the nutrients themselves, but the preparation and/or production method of these foods allows them to be top contributors. Notably, baby food is the top contributor to all nutrients for infants ages 6 through 11 months and is not included in the top food category source data below.

Calcium

Dietary intakes of calcium are described in **Table D.1.1** for infants ages 6 through 11 months and **Table D.1.2** for individuals ages 1 year and older.

TABLE D.1.1
MEAN INTAKES OF CALCIUM FROM COMPLEMENTARY FOODS AND BEVERAGES (CFB) AMONG INFANTS AGES 6 THROUGH 11 MONTHS BY INFANT MILK REPORTING STATUS

Adequate Intake (AI)		Mean Intakes		
AI for Calcium, Ages 7-12 Months (mg/day)[a]	**AI Contribution from CFB, Ages 7-12 Months (mg/day)**	**All Infants (mg/day)**	**Infants Exclusively Human Milk-Fed (mg/day)**	**Infants Fed Any Volume of Formula (mg/day)**
260	140	234	152	254

[a]The AI for infants ages 0 through 6 months is 200 milligrams per day.

mg/day = milligrams per day

TABLE D.1.2
PERCENT OF THE POPULATION AGES 1 YEAR AND OLDER BELOW THE ESTIMATED AVERAGE REQUIREMENT (EAR) FOR CALCIUM BY AGE-SEX GROUP

	Percent Below the EAR	
Age (Years)	**All**	
1+	46	
	Males	**Females**
1-3	<3	*
4-8	22	37

	Percent Below the EAR	
Age (Years)	**Males**	**Females**
9-13	62	68
14-18	56	86
19-30	29	46
31-50	23	42
51-70	27	76
71+	58	82

*Estimate may be less reliable due to small sample size and/or large relative standard error.

Food Subcategory Sources of Calcium

Among infants ages 6 through 11 months of age, across the sociodemographic groups examined, top food subcategory contributors to daily calcium intake include higher-fat milk and yogurt (i.e., whole-fat and reduced-fat); cheese; rice, pasta, and other grain-based mixed dishes; breakfast cereals and bars; and waters.

Among young children ages 12 through 23 months, across sociodemographic groups examined, top food subcategory contributors to daily calcium intake include higher-fat milk and yogurt (i.e., whole-fat and reduced-fat); breakfast cereals and bars; lower-fat milk and yogurt (i.e., low-fat and fat-free); burgers and sandwiches (including tacos and burritos); rice, pasta, and other grain-based mixed dishes; and vegetables (including beans and peas, not starchy).

Among individuals ages 2 years and older, across the sociodemographic groups examined, the top food subcategory sources of calcium include burgers and sandwiches (including tacos and burritos); waters; higher-fat milk and yogurt (i.e., whole-fat and reduced-fat); and breakfast cereals and bars.

Vitamin D

Dietary intakes of vitamin D are described in **Table D.1.3** for infants ages 6 through 11 months and **Table D.1.4** for individuals ages 1 year and older.

TABLE D.1.3
MEAN INTAKES OF VITAMIN D FROM COMPLEMENTARY FOODS AND BEVERAGES (CFB) AMONG INFANTS AGES 6 THROUGH 11 MONTHS BY INFANT MILK REPORTING STATUS

Adequate Intake (AI)		Mean Intakes		
AI for Vitamin D, Ages 0-12 Months (IU)	**AI Contribution from CFB, Ages 7-12 Months (IU)**	**All Infants (IU)**	**Infants Exclusively Human Milk-Fed (IU)**	**Infants Fed Any Volume of Formula (IU)**
400	400	46	24.4	51.2

IU = international units

TABLE D.1.4
PERCENT OF THE POPULATION AGES 1 YEAR AND OLDER BELOW THE ESTIMATED AVERAGE REQUIREMENT (EAR) FOR VITAMIN D BY AGE-SEX GROUP

	Percent Below the EAR	
Age (Years)	**All**	
1+	96	
	Males	**Females**
1-3	95	*
4-8	*	>97
9-13	92	95
14-18	95	>97
19-30	97	>97
31-50	95	>97
51-70	93	>97
71+	89	>97

*Estimate may be less reliable due to small sample size and/or large relative standard error.

Food Subcategory Sources of Vitamin D

Among infants ages 6 through 11 months, across the sociodemographic groups examined, the top food subcategory sources of vitamin D include higher-fat milk and yogurt (i.e., whole-fat and reduced-fat); breakfast cereals and bars; and eggs.

Among young children ages 12 through 23 months, across sociodemographic groups examined, the top food subcategory sources of vitamin D include higher-fat milk and yogurt (i.e., whole-fat and reduced-fat); breakfast cereals and bars; lower-fat milk and yogurt (i.e., fat-free and low-fat); and eggs.

Among individuals ages 2 years and older, across sociodemographic groups examined, the top food subcategory sources of vitamin D include burgers and sandwiches (including tacos and burritos); breakfast cereals and bars, higher-fat milk and yogurt (i.e., whole-fat and reduced-fat); coffee and tea; and eggs.

Potassium

Dietary intakes of potassium are described in **Table D.1.5** for infants ages 6 through 11 months and **Table D.1.6** for individuals ages 1 year and older.

TABLE D.1.5
MEAN INTAKES OF POTASSIUM FROM COMPLEMENTARY FOODS AND BEVERAGES (CFB) AMONG INFANTS AGES 6 THROUGH 11 MONTHS BY INFANT MILK REPORTING STATUS

Adequate Intake (AI)		Mean Intakes		
AI for Potassium, Ages 7-12 Months (mg/day)[a]	**AI Contribution from CFB, Ages 7-12 Months (mg/day)**	**All Infants (mg/day)**	**Infants Exclusively Human Milk-Fed (mg/day)**	**Infants Fed Any Volume of Formula (mg/day)**
860	600	565	430	598

[a]The AI for infants ages 0 through 6 months is 400 milligrams per day.

mg/day = milligrams per day

TABLE D.1.6
PERCENT OF THE POPULATION AGES 1 YEAR AND OLDER ABOVE THE ADEQUATE INTAKE (AI) FOR POTASSIUM BY AGE-SEX GROUP

	Percent Above the AI	
Age (Years)	**All**	
1+	28	
	Males	**Females**
1-3	43	38
4-8	31	20
9-13	25	36
14-18	16	17
19-30	14	23
31-50	29	29
51-70	32	35
71+	31	31

Food Subcategory Sources of Potassium

Among infants ages 6 through 11 months, across sociodemographic groups examined, the top food subcategory sources of potassium include fruit (non-juice); vegetables (including beans and peas, not starchy); starchy vegetables; 100% fruit juice; soups; and higher-fat milk and yogurt (i.e., whole-fat and reduced-fat).

Among young children ages 12 through 23 months, across sociodemographic groups examined, the top food subcategory sources of potassium include higher-fat milk and yogurt (i.e., whole-fat and reduced-fat); fruit (non-juice); 100% juice; breakfast cereals and bars; and baby food.

Among individuals ages 2 years and older, across sociodemographic groups examined, the top food subcategory sources of potassium include burgers and sandwiches; coffee and tea; vegetables (including beans and peas, not starchy); meat, poultry, and seafood mixed dishes; starchy vegetables; and rice, pasta, and other grain-based mixed dishes.

Dietary Fiber

Dietary intakes of dietary fiber are described in **Table D.1.7** for infants ages 6 through 11 months and **Table D.1.8** for individuals ages 1 year and older.

TABLE D.1.7
MEAN INTAKES OF DIETARY FIBER FROM COMPLEMENTARY FOODS AND BEVERAGES (CFB) AMONG INFANTS AGES 6 THROUGH 11 MONTHS BY INFANT MILK REPORTING STATUS

Mean Intake		
All Infants (mg/day)	**Infants Exclusively Human Milk-Fed (mg/day)**	**Infants Fed Any Volume of Formula (mg/day)**
4.6	4.0	4.7

mg/day = milligrams per day

TABLE D.1.8
PERCENT OF THE POPULATION AGES 1 YEAR AND OLDER ABOVE THE ADEQUATE INTAKE (AI) FOR DIETARY FIBER BY AGE-SEX GROUP

	Percent Above the AI	
Age (Years)	**All**	
1+	6	
	Males	**Females**
1-3	*	*
4-8	<3	<3
9-13	<3	*
14-18	<3	<3
19-30	<3	5
31-50	<3	6

	Percent Above the AI	
Age (Years)	**Males**	**Females**
51-70	7	17
71+	8	16

*Estimate may be less reliable due to small sample size and/or large relative standard error.

Food Subcategory Sources of Dietary Fiber

Among infants ages 6 through 11 months, across sociodemographic groups examined, top food subcategory contributors to daily dietary fiber intake include fruit (non-juice); vegetables (including beans and peas, not starchy); and rice, pasta, and other grain-based mixed dishes.

Among young children ages 12 through 23 months, across sociodemographic categories examined, top food subcategory contributors to daily dietary fiber intake include fruit (non-juice); breakfast cereals and bars; burgers and sandwiches (including tacos and burritos); rice, pasta, and other grain-based mixed dishes; and vegetables (including beans and peas, not starchy).

Among individuals ages 2 years and older, across all sociodemographic groups examined, top food subcategory sources of dietary fiber are burgers and sandwiches (including tacos and burritos); vegetables (including beans and peas, not starchy); fruit (non-juice); rice, pasta, and other grain-based mixed dishes; and breakfast cereals and bars.

Sodium

Dietary intakes of sodium are described in **Table D.1.9** for infants ages 6 through 11 months and **Table D.1.10** for individuals ages 1 year and older.

TABLE D.1.9
MEAN INTAKES OF SODIUM FROM COMPLEMENTARY FOODS AND BEVERAGES (CFB) AMONG INFANTS AGES 6 THROUGH 11 MONTHS BY INFANT MILK REPORTING STATUS

Adequate Intake (AI)		Mean Intakes		
AI for Sodium, Ages 7-12 Months (mg/day)[a]	**AI Contribution from CFB, Ages 7-12 Months (mg/day)**	**All Infants (mg/day)**	**Infants Exclusively Human Milk-Fed (mg/day)**	**Infants Fed Any Volume of Formula (mg/day)**
370	300	320	230	341

[a]The AI for infants ages 0 through 6 months is 110 milligrams per day.

mg/day = milligrams per day

TABLE D.1.10
PERCENT OF THE POPULATION AGES 1 YEAR AND OLDER ABOVE THE CHRONIC DISEASE RISK REDUCTION INTAKE (CDRR) FOR SODIUM BY AGE-SEX GROUP

	Percent Above the CDRR	
Age (Years)	**All**	
1+	89	
	Males	**Females**
1-3	*	92
4-8	>97	96
9-13	>97	*
14-18	*	72
19-30	>97	86
31-50	>97	81
51-70	97	77
71+	92	69

*Estimate may be less reliable due to small sample size and/or large relative standard error.

Food Subcategory Sources of Sodium

Among infants ages 6 through 11 months, across sociodemographic groups examined, top food subcategory contributors to daily sodium intake include vegetables (including beans and peas, not starchy); rice, pasta, and other grain-based mixed dishes; soups; starchy vegetables; chips, crackers, and savory snacks; and higher-fat milk/yogurt.

Among young children ages 12 through 23 months, across sociodemographic groups examined, top food subcategory sources of sodium include burgers and sandwiches (including tacos and burritos); rice, pasta, and other grain-based mixed dishes; higher-fat milk/yogurt; poultry (not including deli and mixed dishes); and chips, crackers, and savory snacks.

Among individuals ages 2 years and older, across sociodemographic groups examined, top food subcategory sources of sodium include burgers and sandwiches; rice, pasta, and other grain-based mixed dishes; and meat, poultry, and seafood mixed dishes.

Saturated Fat

Dietary intakes of saturated fat are described in **Table D.1.11** for infants ages 6 through 11 months and **Table D.1.12** for individuals ages 1 year and older.

TABLE D.1.11
MEAN INTAKES OF SATURATED FAT FROM COMPLEMENTARY FOODS AND BEVERAGES (CFB) AMONG INFANTS AGES 6 THROUGH 11 MONTHS BY INFANT MILK REPORTING STATUS

Mean Intake		
All Infants (g/day)	**Infants Exclusively Human Milk-Fed (g/day)**	**Infants Fed Any Volume of Formula (g/day)**
2.6	1.6	2.9

g/day = grams per day

TABLE D.1.12
PERCENT OF THE POPULATION AGES 1 YEAR AND OLDER EXCEEDING LIMITS FOR SATURATED FAT INTAKE BY AGE-SEX GROUP

	Percent Exceeding Limits[a]	
Age (Years)	**All**	
1+	82	
	Males	**Females**
1-3	87	87
4-8	88	84
9-13	89	91
14-18	90	88
19-30	73	83
31-50	77	81
51-70	76	85
71+	82	86

[a]Less than or equal to 10% of daily energy intake, as recommended in the *Dietary Guidelines for Americans, 2020-2025.*

Food Subcategory Sources of Saturated Fat

No data on food category sources of saturated fat for infants ages 6 through 11 months or young children ages 12 through 23 months were available to the Committee.

Among individuals ages 2 years and older, across the sociodemographic groups examined, the top food subcategory sources of saturated fat include burgers and sandwiches; desserts and sweet snacks; rice, pasta, and other grain-based mixed dishes; and meat, poultry, and seafood mixed dishes.

Added Sugars

Dietary intakes of added sugars are described in **Table D.1.13** for infants ages 6 through 11 months and **Table D.1.14** for individuals ages 1 year and older.

TABLE D.1.13
MEAN INTAKES OF ADDED SUGARS FROM COMPLEMENTARY FOODS AND BEVERAGES AMONG INFANTS AGES 6 THROUGH 11 MONTHS BY INFANT MILK REPORTING STATUS

Mean Intakes		
All Infants (tsp eq/day)	**Infants Exclusively Human Milk-Fed (tsp eq/day)**	**Infants Fed Any Volume of Formula (tsp eq/day)**
1.0	0.8	1.0

tsp eq/day = teaspoon equivalents per day

TABLE D.1.14
PERCENT OF THE POPULATION AGES 1 YEAR AND OLDER EXCEEDING LIMITS FOR ADDED SUGARS INTAKE BY AGE-SEX GROUP

	Percent Exceeding Limits[a]	
Age (Years)	**All**	
2+	66	
	Males	**Females**
2-4	66	62
5-8	85	81
9-13	82	82
14-18	74	77
19-30	64	66
31-50	63	66
51-59	60	62
60+	57	58
71+	57	59

[a]Less than or equal to 10% of daily energy intake, as recommended in the *Dietary Guidelines for Americans, 2020-2025.*

Food Subcategory Sources of Added Sugars

Among infants ages 6 through 11 months, across sociodemographic groups examined, top food subcategory sources of added sugars are baby food; desserts and sweet snacks; breakfast cereals and bars; and sugar-sweetened and diet beverages.

Among young children ages 12 through 23 months, across sociodemographic groups examined, top food subcategory sources of added sugars are desserts and sweet snacks; breakfast cereals and bars; sugar-sweetened and diet beverages; and higher-fat milk/yogurt.

Among individuals ages 1 year and older, across sociodemographic groups examined, top food subcategory sources of added sugars are sugar-sweetened and diet beverages; desserts and sweet snacks; and coffee and tea.

Folate (as Dietary Folate Equivalents [DFE])

Dietary intakes of folate as DFE are described in **Table D.1.15** for infants ages 6 through 11 months and **Table D.1.16** for individuals ages 1 year and older.

TABLE D.1.15
MEAN INTAKES OF FOLATE AS DIETARY FOLATE EQUIVALENTS (DFE) FROM COMPLEMENTARY FOODS AND BEVERAGES (CFB) AMONG INFANTS AGES 6 THROUGH 11 MONTHS BY INFANT MILK REPORTING STATUS

Adequate Intake (AI)		Mean Intakes		
AI for Folate as DFE, Ages 7-12 Months (µg/day)[a]	**AI Contribution from CFB, Ages 7-12 Months (µg/day)**	**All Infants (µg/day)**	**Infants Exclusively Human Milk-Fed (µg/day)**	**Infants Fed Any Volume of Formula (µg/day)**
80	29	90	66	96

[a]The AI for infants ages 0 through 6 months is 65 micrograms per day.

µg/day = micrograms per day

TABLE D.1.16
PERCENT OF THE POPULATION AGES 1 YEAR AND OLDER BELOW THE ESTIMATED AVERAGE REQUIREMENT (EAR) FOR FOLATE AS DIETARY FOLATE EQUIVALENTS (DFE) BY AGE-SEX GROUP

	Percent Below the EAR	
Age (Years)	**All**	
1+	16	
	Males	**Females**
1-3	<3	<3
4-8	<3	<3

	Percent Below the EAR	
Age (Years)	**Males**	**Females**
9-13	*	5
14-18	11	34
19-30	8	23
31-50	9	24
51-70	9	31
71+	13	29

*Estimate may be less reliable due to small sample size and/or large relative standard error.

Food Subcategory Sources of Folate (DFE)

No data on food category sources of folate (as DFE) for infants ages 6 through 11 months or young children ages 12 through 23 months were available to the Committee.

Among individuals ages 2 years and older, across sociodemographic groups examined, top food subcategory sources of folate (as DFE) are burgers and sandwiches (including tacos and burritos); breakfast cereals and bars; and rice, pasta, and other grain-based mixed dishes.

Iron

Dietary intakes of iron are described in **Table D.1.17** for infants ages 6 through 11 months and **Table D.1.18** for individuals ages 1 year and older.

TABLE D.1.17
PERCENT BELOW THE ESTIMATED AVERAGE REQUIREMENT (EAR) FOR IRON AMONG INFANTS AGES 6 THROUGH 11 MONTHS BY INFANT MILK REPORTING STATUS

Percent Below the EAR		
All Infants	**Infants Exclusively Human Milk-Fed**	**Infants Fed Any Volume of Formula**
20	74	7

TABLE D.1.18
PERCENT OF THE POPULATION AGES 1 YEAR AND OLDER BELOW THE ESTIMATED AVERAGE REQUIREMENT (EAR) FOR IRON BY AGE-SEX GROUP

	Percent Below the EAR	
Age (Years)	**All**	
1+	6	
	Males	**Females**
1-3	<3	<3
4-8	<3	<3
9-13	<3	<3
14-18	4	23
19-30	<3	22
31-50	<3	20
51-70	<3	<3
71+	<3	<3

Food Subcategory Sources of Iron

Among infants ages 6 through 11 months, across sociodemographic groups examined, top food subcategory contributors to daily iron intake include breakfast cereals and bars; vegetables (including beans and peas, not starchy); desserts and sweet snacks; soups; meat, poultry, and seafood mixed dishes; rice, pasta, and other grain-based mixed dishes; and fruit (non-juice).

Among young children ages 12 through 23 months, across sociodemographic groups examined, top food subcategory contributors to daily iron intake include breakfast cereals and bars; burgers and sandwiches (including tacos and burritos); chips, crackers, and other savory snacks; baby food; and rice, pasta, and other grain-based mixed dishes.

No data on food category sources of iron for individuals ages 1 year and older were available to the Committee.

Energy

Dietary intakes of energy are described in **Table D.1.19** for infants ages 6 through 11 months.

TABLE D.1.19
MEAN INTAKES OF ENERGY FROM COMPLEMENTARY FOODS AND BEVERAGES AMONG INFANTS AGES 6 THROUGH 11 MONTHS BY INFANT MILK REPORTING STATUS

Mean Intakes		
All Infants (kcal/day)	**Infants Exclusively Human Milk-Fed (kcal/day)**	**Infants Fed Any Volume of Formula (kcal/day)**
317	223	340

kcal/day = kilocalories per day

Food Subcategory Sources of Energy

No data on food category sources of energy for infants ages 6 through 11 months or young children ages 12 through 23 months were available to the Committee.

Data for individuals ages 2 years and older show the top food subcategory contributors to daily energy intake across sociodemographic groups (including race and/or ethnicity, family income as a percent of the poverty level, and household food security) as burgers and sandwiches (including tacos and burritos); desserts and sweet snacks; rice, pasta, and other grain-based mixed dishes; and meat, poultry, and seafood mixed dishes.

Dietary Protein

Dietary intakes of dietary protein are described in **Table D.1.20** for infants ages 6 through 11 months and **Table D.1.21** for individuals ages 1 year and older.

TABLE D.1.20
PERCENT BELOW THE ESTIMATED AVERAGE REQUIREMENT (EAR) FOR DIETARY PROTEIN AMONG INFANTS AGES 6 THROUGH 11 MONTHS BY INFANT MILK REPORTING STATUS

Percent Below the EAR		
Infants Fed Exclusively Human Milk	**Infants Exclusively Human Milk-Fed**	**Infants Fed Any Volume of Formula**
7	22	3

TABLE D.1.21
PERCENT OF THE POPULATION AGES 1 YEAR AND OLDER BELOW THE ESTIMATED AVERAGE REQUIREMENT (EAR) FOR DIETARY PROTEIN BY AGE-SEX GROUP

	Percent Below the EAR
Age (Years)	**All**
1+	7

	Percent Below the EAR	
Age (Years)	**Males**	**Females**
1-3	<3	<3
4-8	<3	<3
9-13	<3	<3
14-18	8	23
19-30	4	7
31-50	4	9
51-70	5	8
71+	9	14

Food Subcategory Sources of Dietary Protein

Among infants ages 6 through 11 months, across sociodemographic groups examined, top food subcategory contributors to daily dietary protein intake include higher-fat milk and yogurt (i.e., whole-fat and reduced-fat); rice, pasta, and other grain-based mixed dishes; vegetables (including beans and peas, not starchy); and poultry (not including deli and mixed dishes).

Among young children ages 12 through 23 months, across sociodemographic groups examined, top food subcategory contributors to daily dietary protein intake include higher-fat milk and yogurt (i.e., whole-fat and reduced-fat); burgers and sandwiches (including tacos and burritos); poultry (not including deli and mixed dishes); rice, pasta, and other grain-based mixed dishes; eggs; and meat, poultry, and seafood mixed dishes.

Among individuals ages 1 year and older, the top three food subcategory sources of dietary protein are burgers and sandwiches (including tacos and burritos); meat, poultry, and seafood mixed dishes; and rice, pasta, and other grain-based mixed dishes.

Vitamin B12

Dietary intakes of vitamin B12 are described in **Table D.1.22** for infants ages 6 through 11 months and **Table D.1.23** for individuals ages 1 year and older.

TABLE D.1.22
MEAN INTAKES OF VITAMIN B12 FROM COMPLEMENTARY FOODS AND BEVERAGES (CFB) AMONG INFANTS AGES 6 THROUGH 11 MONTHS BY INFANT MILK REPORTING STATUS

Adequate Intake (AI)		Mean Intakes		
AI for Vitamin B12, Ages 7-12 Months (µg/day)[a]	**AI Contribution from CFB, Ages 7-12 Months (µg/day)**	**All Infants (µg/day)**	**Infants Exclusively Human Milk-Fed (µg/day)**	**Infants Fed Any Volume of Formula (µg/day)**
0.5	0.25	0.76	0.48	0.83

[a]The AI for infants ages 0 through 6 months is 0.4 micrograms per day (µg/day).

µg/day = micrograms per day

TABLE D.1.23
PERCENT OF THE POPULATION AGES 1 YEAR AND OLDER BELOW THE ESTIMATED AVERAGE REQUIREMENT (EAR) FOR VITAMIN B12 BY AGE-SEX GROUP

	Percent Below the EAR	
Age (Years)	**All**	
1+	7	
	Males	**Females**
1-3	<3	<3
4-8	<3	<3
9-13	<3	<3
14-18	<3	20
19-30	6	10
31-50	3	11
51-70	6	11
71+	7	10

Food Subcategory Sources of Vitamin B12

No data on food category sources of vitamin B12 for infants ages 6 through 11 months or 12 through 23 months were available to the Committee.

Among individuals ages 2 years and older, across the sociodemographic groups examined, the top food subcategory sources of vitamin B12 are burgers and sandwiches (including tacos and burritos);

breakfast cereals and bars; meat, poultry, and seafood mixed dishes; and higher-fat milk and yogurt (i.e., whole-fat and reduced-fat).

Vitamin E

Dietary intakes of vitamin E are described in **Table D.1.24** for infants ages 6 through 11 months and **Table D.1.25** for individuals ages 1 year and older.

TABLE D.1.24
MEAN INTAKES OF VITAMIN E FROM COMPLEMENTARY FOODS AND BEVERAGES (CFB) AMONG INFANTS AGES 6 THROUGH 11 MONTHS BY INFANT MILK REPORTING STATUS

Adequate Intake (AI)		Mean Intakes		
AI for Vitamin E, Ages 7-12 Months (mg/day)[a]	**AI Contribution from CFB, Ages 7-12 Months (mg/day)**	**All Infants (mg/day)**	**Infants Exclusively Human Milk-Fed (mg/day)**	**Infants Fed Any Volume of Formula (mg/day)**
5	2.06	2.08	1.66	2.18

[a]The AI for infants ages 0 through 6 months is 4 milligrams per day.

mg/day = milligrams per day

TABLE D.1.25
PERCENT OF THE POPULATION AGES 1 YEAR AND OLDER BELOW THE ESTIMATED AVERAGE REQUIREMENT (EAR) FOR VITAMIN E BY AGE-SEX GROUP

	Percent Below the EAR	
Age (Years)	**All**	
1+	74	
	Males	**Females**
1-3	41	45
4-8	33	51
9-13	61	60
14-18	83	94
19-30	79	84
31-50	67	84
51-70	68	86
71+	72	87

Food Subcategory Sources of Vitamin E

The primary components of many of the top food subcategories described here are not notable contributors of vitamin E alone, but rather their preparation with oils makes them a carrier of vitamin E. Among infants ages 6 through 11 months, across sociodemographic groups examined, top food subcategory contributors to daily vitamin E intake include fruit (non-juice); vegetables (including beans and peas, not starchy); starchy vegetables; soups; rice, pasta, and other grain-based dishes; and chips, crackers, and savory snacks.

Among young children ages 12 through 23 months, across sociodemographic groups examined, top food subcategory contributors to daily vitamin E intake include burgers and sandwiches (including tacos and burritos); rice, pasta, and other grain-based dishes; chips, crackers, and savory snacks; baby food; poultry (not including deli and mixed dishes); eggs; and higher-fat milk and yogurt (i.e., whole-fat and reduced-fat).

Across sociodemographic groups examined, the top food subcategory source of vitamin E is burgers and sandwiches. The second and third food subcategory sources that contribute to vitamin E intake vary across socioeconomic groups, but include some combination of chips, crackers, and savory snacks; vegetables (including beans and peas, not starchy), rice, pasta, and other grain-based mixed dishes; or meat, poultry, and seafood mixed dishes. Among ages 1 year and older, 74 percent have vitamin E intakes below the EAR.

Choline

Dietary intakes of choline are described in **Table D.1.26** for infants ages 6 through 11 months and **Table D.1.27** for individuals ages 1 year and older.

TABLE D.1.26
MEAN INTAKES OF CHOLINE FROM COMPLEMENTARY FOODS AND BEVERAGES (CFB) AMONG INFANTS AGES 6 THROUGH 11 MONTHS BY INFANT MILK REPORTING STATUS

Adequate Intake (AI)		Mean Intakes		
AI for Choline, Ages 7-12 Months (mg/day)[a]	**AI Contribution from CFB, Ages 7-12 Months (mg/day)**	**All Infants (mg/day)**	**Infants Exclusively Human Milk-Fed (mg/day)**	**Infants Fed Any Volume of Formula (mg/day)**
150	54	47	36	50

[a]The AI for infants ages 0 through 6 months is 125 milligrams per day.

mg/day = milligrams per day

TABLE D.1.27
PERCENT OF THE POPULATION AGES 1 YEAR AND OLDER ABOVE THE ADEQUATE INTAKE (AI) FOR CHOLINE BY AGE-SEX GROUP

	Percent Above the AI	
Age (Years)	**All**	
1+	12	
	Males	**Females**
1-3	59	52
4-8	40	30
9-13	8	7
14-18	<3	<3
19-30	8	6
31-50	12	7
51-70	13	8
71+	10	6

Food Subcategory Sources of Choline

Among infants ages 6 through 11 months, across sociodemographic groups examined, top food subcategory sources of choline include vegetables (including beans and peas, not starchy); eggs; rice, pasta, and other grain-based mixed dishes; starchy vegetables; soups; higher-fat milk and yogurt (i.e., whole-fat and reduced-fat); and fruit (non-juice).

Among young children ages 12 through 23 months, across the sociodemographic groups examined, the top food subcategory sources of choline include higher-fat milk and yogurt (i.e., whole-fat and reduced-fat); eggs; burgers and sandwiches (including tacos and burritos); poultry (not including deli and mixed dishes); rice, pasta, and other grain-based mixed dishes; meat, poultry, and seafood mixed dishes; and lower-fat milk and yogurt (i.e., non-fat and low-fat).

No data on food category sources of choline for individuals ages 1 year and older were available to the Committee.

Zinc

Dietary intakes of zinc are described in **Table D.1.28** for infants ages 6 through 11 months.

TABLE D.1.28
PERCENT BELOW THE ESTIMATED AVERAGE REQUIREMENT (EAR) FOR ZINC AMONG INFANTS AGES 6 THROUGH 11 MONTHS BY INFANT MILK REPORTING STATUS

Percent Below the EAR		
All Infants	**Infants Exclusively Human Milk-Fed**	**Infants Fed Any Volume of Formula**
10	47	<3

Food Subcategory Sources of Zinc

Among infants ages 6 through 11 months, across sociodemographic groups examined, top food subcategory sources of zinc include breakfast cereals and bars; higher-fat milk and yogurt (i.e., whole-fat and reduced-fat); rice, pasta, and grain-based mixed dishes; fruit (non-juice); soups; meat, poultry, and seafood mixed dishes; and eggs.

Young children ages 12 through 23 months consume an average of 6.8 mg of zinc from infant milk, foods, and beverages. Across the sociodemographic groups examined, the top food subcategory sources of zinc include breakfast cereals and bars; burgers and sandwiches (including tacos and burritos); higher-fat milk and yogurt (i.e., whole-fat and reduced-fat); rice, pasta, and other grain-based mixed dishes; and breakfast cereals and bars.

Total Fat

Dietary intakes of total fat are described in **Table D.1.29** for infants ages 6 through 11 months.

TABLE D.1.29
MEAN INTAKES OF TOTAL FAT FROM COMPLEMENTARY FOODS AND BEVERAGES (CFB) AMONG INFANTS AGES 6 THROUGH 11 MONTHS BY INFANT MILK REPORTING STATUS

Adequate Intake (AI)		Mean Intake		
AI for Total Fat, Ages 7-12 Months (g/day)[a]	**AI Contribution from CFB, Ages 7-12 Months (g/day)**	**All Infants (g/day)**	**Infants Exclusively Human Milk-Fed (g/day)**	**Infants Fed Any Volume of Formula (g/day)**
30	5.7	7.9	5.6	8.5

[a]The AI for infants ages 0 through 6 months is 31 grams per day.

g/day = grams per day

Food Subcategory Sources of Total Fat

Among infants ages 6 through 11 months, across sociodemographic groups examined, top food subcategory sources of total fat include vegetables (including beans and peas, not starchy); higher-fat milk and yogurt (i.e., whole-fat and reduced-fat); starchy vegetables; poultry (not including deli and mixed dishes); soups; eggs; meat, poultry, and seafood mixed dishes; rice, pasta, and other mixed dishes; chips, crackers, and savory snacks; and desserts and sweet snacks.

Among young children ages 12 through 23 months, across the sociodemographic groups examined, the top food subcategory sources of total fat include higher-fat milk and yogurt (i.e., whole-fat and reduced-fat); burgers and sandwiches (including tacos and burritos); chips, crackers, and savory snacks; poultry (not including deli and mixed dishes); rice, pasta, and other grain-based mixed dishes; and desserts and sweet snacks.

Question 3. What is the current prevalence of nutrition-related chronic health conditions?

Approach to Answering Question: Data Analysis

Conclusion Statement(s)

The widespread prevalence of nutrition-related chronic health conditions continues to be a major public health issue in the United States. The high prevalence of risk factors among adolescents, such as the 38 percent of individuals ages 12 through 19 years with prediabetes, is particularly concerning as it may contribute to an increased risk of developing chronic diseases later in life. Chronic disease rates are especially high among adults and older adults.

Variation in prevalence, incidence, and mortality rates indicate health disparities for some chronic health conditions, such as higher prevalence of obesity and diabetes among individuals of lower socioeconomic position.

Some chronic health conditions—including obesity, diabetes, and (for females only) osteoporosis—have become more prevalent compared to 10 to 20 years ago.

Summary of the Evidence

The body of evidence for these conclusion statements includes data from NHANES, NHIS, SEER, and NVSS. The evidence is summarized in the following paragraphs by life stage and sociodemographic group. Full data analysis methods, summaries, and tables are available in the Federal Data Analysis Reports and Data Analysis Supplements.[4,60]

Growth, Size, Body Composition, Overweight and Obesity

Infants

Low Birthweight

Prevalence of low birthweight among infants born in the United States is 9 percent and varies by birth parent age and race and/or ethnicity. When prevalence is examined by birth parent race and/or ethnicity, it ranges from 7 percent among those who are non-Hispanic White to 15 percent among those who are non-Hispanic Black. By birth parent age, prevalence of low birthweight ranges from 8 percent among those ages 30 through 34 years to 14 percent among those younger than age 15 years.

Individuals Ages 2 Years and Older

Weight status for children and adolescents ages 2 through 19 years and for adults and older adults ages 20 years and older is classified using the BMI measure.

Underweight

The prevalence of underweight is low among children and adolescents ages 2 through 19 years (4 percent) and adults and older adults ages 20 years and older (2 percent).

Overweight

The prevalence of overweight among children and adolescents ages 2 through 19 years is 17 percent. Among adults and older adults ages 20 years and older, the prevalence of overweight is high at 32 percent.

Children and Adolescents Ages 2 through 19 Years

Obesity

The prevalence of obesity among children and adolescents ages 2 through 19 years is 19 percent, and the prevalence of severe obesity is 6 percent. For comparison, during 2009-2010, the prevalence of obesity in this age group was 17 percent, and the prevalence of severe obesity was 6 percent.

Significant differences in the prevalence of obesity (including severe obesity) are observed across sociodemographic groups, such that:

- Prevalence of obesity is significantly lower among non-Hispanic Asian children and adolescents (9 percent) compared to all other racial and/or ethnic groups examined. Prevalence is also lower in non-Hispanic White children and adolescents (17 percent) than among those who are non-Hispanic Black (25 percent) and Hispanic and/or Latino (26 percent).
- Prevalence of obesity is significantly higher in children and adolescents ages 12 through 19 years (22 percent) and ages 6 through 11 years (21 percent) compared to children ages 2 through 5 years (13 percent).
- Among children ages 6 through 11 years, prevalence of obesity is significantly higher in males (23 percent) than females (19 percent).
- Prevalence of obesity by family income as a percent of the federal poverty level is significantly lower among children and adolescents ages 2 through 19 years with family income >350 percent of the federal poverty level (12 percent) compared to those with family income ≤130 percent of the federal poverty level (26 percent).

Although statistical testing is not available, prevalence of obesity by household food security category also varies, ranging from 16 percent among children from households with full food security to 27 percent among children from households with very low food security.

Adults and Older Adults Ages 20 Years and Older

Prevalence of obesity and severe obesity among adults and older adults ages 20 years and older are 41 percent and 9 percent, respectively. Across sociodemographic groups examined, significant differences are present in prevalence of obesity among this age group, such that:

- Compared to other racial and/or ethnic groups, prevalence of obesity is significantly lower in non-Hispanic Asian adults (16 percent) and significantly higher in non-Hispanic Black adults (50 percent).
- Prevalence of obesity is significantly higher among adults and older adults ages 20 years and older with family income of 130 to 350 percent of the federal poverty level (47 percent) than among those with family income >350 percent of the federal poverty level (39 percent).
- Prevalence of obesity is significantly lower among adults and older adults ages 20 years and older with a college degree or above (34 percent) than among those with less than a high school diploma (40 percent) and those with a high school diploma or some college (46 percent).

Variation also exists in prevalence of obesity across household food security categories. Among adults and older adults ages 20 years and older with full household food security, prevalence of obesity is 39 percent. Among adults with marginal, low, and very low household food security, prevalence of obesity (including severe obesity) ranges from 46 to 47 percent.

Cardiovascular Health

Children and Adolescents Ages 8 through 19 Years

Cholesterol

The total prevalence of high low-density lipoprotein (LDL) cholesterol among children and adolescents ages 12 through 19 years is 5 percent. Prevalence is 11 percent among children and adolescents in households with very low food security and 3 percent among those in households with full food security.

Prevalence of low high-density lipoprotein (HDL) cholesterol among children and adolescents ages 12 through 19 years is 14 percent. By sex, prevalence is 19 percent among males and 9 percent among females. By race and/or ethnicity, prevalence is 16 percent for non-Hispanic White children, 15 percent for Hispanic and/or Latino children, 10 percent for non-Hispanic Asian children, and 7 percent for non-Hispanic Black children.

Hypertension

Prevalence of hypertension among children and adolescents ages 8 through 17 years is 5.1 percent.

Adults and Older Adults Ages 18 Years and Older

Cholesterol and Triglycerides

The total prevalence of high LDL cholesterol among adults and older adults ages 20 years and older is 59 percent, with variation by age. Among females, prevalence ranges from 47 percent among individuals ages 20 through 39 years to 72 percent among individuals ages 40 through 59 years. Among males, prevalence ranges from 55 percent among individuals ages 20 through 39 years to 73 percent among individuals ages 40 through 59 years.

Prevalence of high LDL cholesterol also varies by race and/or ethnicity. Among males, prevalence by race and/or ethnicity ranges from 57 percent among non-Hispanic White males to 63 percent among Hispanic and/or Latino males. Among females, prevalence by race and/or ethnicity ranges from 50 percent among non-Hispanic Black females to 62 percent among Hispanic and/or Latino females.

The total age-adjusted prevalence of low HDL cholesterol among adults and older adults ages 20 and older is 16 percent, which is significantly lower compared to 2007-2008 (22 percent). Age-adjusted prevalence is significantly higher among males (27 percent) compared to females (8 percent) and ranges from 12 percent among non-Hispanic Black adults to 22 percent among Hispanic and/or Latino adults. Prevalence of low HDL cholesterol also varies by household food security, ranging from 15 percent among adults in households with full food security to 25 percent among adults in households with very low food security.

The total prevalence of high triglycerides among adults and older adults ages 20 years and older is 21 percent. Prevalence by household food security category ranges from 19 percent among adults in households with full food security to 27 percent among adults in households with low food security.

Hypertension

The total prevalence of hypertension among adults and older adults ages 18 years and older is 48 percent. Differences in age-adjusted prevalence exist by age, race and/or ethnicity, education, and family income relative to the federal poverty level. By age, prevalence is significantly lower among adults ages 18 through 39 years (23 percent) compared to adults ages 40 through 59 years (52 percent) and older adults ages 60 years and older (74 percent). By race and/or ethnicity, prevalence is significantly higher among adults who are non-Hispanic Black (57 percent) than among adults who are non-Hispanic White (44 percent), non-Hispanic Asian (45 percent), and Hispanic and/or Latino (43 percent). By educational attainment, prevalence is significantly lower among adults with a college degree or above (39 percent) than among adults with less than a high school diploma (47 percent) and adults with a high school diploma or some college (50 percent). By family income, prevalence is significantly lower among adults with family income >350 percent of the federal poverty level (43 percent) compared to adults with family income >130 through 350 percent of the federal poverty level (47 percent).

Among males, age-adjusted prevalence of hypertension was higher in 1999-2000 (52 percent), lower in 2013-2014 (45 percent), and higher again in 2017-2018 (51 percent). Among females, no significant difference in age-adjusted prevalence of hypertension was observed in 2017-2018 compared to 1999-2000.

Stroke

Prevalence of stroke among adults and older adults ages 18 years and older is 3 percent and varies by age, race and/or ethnicity, and educational attainment. By age, prevalence ranges from 1 percent among adults ages 18 through 44 years to 12 percent among older adults ages 75 years and older. By race and/or ethnicity, prevalence of stroke ranges from 2 percent among adults who are Mexican or Mexican American (single race or multiracial) to 8 percent among adults who are American Indian or Alaska Native and White

(multiracial). Among adults ages 25 years and older, the prevalence of stroke by educational attainment is 6 percent among adults without a high school diploma, 4 percent among adults with a high school diploma or General Educational Development (GED) and no college, 4 percent among adults with some college, and 2 percent among adults with a college degree or higher.

Coronary Heart Disease

The total prevalence of coronary heart disease (CHD) among adults and older adults ages 18 years and older is 5 percent and varies by sex, age, and educational attainment. The prevalence of CHD is 4 percent in adult females and 6 percent in adult males. By age, prevalence of CHD ranges from 1 percent among adults ages 18 through 44 years to 20 percent among older adults ages 75 years and older. Among adults ages 25 years and older, prevalence of CHD ranges from 4 percent among individuals with a college degree or higher to 8 percent among individuals with less than a high school diploma.

Prediabetes and Diabetes

Children and Adolescents Ages 12 through 19 Years

Prediabetes

The prevalence of prediabetes in children and adolescents ages 12 through 19 years is high (38 percent) and ranges from 33 percent among females to 43 percent among males. As described below, prediabetes prevalence is also 38 percent among adults and older adults.

Diabetes

The prevalence of diagnosed diabetes (proxy or self-reported) among children and adolescents ages 19 years and younger is 352,000 cases, or about 35 per 10,000. Additional estimates of diabetes in children and adolescents are not available due to the limited federal, nationally representative data on diabetes for this age group.

Adults and Older Adults Ages 18 Years and Older

Prediabetes

The total prevalence of prediabetes among adults and older adults ages 18 years and older is 38 percent. Examining data by age, prevalence is 28 percent among adults ages 18 through 44 years, 45 percent among adults ages 45 through 64 years, and 49 percent among older adults ages 65 years and older. Prevalence by sex is 42 percent among males and 34 percent among females.

Diabetes

The prevalence of diabetes, including diagnosed and undiagnosed diabetes, among adults and older adults ages 20 years and older is 16 percent. Age-adjusted prevalence, however, is significantly different among sociodemographic groups for age, race and/or ethnicity, family income relative to the federal poverty level, education, and BMI status.

Age-adjusted diabetes prevalence is significantly different between age groups and is lowest among adults ages 20 through 39 years (4 percent), higher among adults ages 40 to 59 years (16 percent), and

highest among older adults ages 60 years and older (30 percent). By race and/or ethnicity, age-adjusted prevalence is significantly lower among non-Hispanic White adults (12 percent) compared to Hispanic and/or Latino adults (21 percent), non-Hispanic Asian adults (18 percent), and non-Hispanic Black adults (19 percent). By sex, age-adjusted prevalence is significantly higher among males (16 percent) than females (13 percent).

Age-adjusted diabetes prevalence is also significantly different between family income groups, relative to the federal poverty level. It is highest among adults with family income ≤130 percent of the federal poverty level (20 percent), followed by adults with family income >130 through 350 percent of the federal poverty level (16 percent), and lowest among adults with family income >350 percent of the federal poverty level (11 percent).

Finally, significant differences exist in age-adjusted diabetes prevalence between BMI levels. Prevalence is highest among adults with a BMI ≥30.0 (23 percent), followed by adults with a BMI of 25.0 to 29.9 (10 percent), and lowest among adults with a BMI of 18.5 to 24.9 (7 percent).

Metabolic Syndrome

Adults and Older Adults Ages 20 Years and Older

The total prevalence of metabolic syndrome among adults and older adults ages 20 years and older is 40 percent. Prevalence varies by age, sex, race and/or ethnicity, and household food security category. Prevalence of metabolic syndrome is 24 percent among adults ages 20 through 39 years, 43 percent among adults ages 40 through 59 years, and 55 percent among older adults ages 60 years and older. By sex, prevalence is 41 percent among females and 38 percent among males. By racial and/or ethnic groups, prevalence of metabolic syndrome ranges from 31 percent among non-Hispanic Asian individuals to 40 percent among non-Hispanic White individuals. Finally, across household food security categories, prevalence of metabolic syndrome ranges from 38 percent among individuals with full household food security to 47 percent among individuals with very low household food security.

Gestational Conditions

Gestational Diabetes

The rate of gestational diabetes is 8 per 100 live births, or about 8 percent. This rate (2020 data) is significantly higher compared to the 2016 rate (6 per 100 live births, or 6 percent). The rate of gestational diabetes is significantly different across sociodemographic groups for pre-pregnancy BMI, birth parent race and/or ethnicity, and birth parent age. By pre-pregnancy BMI group, the lowest rate is among individuals with an underweight BMI (4 percent), and the highest rate is among individuals with obesity (13 percent). By racial and/or ethnic group, the lowest rate is among birth parents who are non-Hispanic Black (7 percent), and the highest rate is among birth parents who are non-Hispanic Asian (15 percent). By age group, the lowest rate is among birth parents younger than age 20 years (3 percent), and the highest rate is among birth parents ages 40 years and older (15 percent).

Gestational Hypertension

The rate of gestational hypertension is 84 per 1,000 live births. The prevalence of gestational hypertension varies by age and race and/or ethnicity, ranging from 70 per 1,000 live births among birth parents who are Hispanic and/or Latino to 105 per 1,000 live births among birth parents who are 40 years and older.

Osteoporosis & Low Bone Mass

Adults and Older Adults Ages 50 Years and Older

The total age-adjusted prevalence of osteoporosis among adults and older adults ages 50 years and older is 13 percent and varies by sex and race and/or ethnicity. Age-adjusted prevalence is significantly higher in females (20 percent) compared to males (4 percent). The percentage (age-adjusted) of non-Hispanic Black adults with osteoporosis is 7 percent, while the prevalence for non-Hispanic White adults is 13 percent, non-Hispanic Asian adults is 18 percent, and Hispanic and/or Latino adults is 15 percent. The age-adjusted prevalence of osteoporosis in females ages 50 years and older was significantly higher in 2017-2018 (20 percent) compared to 2007-2008 (14 percent), while the prevalence in males of the same age was not significantly different.

The total age-adjusted prevalence of low bone mass (osteopenia) in adults and older adults ages 50 years and older is 43 percent. Age-adjusted prevalence is significantly higher in females (52 percent) than in males (34 percent). No significant difference was observed in the age-adjusted prevalence in 2017-2018 compared to 2007-2008.

Breast and Colorectal Cancer

Breast Cancer

The total age-adjusted incidence rate of female breast cancer is 137 per 100,000, and the total age-adjusted female breast cancer mortality rate is 19 per 100,000. Incidence and mortality rates of female breast cancer per 100,000 vary by age and race and/or ethnicity.

By age, age-adjusted incidence of breast cancer is 50 per 100,000 among females under age 50 years, 291 among females ages 50 through 64 years, and 455 among females ages 65 years and older. Mortality rates of female breast cancer are 4 among females under 50 years, 32 among females ages 50 through 64 years, and 88 among females ages 65 years and older.

By race and/or ethnicity, breast cancer incidence is 147 per 100,000 among non-Hispanic White females; 136 among non-Hispanic Black females, 131 among non-Hispanic American Indian and Alaska Native females, 126 among non-Hispanic Asian or Pacific Islander females, and 111 among Hispanic and/or Latino females. Breast cancer mortality rates are 12 among non-Hispanic Asian or Pacific Islander females, 14 among Hispanic and/or Latino females, 17 among non-Hispanic American Indian and Alaska Native females, 19 among non-Hispanic White females, and 26 among non-Hispanic Black females.

Colorectal Cancer

The total age-adjusted incidence rate for colorectal cancer is 38 per 100,000, and the total age-adjusted mortality rate is 13 per 100,000. For colorectal cancer, age-adjusted incidence and mortality rates

per 100,000 vary across sex, age, and racial and/or ethnic groups as follows. By sex, incidence is 43 among males and 33 among females. The mortality rate is 15 among males and 11 among females.

By age, incidence rates for colorectal cancer are 10 per 100,000 among individuals younger than age 50 years, 74 among individuals ages 50 through 64 years, and 155 among individuals ages 65 years and older. The mortality rate is 2 among individuals less than age 50 years, 20 among individuals ages 50 through 64 years, and 65 among individuals ages 65 years and older. For comparison, the 2016 incidence rates were 8 for individuals younger than age 50 years, 72 among adults ages 50 through 64 years, and 173 among older adults ages 65 years and older.

By race and/or ethnicity, colorectal cancer incidence rates are 31 per 100,000 among non-Hispanic Asian or Pacific Islander individuals, 35 among Hispanic and/or Latino individuals, 38 among non-Hispanic White individuals, 44 among non-Hispanic Black individuals, and 59 among non-Hispanic American Indian or Alaska Native individuals. Mortality rates are 9 among individuals who are non-Hispanic Asian or Pacific Islander, 11 among Hispanic and/or Latino individuals, 13 among non-Hispanic White individuals, 16 among non-Hispanic Black individuals, and 18 among non-Hispanic American Indian or Alaska Native individuals.

Dental Health

Oral health and nutrition have a bidirectional relationship. Dietary behaviors that may contribute to dental health include consuming foods and beverages that are low in sugar or acid, meeting calcium recommendations, drinking fluoridated water, and limiting alcohol intake.[61] However, dental disease may also impact dietary intakes, particularly among older adults with teeth that are lost or compromised.

Children and Adolescents Ages 2 through 19 Years

The prevalence of untreated or restored dental caries in children and adolescents ages 2 through 19 years is 46 percent, with significant differences by age, family income as a percent of the federal poverty level, and race and/or ethnicity. Prevalence is significantly different between all child and adolescent age groups and is highest among adolescents ages 12 through 19 years (56 percent) compared to children ages 6 through 11 years (48 percent) and children ages 2 through 5 years (22 percent).

The prevalence of dental caries is also significantly different between all groups for family income as a percent of the federal poverty level. The prevalence is highest in children and adolescents with family income ≤130 percent (54 percent) compared to those with family income >130 through 350 percent (47 percent) and with family income >350 percent (36 percent). Among the racial and/or ethnic groups examined, Hispanic and/or Latino children and adolescents have a significantly higher prevalence of dental caries (55 percent) compared to those who are non-Hispanic White (43 percent), non-Hispanic Black (42 percent), and non-Hispanic Asian (47 percent).

Adults and Older Adults Ages 20 Years and Older

The prevalence of untreated dental caries is 26 percent among adults ages 20 through 44 years, 25 percent among adults ages 45 through 64 years, and 20 percent among older adults ages 65 years and older. Among older adults ages 65 years and older, the age-adjusted prevalence of complete tooth loss

was 13 percent in 2017-2018, which was significantly lower compared to 1999-2000 (30 percent). The prevalence was significantly lower between these time periods for both males (14 vs. 26 percent) and females (13 vs. 33 percent).

The prevalence of complete tooth loss in older adults differs by age, family income as a percent of the federal poverty level, and education level. Prevalence is significantly different between age groups and is highest in individuals ages 75 years and older (17 percent) compared to individuals ages 70 through 74 years (11 percent) and individuals ages 65 through 69 years (11 percent). Prevalence is significantly higher among older adults with family income ≤130 percent of the federal poverty level (28 percent) compared to older adults with family income >130 through 350 percent of the federal poverty level (17 percent). The prevalence of complete tooth loss is also significantly different between education levels. The prevalence is lowest among older adults with a college degree or above (3 percent) compared to those with less than high school diploma (32 percent) and with a high school diploma or some college (15 percent).

Food Allergies

Children and Adolescents Ages 17 Years and Younger

The prevalence of food allergies (proxy- or self-reported) among children and adolescents ages 17 years and younger is 7 percent. For children ages 0 through 4 years and children 5 through 11 years, prevalence is 6 percent, and for adolescents ages 12 through 17 years, prevalence is 8 percent. The prevalence is 13 percent among children and adolescents of two or more racial and/or ethnic groups.

Question 4. Which nutrients and/or dietary components present a substantial public health concern because of underconsumption or overconsumption?

Approach to Answering Question: Data Analysis

Conclusion Statements

Individuals Ages 1 Year and Older

Based on dietary intake, biomarker data, and relevance to health, for individuals ages 1 year and older, vitamin D, calcium, potassium, and dietary fiber are nutrients of public health concern due to underconsumption and added sugars, (for ages 2 years and older) saturated fat, and sodium are nutrients of public health concern due to overconsumption.

Infants Ages 6 through 11 Months

Based on dietary intake data and relevance to health, iron is a nutrient of public health concern for infants ages 6 through 11 months who are human milk-fed.

Adolescent Females

Based on dietary intake data for females ages 14 through 18 years and biomarker data for females ages 12 through 19 years, iron is of public health concern for adolescent females.

Females Ages 20 through 49 Years

Based on dietary intake and biomarker data, iron is of public health concern for females ages 20 through 49 years.

Individuals who are Pregnant

Based on dietary intake data in females ages 20 through 44 years and biomarker data in pregnant females, iron is of public health concern among females who are pregnant.

Based on dietary intake data and relevance to health, folate is of public health concern for females during the preconception period and during the first trimester of pregnancy.

Based on biomarker data and relevance to health in females who are pregnant, iodine is of public health concern for females who are pregnant.

Summary of the Evidence

The body of evidence for these conclusion statements includes data from NHANES for biochemical indicators and chronic disease prevalence, and WWEIA, NHANES for usual nutrient intakes, including the prevalence of how the group meets the markers of adequacy (EAR and AI) or those of overconsumption (CDRR, UL, and *Dietary Guidelines* limits). The evidence is summarized in the following paragraphs by life stage and includes sociodemographic group data. Full data analysis methods, summaries, and tables are available in the Federal Data Analysis Reports and Data Analysis Supplements.[4,5,7,26,57,58,60]

Individuals Ages 1 Year and Older

Nutrients of Public Health Concern

Vitamin D

Relevance: Vitamin D is required for bone growth and remodeling and may have physiological roles outside of bone health.[16]

Dietary Intake Data: 96 percent of individuals ages 1 year and older have intakes of vitamin D below the EAR.

Biomarker Data: The prevalence of vitamin D concentrations at risk of deficiency (serum 25-hydroxyvitamin D <30 nmol/L) in the United States indicates that many individuals are at risk for inadequacy at 1.3 percent for ages 1 through 5 years, 1.2 percent for ages 6 through 11 years, 6.8 percent for ages 12 through 19 years, 7.3 percent for ages 20 through 39 years, 5.1 percent for ages 40 through 59 years, and 2.4 percent for ages 60 years and older.

Health Outcome(s): The age-adjusted prevalence of osteoporosis in adults and older adults ages 50 years and older is 12.6 percent.

Sociodemographic Data: Regardless of race and/or ethnicity, poverty level, and food security level, vitamin D intakes are 95 percent or more below the EAR.

Calcium

Relevance: Calcium is a mineral associated with the formation and metabolism of bone and is located primarily in the bones and teeth. Bone is constantly being remodeled and is especially important when peak bone mass is achieved, in particular during adolescence with growth and early adulthood, and during periods of rapid bone remodeling among post-menopausal females. Calcium is also involved in vascular contraction and vasodilation, muscle function, nerve transmission, intracellular signaling, and hormonal secretion.[16]

Dietary Intake Data*:* 46 percent of individuals ages 1 year and older have intakes of calcium below the EAR.

Biomarker Data: No NHANES data are available for calcium concentrations. Serum calcium levels are tightly regulated and do not closely reflect nutritional status.

Health Outcome(s): The age-adjusted prevalence of osteoporosis among adults and older adults ages 50 years and older is 12.6 percent.

Sociodemographic Data: Certain sociodemographic groups may be at elevated risk for having low calcium intakes, such as non-Hispanic Black and non-Hispanic Asian adults, with 62 percent and 59 percent, respectively, below the EAR. A lower percentage of non-Hispanic Black adults have osteoporosis compared to other racial and/or ethnic groups. Additionally, females ages 14 through 18 years during the stage of peak bone accumulation, and females ages 71 years and older during the stage when more bone loss occurs, may also be at elevated risk of low intakes of calcium with 86 percent and 82 percent, respectively, below the EAR.

Potassium

Relevance: Potassium is a mineral that is critical for maintaining intracellular fluid volume and transmembrane electrochemical gradients, which is required for nerve transmission, muscle contraction, and kidney function.

Dietary Intake Data: 28 percent of individuals ages 1 year and older have intakes of potassium above the AI.

Biomarker Data: No NHANES data are available for potassium concentrations. Serum potassium levels are tightly regulated in individuals without kidney disease and do not reflect nutritional status.

Health Outcome(s): Hypertension is prevalent among the U.S. population (48 percent of individuals ages 18 years and older). Per the review of the potassium DRI by NASEM, moderate strength of evidence exists between potassium intake and blood pressure, based on potassium supplementation trials.[17]

Sociodemographic Data: Non-Hispanic Black individuals may be at elevated risk for low potassium intakes, with 16 percent above the AI.

Sodium

Relevance: Sodium has an important role in maintaining extracellular volume, plasma osmolality, and transporting molecules across cell membranes. High intakes of sodium increase risk of high blood pressure, which increases risk of cardiovascular disease and stroke.[17]

Dietary Intake Data: 89 percent of individuals ages 1 year and older have intakes of sodium above the CDRR.

Biomarker Data: No current NHANES data are available for sodium concentrations.

Health Outcome(s): Cardiovascular disease is prevalent in the United States. The prevalence of hypertension for U.S. adults ages 18 years and older is 48 percent. The prevalence of coronary heart disease is 5 percent among adults ages 18 and older. The prevalence of stroke is 3 percent among adults ages 18 years and older, 7 percent among older adults ages 65 through 74 years, and 12 percent among older adults ages 75 years and older.

Sociodemographic Data: Sodium intakes above the CDRR are 88 to 90 percent regardless of race and/or ethnicity. Prevalence of hypertension, however, is significantly higher among non-Hispanic Black adults than among non-Hispanic White and Hispanic adults.

Dietary Fiber

Relevance: Dietary fiber consists of nondigestible carbohydrates and lignin that are intrinsic and intact in plants. Higher intakes of dietary fiber are associated with a reduced risk of coronary heart disease.

Dietary Intake Data: 6 percent of individuals ages 1 year and older have intakes of dietary fiber above the AI.

Biomarker Data: No biomarker data exists to confirm low intakes of dietary fiber.

Health Outcome(s): The prevalence of coronary heart disease is 5 percent among adults ages 18 and older, 12 percent among older adults ages 65 through 74 years, and 20 percent among older adults ages 75 years and above.

Sociodemographic Data: Certain sociodemographic groups may be at elevated risk for having low dietary fiber intake, such as non-Hispanic Black individuals and individuals with a very low household food security level, with less than 3 percent above the AI. Regardless of race and/or ethnicity, the prevalence of coronary heart disease ranges from 3 to 5 percent. Children and adolescents ages 4 through 18 years may also be at elevated risk for having low dietary fiber intakes with less than 3 percent above the AI.

Added Sugars

Relevance: Added sugars contribute to energy intake without providing additional nutrient content. High intakes of added sugars may lead to excess weight gain, which increases risk for obesity and obesity-related diseases. The *Dietary Guidelines* recommendation for individuals ages 2 years and older is to limit added sugars to less than 10 percent of calories per day. Young children from birth through 23 months should avoid added sugars.

Dietary Intake Data: 65 percent of individuals ages 1 year and older have intakes of added sugars above the *Dietary Guidelines* recommended limit of less than 10 percent of calories per day starting at age 2. The recommendation for infants and young children from birth through 23 months is to avoid added sugars.

Biomarker Data: No biomarker exists to measure added sugars concentrations.

Health Outcome(s): Given that the top food source of added sugars in the United States is sugar-sweetened beverages, the 2025 Committee examined the relationship between sugar-sweetened beverages and health outcomes (see **Part D. Chapter 3: Beverages**) and drew the following conclusion statements, which were based on evidence graded as moderate, from systematic reviews:

- Sugar-sweetened beverage consumption by infants, children, and adolescents is associated with unfavorable growth patterns and body composition, and higher risk of obesity in childhood up to early adulthood. This conclusion statement is based on evidence graded as moderate. (Grade: Moderate)
- Sugar-sweetened beverage consumption by adults and older adults is associated with unfavorable body composition. This conclusion statement is based on evidence graded as moderate. (Grade: Moderate)
- Sugar-sweetened beverage consumption by adults and older adults is associated with higher risk of obesity. This conclusion statement is based on evidence graded as moderate. (Grade: Moderate)
- Sugar-sweetened beverage consumption by adults and older adults may be associated with higher risk of type 2 diabetes. This conclusion statement is based on evidence graded as moderate. (Grade: Moderate)

The total prevalence of overweight and obesity among children and adolescents ages 2 through 19 years is 36 percent. Among adults ages 20 years and older, the prevalence of overweight and obesity is 73 percent.

Sociodemographic Data: Certain life stages may be at elevated risk of high added sugars intake, with 74 to 85 percent of children and adolescents ages 5 through 8 years exceeding the recommended limits for added sugars. Other sociodemographic groups may also be at elevated risk of high added sugars intakes, as more than 70 percent of the following groups exceed limits for added sugars: individuals who are non-Hispanic Black, individuals classified as food insecure, and individuals with a PIR ≤1.85.

Saturated Fat (Ages 2 Years and Older)

Relevance: There is no biological requirement for intake of saturated fat, and the relationship between consumption of saturated fat and cardiovascular disease has long been understood. The 2020 Committee concluded that strong evidence demonstrates that replacing saturated fatty acids with polyunsaturated fatty acids in adults reduces the risk of coronary heart disease events and cardiovascular disease mortality. It also concluded that strong evidence demonstrates that diets lower in saturated fatty acids and cholesterol during childhood results in lower levels of total blood and low-density lipoprotein (LDL) cholesterol

throughout childhood, particularly in male children.[62] The *Dietary Guidelines* recommendation for individuals ages 2 years and older is to limit saturated fat to less than 10 percent of calories per day. There is no limit on saturated fat intake from birth through 23 months, although the development of the HEI-Toddlers-2020 showed that saturated fat cannot be unlimited without displacing the energy available to achieve other food group and subgroup goals. Therefore, the standard maximum score for the HEI-Toddlers-2020 is based on approximately 12 percent of energy from saturated fats.[63]

Dietary Intake Data: 82 percent of individuals ages 1 year and older have intakes of saturated fat above the *Dietary Guidelines for Americans, 2020-2025* recommended limit of less than 10 percent of calories per day starting at age 2 years.

Biomarker Data: No biomarker exists to directly measure saturated fat concentrations.

Health Outcome(s): The prevalence of high LDL cholesterol among children and adolescents ages 12 through 19 years is 5 percent, and among adults and older adults ages 20 years and older is 59 percent. Among adults ages 18 years and older, prevalence of coronary heart disease is 5 percent.

Sociodemographic Data: Certain life stages and sociodemographic groups may be at elevated risk of high saturated fat intakes, with 88 to 91 percent of children and adolescents ages 9 through 18 years exceeding limits for saturated fat. Eighty-eight percent of non-Hispanic White adults, 76 percent of non-Hispanic Black adults, 54 percent of non-Hispanic Asian adults, and 74 percent of Hispanic adults exceed the limit for saturated fat.

Nutrients or Dietary Components that Pose Special Challenges

Choline

Choline is an essential nutrient for methyl metabolism, cholinergic neurotransmission (which is involved in memory and muscle control), cell membrane signaling, and lipid and cholesterol transport and metabolism.[14] Dietary intake data show that 12 percent of individuals ages 1 year and older have intakes of choline above the AI and certain life stages may be at elevated risk for low intakes, as less than 3 percent of adolescents ages 14 through 18 years have intakes of choline above the AI. It is also understood that choline intakes may be challenging to achieve for those who consume a vegan diet or avoid eggs. Although choline is an essential nutrient, few data exist on the impact of inadequate dietary intake in healthy individuals, and no biomarker data are available. Therefore, due to underconsumption but lack of adverse clinical and health outcome data, choline poses special challenges for individuals ages 1 year and older.

Infants Younger Than Age 6 Months

Notwithstanding that dietary intakes among infants younger than age 6 months are important due to the specific dietary requirements necessary to support proper growth and development, the Committee did not evaluate data on nutrient intakes during this life stage. Identifying nutrients of potential concern among infants is challenging due to minimal research on nutrient requirements, absence of biomarker data, and challenges with assessing dietary intakes during the life stage. Moreover, the AI values for nutrients during this life stage reflect usual human milk content, therefore it is not appropriate to use the 3-pronged

framework to determine nutrients of public health concern for infants younger than age 6 months whose only source of nutrition is human milk and/or infant formula. Nonetheless, the Committee notes the importance of supplemental vitamin D during this life stage for infants who are exclusively fed human milk or for those who receive both human milk and infant formula.

Infants Ages 6 through 11 Months

Nutrients of Public Health Concern

Iron (Human Milk-Fed)

Relevance: Iron is a mineral and critical component of hemoglobin, a protein that transports oxygen throughout the body.[14] Iron is particularly important during some life stages, such as infancy, to support neurological development and immune function where critical windows for iron exist and once closed, recovery may not be possible.

Dietary Intake Data: 74 percent of infants fed human milk have intakes of iron below the EAR.

Biomarker Data: No nationally representative biomarker data are available for iron status in infants ages 6 through 11 months.

Health Outcome(s): Infants fed human milk are more likely to have inadequate intakes of iron, which increases the risk of iron-deficiency anemia.

Nutrients or Dietary Components that Pose Special Challenges

Zinc (Human Milk-Fed)

Zinc is an essential nutrient for proper growth and development.[14] Dietary intake data show that 47 percent of infants ages 6 through 11 months fed human milk have zinc intakes below the EAR. However, no biomarker data or clinical health outcome data related to low dietary intakes of zinc among infants ages 6 through 11 months were available to the Committee. Therefore, zinc poses a special challenge based on the percent of human milk-fed infants below the EAR.

Zinc (Infant Formula-Fed)

Dietary intake data show that 78 percent of infants ages 6 through 11 months fed infant formula have intakes of zinc above the Tolerable Upper Intake Level (UL). No biomarker data or clinical health outcome data related to high dietary intakes of zinc among infants ages 6 through 11 months were available to the Committee. Additionally, concerns exist that this UL is not reflective of true biological concerns.[64] Therefore, zinc poses a special challenge based on the percent of infants fed infant formula with intakes above the UL.

Protein (Human Milk-Fed)

Protein during infancy is critically important for muscle and tissue development.[15] Dietary intake data show that 22 percent of infants ages 6 through 11 months fed human milk have intakes of protein below the EAR. No biomarker or clinical health outcome data related to low dietary intakes of protein among

infants ages 6 through 11 months were available to the Committee. Therefore, protein poses a special challenge based on the percent of human milk-fed infants with intakes below the EAR.

Retinol (Infant Formula-Fed)

Retinol, or vitamin A, is a nutrient that is especially important for normal vision.[14] Excess intake of vitamin A can lead to acute vitamin A toxicity. Dietary intake data show that 24 percent of infants ages 6 through 11 months fed infant formula have intakes of retinol above the UL. However, no biomarker data or clinical health outcome data related to high dietary intakes of retinol among infants ages 6 through 11 months were available to the Committee, nor is there evidence of harm from vitamin A levels in formula. Therefore, retinol poses a special challenge based on the percentage of infants fed infant formula with intakes above the UL, and intakes of retinol among this group should continue to be monitored.

Potassium

Dietary intake data show that mean nutrient intakes of potassium from complementary foods and beverages for infants ages 6 through 11 months fall below the AI contribution from complementary foods and beverages. No biomarker or clinical health outcome data related to low dietary intakes of potassium among infants ages 6 through 11 months were available to the Committee. Therefore, potassium poses a special challenge based on low mean intakes from complementary food and beverages.

Vitamin D

Dietary intake data show that mean nutrient intakes of vitamin D from complementary foods and beverages for infants ages 6 through 11 months fall below the AI contribution from complementary foods and beverages. No biomarker or clinical health outcome data related to low dietary intakes of vitamin D among infants ages 6 through 11 months were available to the Committee. Therefore, vitamin D poses a special challenge based on low mean intakes from complementary food and beverages.

Choline

Dietary intake data show that mean nutrient intakes of choline from complementary foods and beverages for infants ages 6 through 11 months fall below the AI contribution from complementary foods and beverages. No biomarker or clinical health outcome data related to low dietary intakes of choline among infants ages 6 through 11 months were available to the Committee. Therefore, choline poses a special challenge based on low mean intakes from complementary food and beverages.

Adolescents Ages 14 through 18 Years

Nutrients or Dietary Components that Pose Special Challenges

Adolescents ages 14 through 18 years, especially adolescent females, are at a greater risk of inadequate nutrient intake than other age groups. Poor nutrient intakes during this life stage are particularly concerning, as it is a time of growth and development, puberty, hormonal changes, and the onset of menstruation for females. Related to growth and muscle development, 8 percent of males and 23 percent of females have intakes of protein below the EAR. Nutrients important for bone health (vitamin D, calcium, phosphorus, magnesium, and zinc) are also underconsumed by a high percentage of adolescents,

especially adolescent females. For example, 86 percent of females ages 14 through 18 years have intakes of calcium below the EAR, compared to 46 percent of individuals ages 1 year and older. Similarly, 53 percent of females ages 14 through 18 years have intakes of phosphorus below the EAR, compared to 5 percent of individuals ages 1 year and older. Other nutrients where high percentages of adolescents are below the EAR (in addition to the nutrients of public health concern) include vitamin A, vitamin B6, folate, vitamin B12, vitamin C, vitamin E, and copper. Additionally, adolescents are at high risk of overconsumption of added sugars and saturated fat compared to the general population ages 1 year and older.

Adolescent Females

Nutrients of Public Health Concern

Iron

Relevance: Iron needs increase for females around the age of 12.5 years when menstruation begins.[14,65] Accordingly, the RDA for iron increases from 8 mg per day to 15 mg per day. For females who have reached age 14 years but are not yet menstruating, the requirement is 10.5 mg per day.

Dietary Intake Data: Among females ages 14 through 18 years, 23 percent have intakes of iron below the EAR. Although data show that less than 3 percent of females ages 9 through 13 years have intakes of iron below the EAR, the EAR for this age-sex group may not account for females who have begun menstruation and have increased iron requirements.

Biomarker Data: The prevalence of inflammation-adjusted serum ferritin deficiency (<15 µg/L) is 24 percent for females ages 12 through 19 years.

Health Outcome(s): Adolescent females have increased iron requirements and are more likely to have inadequate intakes of iron, which increases the risk of iron deficiency.

Females Ages 20 through 49 Years

Nutrients of Public Health Concern

Iron

Relevance: Iron requirements are higher for females ages 20 through 49 years than males ages 20 through 49 years to account for loses with menstruation.[14]

Dietary Intake Data: 22 percent of females ages 19 through 30 years and 20 percent of females ages 31 through 50 years have dietary intakes of iron below the EAR.

Biomarker Data: The prevalence of inflammation-adjusted serum ferritin deficiency (<15 µg/L) is 23 percent for females ages 20 through 49 years.

Health Outcome(s): Females ages 20 through 49 years have higher iron requirements than their male counterparts and are more likely to have inadequate intakes of iron, which increases the risk of iron-deficiency anemia.

Individuals who are Pregnant or Lactating

Nutrients of Public Health Concern

Iron (Pregnancy)

Relevance: Iron requirements increase during pregnancy to support fetal development.[14]

Dietary Intake Data: Although the sample size was too small to determine a reliable estimate of dietary intakes of iron among females who are pregnant ages 20 through 44 years, 22 percent of non-pregnant females ages 19 through 30 years and 20 percent of females ages 31 through 50 years who are not pregnant have dietary intakes of iron below the EAR. These data suggest that iron remains of concern during pregnancy.

Biomarker Data: Among females who are pregnant or who are lactating, the prevalence of high serum soluble transferrin receptor concentration is 13 percent. Although these data include females who are lactating, the prevalence is likely driven by those who are pregnant as iron requirements during lactation fall and then return to pre-pregnancy levels when menstruation resumes.

Health Outcome(s): Females who are pregnant have increased iron requirements and are more likely to have inadequate intakes of iron, which increases the risk of iron-deficiency anemia.

Folate (Pregnancy - 1st trimester)

Relevance: Folate is a water-soluble B vitamin that functions as a coenzyme in the metabolism of nucleic and amino acids.[14] Folate requirements increase during pregnancy to support neural tube development.

Dietary Intake Data: 52 percent of pregnant females ages 20 through 44 years have intakes of folate below the EAR.

Biomarker Data: The prevalence of low folate (red blood cell) concentration is 0 percent among pregnant or lactating females ages 20 through 44 years.

Health Outcome(s): Adequate folate intake is critical to prevent neural tube defects in the developing fetus, such as spina bifida.

Iodine (Pregnancy)

Relevance: Iodine is an essential component of thyroid hormones that regulate many key biochemical reactions, including protein synthesis.[14] Iodine requirements increase by more than 50 percent during pregnancy to support neurological development and fetal growth. Most prenatal products do not contain iodine.[66]

Dietary Intake Data: Dietary intake data are not available for iodine.

Biomarker Data: Although no recent biomarker data related to iodine intakes among females who are pregnant were available to the Committee, data from NHANES 2007-2014 show that median urinary iodine concentration among females who are pregnant was 144 µg/L, which is below the WHO cut-off for 'insufficiency' (less than 150 µg/L).[67]

Health Outcome(s): Inadequate iodine intake during pregnancy can lead to severe adverse fetal health effects such as neurological damage and growth and developmental abnormalities.

Nutrients or Dietary Components that Pose Special Challenges

Folic Acid

Dietary intake data show that 21 percent of females who are pregnant and who use dietary supplements have folic acid intakes above the UL. Previous dietary intake data show that 24 percent of females who are lactating and who use dietary supplements have folic acid intakes above the UL.[68] Folic acid supplementation is recommended at least 1 month before conception and through the first 2 to 3 months of pregnancy. No clinical health outcome data related to high dietary intakes of folic acid during pregnancy or lactation were available to the Committee. Therefore, folic acid poses a special challenge for females who are pregnant or lactating and who use dietary supplements.

Iron

Previous dietary intake data show that 29 percent of females who are lactating and who use dietary supplements have intakes of iron above the UL.[68] No clinical health outcome data related to high dietary intakes of iron during lactation were available to the Committee. Although no current reliable estimates exist for the percentage of females who are pregnant and who use dietary supplements and have intakes above the UL, the concern for exceeding the UL also exists for this population. Therefore, iron poses a special challenge for females who are pregnant or lactating and who use dietary supplements.

Older Adults

Nutrients or Dietary Components that Pose Special Challenges

Protein

Protein consumption is important to help prevent loss of lean muscle mass that occurs with age (i.e., sarcopenia). While <1 percent of older adults are categorized as underweight and 42 percent are categorized as having obesity, sarcopenia impacts all older adults regardless of weight status. Fourteen percent of females ages 71 years and older and 9 percent of males 71 years and older have intakes of protein below the EAR. Eight percent of females ages 51 through 70 years and 5 percent of males ages 51 through 71 years have intakes of protein below the EAR. No biomarker data related to protein status or clinical health outcome data on the prevalence of sarcopenia or reduced muscle strength were available to the Committee. Therefore, protein poses a special challenge based on the percentage of older adults with protein intakes below the EAR.

Vitamin B12

Vitamin B12 status tends to decline with age because the ability to absorb B12 may decrease, and certain medications may also decrease absorption. Among individuals ages 71 years and older, 10 percent of females and 7 percent of males have intakes of vitamin B12 below the EAR. Eleven percent of females ages 51 through 70 years and 6 percent of males ages 51 through 71 years have intakes of vitamin B12 below the EAR. No biomarker data or clinical health outcome data related to B12 status were available to the Committee. Therefore, vitamin B12 poses a special challenge for older adults based on their reduced ability to absorb this nutrient.

Discussion

In general, U.S. dietary intakes do not align with recommendations in the *Dietary Guidelines for Americans*. Dietary patterns, as assessed by the HEI-2020 and HEI-Toddlers-2020, indicate that intakes of food groups and nutrients do not meet recommendations for all life stages and sociodemographic groups examined. Data show that dietary intakes of food groups, nutrients, and dietary components associated favorably with health outcomes (total Vegetables; Fruits; Dairy and Fortified Soy Alternatives; Seafood; Nuts, Seeds, and Soy Products; and Whole Grains; dietary protein; dietary fiber; calcium; potassium; magnesium; iron; zinc; copper; phosphorus; vitamin A; thiamin; vitamin B6; folate (DFE); vitamin B12; vitamin C; vitamin D; vitamin E; and vitamin K) are underconsumed by much of the population, while intakes of food groups, nutrients, and dietary components associated unfavorably with health outcomes (added sugars, saturated fat, and sodium) are overconsumed. Systematic reviews that support dietary patterns characterized by higher intakes of vegetables, fruits, legumes, whole grains, fish/seafood, nuts, and unsaturated vegetable oils and lower intakes of red and processed meats, sugar-sweetened foods and beverages, refined grains, and saturated fats were associated favorably with health outcomes, such as lower risks of cardiovascular disease, type 2 diabetes, obesity, age-related cognitive decline, and colorectal and breast cancer.[69-74] Furthermore, evidence from food pattern modeling shows that consuming a diet aligned with the HUSS Dietary Pattern allows achievement of nutrient recommendations with few exceptions. (See **Part D. Chapter 9: Nutrient Profile Development** and **Part D. Chapter 10: Food Group and Subgroup Analyses**.) The Dietary Reference Intakes, many of which are based on prevention of poor health outcomes, serve as the foundation for established nutritional goals used in food pattern modeling.[11-18] Although no major differences in dietary intake were noted since the 2020 Committee's review, a few differences in intake have occurred over time, such as a positive shift in beverage patterns to more water and less sugar-sweetened beverages. For adolescents, Vegetables intake is higher, but Dairy and Fortified Soy Alternatives intake is lower. Dairy and Fortified Soy Alternatives intake is also lower for adults now than in the past.

Nutrition-related chronic health conditions and their precursors pose a major threat to health throughout the lifespan, even starting during childhood and adolescence, which does not bode well for the future of health in the United States. Based on its review of data on dietary intakes, biomarkers, and disease prevalence, the 2025 Committee identified the same nutrients of public health concern for individuals ages 1 year and older as the 2020 Committee: vitamin D, calcium, potassium, and dietary fiber due to underconsumption; and added sugars, (for ages 2 years and older) saturated fat, and sodium due to overconsumption. Many of the food groups and subgroups that are noted as underconsumed (Vegetables; Fruits; Whole Grains; Seafood; Nuts, Seeds, and Soy Products; and Dairy and Fortified Soy Alternatives) are major contributors of these nutrients (e.g., Dairy and Fortified Soy Alternatives to vitamin D and calcium, Vegetables to dietary fiber). Similarly, many top sources of food groups are consumed in forms that are high in nutrients to limit: added sugars, saturated fat, and sodium.

Understanding the current U.S. health status and dietary intakes helped the 2025 Committee provide practical recommendations and advice to the Departments, along with evidence from systematic reviews

and food pattern modeling, regarding what to include in the *Dietary Guidelines for Americans, 2025-2030*. The Committee used dietary intake data to help put into perspective the conclusions drawn from the systematic review and food pattern modeling evidence. For example, systematic review evidence suggested that a dietary pattern that includes legumes is associated with favorable health outcomes.[69,70,74] Therefore, the Committee used the usual intake distribution data to understand the range of intakes of Beans, Peas, and Lentils (i.e., legumes) in the United States to develop quantitative recommendations that are achievable.[58] Another example was the Committee's decision to remove some foods lower in nutrient density from the nutrient profiles used in food pattern modeling based on dietary intake data indicating that many top sources of food groups are consumed in forms that are high in nutrients to limit: added sugars, saturated fat, and sodium (see **Part D. Chapter 9: Nutrient Profile Development**).

Several key themes emerged throughout the Committee's review of the data analysis evidence, including the importance of consuming a healthy dietary pattern throughout the lifespan, the impact of environmental influences on dietary intakes, the value of applying a health equity lens, and the importance of recognizing the impacts of COVID-19. These topics are discussed in the following sections, along with a discussion of the strengths and limitations of the nationally representative data used in the data analysis approach.

Importance of a Healthy Dietary Pattern Throughout the Lifespan

The lifespan approach was an important concept for the development of the *Dietary Guidelines for Americans, 2020-2025* and continued to influence the work of the 2025 Committee because age and life stage characterize nutritional needs and dietary behaviors. The rates of nutrition-related outcomes and indicators were considered along with dietary intakes and patterns to gain insights on life stages by sex, another important differentiator of intakes.

It is estimated that more than $700 billion is spent each year in healthcare costs related to nutrition-related chronic diseases, including $173 billion on obesity, $240 billion on heart disease, and $307 billion on diabetes.[75,76] Financial burden aside, these chronic health conditions threaten the population's ability to lead long, healthy lives. Obesity is a major public health issue, impacting 36 percent of children ages 2 through 19 years and 41 percent of adults ages 20 years and older. Further, the prevalence of prediabetes among children and adolescents ages 12 through 19 years is 38 percent. Obesity, prediabetes, hypertension, unfavorable blood lipid profile, and metabolic syndrome are also risk factors for other chronic diseases such as cardiovascular disease and diabetes.

Although non-dietary factors contribute to risk of developing a chronic health condition, the importance of consuming a healthy dietary pattern throughout the lifespan cannot be overstated and starts early in life. Yet, dietary intakes are not aligned with dietary guidance at any age. HEI score data show that dietary patterns tend to be healthier at the earlier stages of life (ages 12 months through 4 years) and the later stages of life (ages 71 years and older), with the poorest intakes among adolescents ages 14 through 18 years. Dietary patterns also tend to be somewhat healthier during pregnancy and lactation. These HEI scores align with data on food group and nutrient intakes. For food groups and subgroups, average intake data across age-sex groups show low intakes of Vegetables; Fruits; Whole Grains; Seafood; Nuts, Seeds,

and Soy Products; and Dairy and Fortified Soy Alternatives and high intakes of Refined Grains. Many health-promoting nutrients and dietary components with intake requirements are underconsumed, while those with recommendations to limit (i.e., added sugars, saturated fat, and sodium) are overconsumed.

Using this lifespan approach, infancy, adolescence, pregnancy, and lactation were determined to be life stages during which the impact of nutritional inadequacies is substantial due to the occurrence of development and growth, the high risk of poor immediate or long-term outcomes, and poor dietary and nutrient intakes, especially among adolescent females. Considerations for these life stages are discussed in the following sections.

Infants

Iron is notable as a nutrient of public health concern for infants ages 6 through 11 months who are fed human milk, as the health risks of underconsumption are particularly high due to the role of iron in cognition and brain development. The Committee recognizes the American Academy of Pediatrics (AAP) recommendations for iron supplementation starting at age 4 months for infants fed exclusively human milk or infants partially fed human milk if no iron-containing complementary foods are consumed.[77]

Adolescents

Throughout the lifespan, dietary intake is poorest in adolescence despite this period being essential for heightened linear growth. Adolescent females and males have poor dietary intakes, but females experience a constellation of nutrient shortfalls and high needs for nutrients related to growth, development, and menstruation losses. For nearly all nutrients with an EAR, a high percentage of adolescents ages 14 through 18 years—and especially females—have intakes below the EAR. Notably, nutrient intake data indicate that 56 percent of males and 68 percent of females ages 14 through 18 years have intakes below the EAR for calcium, 95 percent of males and >97 percent of females have intakes below the EAR for vitamin D, 81 percent of males and 89 percent of females have intakes below the EAR for magnesium, 13 percent of males and 53 percent of females have intakes below the EAR for phosphorous, and in particular, 23 percent of females ages 14 through 18 years have intakes of protein below the EAR. The nutrients contributing to bone health—including calcium, vitamin D, protein, magnesium, and phosphorous—are critical during this life stage where linear and skeletal growth is rapid and the accretion of bone mineral density is maximized throughout the lifespan. For this reason, osteoporosis, which affects 20 percent of females ages 50 years and older, is often referred to as a disease rooted in childhood. Among individuals ages 50 years and older, approximately 1 in 2 females and up to 1 in 4 males will have a broken bone resulting from osteoporosis in their lifetime, according to the Bone Health and Osteoporosis Foundation.[78]

Nationally representative biomarker data indicate that 24 percent of adolescent females have iron deficiency. However, some studies show that iron deficiency among adolescent females may be up to 40 percent, which indicates that increasing iron intake in late prepubertal females may be beneficial.[79] Iron is important for growth, development, and brain function, due to its incorporation into red blood cells that deliver oxygen, energy, and nutrients to body cells. Yet, iron losses may be high with the initiation and continuation of menstruation in females throughout adolescence and into adulthood. Changes occur in

eating habits and behaviors during this life stage as adolescents consume more food independently and outside of the household. Disordered eating such as anorexia nervosa and bulimia nervosa is common among adolescent and young adult females and may contribute to poor dietary practices, and the food environments that adolescents navigate may also not support healthful choices.[80]

Pregnancy and Lactation

Pregnancy and lactation are other life stages that the Committee is highlighting due to the need for heightened attention to food and nutrient intakes, shortfalls, and risk of health outcomes. The nutrient and dietary shortfalls that most adolescent females experience can persist into young adulthood, the most common life stage during which pregnancy and lactation occur. Dietary intakes during pregnancy can impact the birthing parent's immediate and long-term health, and the developing embryo and fetus may be influenced by the nutritional status and environment of the birthing parent. Gestational diabetes was estimated at 8 percent, significantly higher than the 6 percent noted for 2016, and gestational hypertension was 84.3 per 1,000 live births. These outcomes threaten the health and wellbeing of individuals who are pregnant or lactating, and the lives of their children.

Although dietary quality, as measured by HEI scores, is higher among individuals who are pregnant or lactating (total HEI scores: 63 and 62, respectively) compared to their female counterparts who are not pregnant or lactating (total HEI score: 53), several nutrient shortfalls are still present among this group. Iron is a nutrient of public health concern during pregnancy and for females ages 20 through 49 years. Although no reliable estimates were available to evaluate iron intake among individuals who are lactating, dietary intake and biomarker data for females ages 20 through 49 years indicate that iron is assumed to be of public health concern for this life stage. Folate is essential early in pregnancy for the prevention of neural tube defects, when many individuals are unaware that they are pregnant. Folate-rich foods such as vegetables, however, are not consumed at recommended levels. Therefore, folate is considered as a nutrient of public health concern for females during the preconception period and the first trimester of pregnancy. Iodine is an important regulator of metabolism, growth, and development during pregnancy and is also identified as a nutrient of public health concern based on biomarker data. Several other nutrients are noted as posing special challenges, including iodine, which is not available in the current nutrient databases, therefore future consideration of iodine intake is needed.

Environmental Influences

Although individual behavior and personal choices contribute to dietary intake, the food environment and other environmental factors strongly influence the ability of individuals to consume healthy dietary patterns. The types and amounts of foods that individuals consume are influenced by a variety of well-recognized personal, physical, economic, and sociocultural factors that include taste, culture, convenience, access, availability, cost, education, time, skills, and social systems. Many of these factors are shaped by the food environment. For example, children and adolescents attending public schools select from the choices that are offered to them in the school cafeteria, which are regulated through the National School Lunch Program. Therefore, such programs are key mediators of healthy dietary patterns among children.

Adults are also influenced by the food available in the places they live, work, and visit as part of their routines.

Dietary intakes may reflect the food environment, which is represented in the foods included in the national food composition database (FNDDS) for this data analysis work. **Part D. Chapter 11: Diet Simulations** describes how analyses were conducted to evaluate the proposed modifications to the HUSS Dietary Patterns, considering a wide variability in the selection of foods and beverages and varying amounts of lower nutrient-dense foods and beverages. Results showed that CDRR criteria were not met for most age-sex groups even when lower-nutrient-dense foods that exceeded the sodium limit criteria were excluded from simulation. These results help make salient the potential for healthier diets by shifting industry practices toward reformulating food products with less sodium. Industry's shifting the nutrient profiles of its food products could help individuals stay within recommendations for nutrients to limit, such as added sugars and saturated fat. Creating a healthier food environment may lead to better dietary intakes and nutrition-related health outcomes.

Healthy dietary patterns play an important role in promoting health and preventing disease but are not the only determinant of health. The onset and progression of chronic disease is impacted by behavioral aspects such as physical activity and social determinants—many of which are environment-related—such as safe housing, transportation, neighborhood contexts, access to health care, and education.[1] Cross-sector collaboration is needed to improve U.S. health because social and environmental determinants of health play out in complex systems that span across sectors.

Health Equity/Sociodemographic Data

This Committee intentionally emphasized and incorporated health equity throughout its work. For the data analysis approach, such efforts included ensuring that the data reviewed for each scientific question considered the variety of sociodemographic variables (described in the Introduction of this chapter) to provide a more granular look at how dietary intakes and chronic disease prevalence may vary in the population and allow for insights into the choices and environments supporting these intakes (see **Box D.1.2**). Statistical testing was not completed for many analyses, and differences between groups could not be determined. Nonetheless, several valuable insights were gleaned from these data that provide a more nuanced look at population dietary patterns, intakes, and health outcomes.

Box D.1.2: Data Analysis Variables

This Committee prioritized health equity throughout the data analysis approach by examining data for sociodemographic variables including age, sex, race and/or ethnicity, and poverty to income ratio. This Committee was the first to evaluate several sociodemographic characteristics and factors, such as food security status and participation in the SNAP and WIC programs, in its data analysis efforts.

Few individuals consume a dietary pattern that aligns with *Dietary Guidelines* recommendations, regardless of race, ethnic, or sociodemographic group examined. All U.S. individuals can benefit from shifting to healthier dietary patterns. A few meaningful differences exist in HEI scores across race, ethnic, and sociodemographic groups. For individuals ages 2 years and older, non-Hispanic Asian individuals have a higher HEI score (63) than all other racial and/or ethnic groups. Among children and adolescents ages 2 through 18 years, non-Hispanic Asian children have a higher total HEI-2020 score (57 for males and females) compared to non-Hispanic White children (males: 50, females: 52), non-Hispanic Black children (males: 52, females: 51), and children of other race and/or ethnicity groups (males: 50, females: 52). Among adults ages 19 years and older, total HEI-scores are higher among non-Hispanic Asian adults (64) than adults of all other racial and/or ethnic groups examined. Mean total HEI-2020 scores are also higher among adult females from food secure households (60) than adult females from food insecure households (54).

Data on the percentage of individuals below, or at or above, recommended intakes of food groups and subgroups are relatively consistent across sociodemographic groups and largely mirror findings from the HEI-2020 data. Most individuals could benefit from shifting intakes to better align with recommendations, but a few sociodemographic groups have intakes that stand out. For example, among ages 1 year and older, a noticeable percentage of non-Hispanic Asian individuals have intakes at or above the recommendations for Vegetables, Dark-Green Vegetables, Other Vegetables, Fruits, Whole Grains, Seafood, and Nuts, Seeds, and Soy Products, compared to the percentages for the other racial and/or ethnic groups examined.

As described earlier in this chapter, certain sociodemographic groups may be at elevated risk for inadequate nutrient intakes. Across race and/or ethnicity, data on the percentage of individuals below the EAR show that non-Hispanic Black individuals may be at a greater risk for inadequate nutrient intakes. These data also show that individuals with household income below 131 percent of the poverty level and individuals with very low food security may be at a higher risk for inadequate nutrient intakes. Findings by race and/or ethnicity highlight the importance of representing the population using a specific and detailed approach to such characteristics of diversity.

U.S. rates of nutrition-related chronic health conditions are high, and data show significant differences in prevalence across sociodemographic groups. For example, the prevalence of obesity is lower among non-Hispanic Asian children compared to all other race and/or ethnicity groups examined, and the prevalence is lower in non-Hispanic White children compared to non-Hispanic Black and Hispanic and/or Latino children. Obesity is significantly lower among children with higher family income compared to those with lower family income. Among adults, the prevalence of obesity is lower among non-Hispanic Asian adults and higher in non-Hispanic Black adults. Prevalence of hypertension is higher in non-Hispanic Black adults than adults of all other race and/or ethnicity groups examined. Diabetes is lower in non-Hispanic White adults compared to all other race and/or ethnicity groups examined, while gestational diabetes is highest among non-Hispanic Asian adults and lowest among non-Hispanic Black adults. Income data show that among adults, the prevalence of obesity, of hypertension, and of diabetes are higher among families with lower incomes compared to higher incomes. Education data show that prevalence of obesity and of

hypertension among adults are lower among those with higher educational attainment (college degree or above) than those with lower educational attainment. Although statistical testing was not completed, another interesting finding is that the mortality rate of breast cancer is highest (by absolute differences) among non-Hispanic Black females, although the incidence rate is highest among non-Hispanic White females. Taken together, these data indicate presence of health disparities across some of the sociodemographic groups examined.

The Committee examined intakes and nutrition-related chronic disease by SNAP and WIC program participation status for some of the analyses. Data on intakes of food groups and nutrients revealed that regardless of program participation status, intakes do not align with recommendations. SNAP and WIC play an important role in promoting food and nutrition security, serving a combined 47.5 million individuals per month.[81,82] SNAP provides food benefits to low-income families, which helps them afford nutritious food essential to health and wellbeing.[83] SNAP-Ed, a federally funded grant program, offers nutrition education to eligible individuals to empower them with knowledge to maximize nutrition in their food choices, along with practical information for comparing prices and nutrition labels and planning and cooking healthy meals.[84] Similarly, WIC benefits help provide low-income women, infants, and children younger than age 5 years with nutritious foods, nutrition education, health referrals, and other social services. WIC serves about 40 percent of all infants in the United States.[85] The circumstances in which individuals are eligible for and participate in these programs are complex, and some income-eligible households may not participate in the programs. For example, most SNAP households live at or below the poverty level, and most include either a child, an older adult, or an individual with a disability.[82] These complexities represent the intersectionality that exists among individuals who are characterized as a SNAP participant. These characteristics also impact dietary intakes and the prevalence of chronic disease but are not captured in the data. Further, the completed analyses were not designed to assess the impact of the SNAP or WIC programs, control for confounding, or describe statistical differences between participants compared to nonparticipants (income-eligible and higher income). Prior research on dietary intakes among program participants, which includes statistical testing and elaborates on these analytic challenges, is available elsewhere.[86-88]

Impact of COVID-19

During the NHANES 2019-2020 cycle, the COVID-19 pandemic disrupted data collection. Although the partial 2019-2020 data were combined with data from the previous cycle (2017-2018) to create a nationally representative 2017-March 2020 sample, NHANES did not collect data during the height of COVID-19.[89] This is an important consideration when describing current dietary intakes because COVID-19 brought attention to food insecurity and diet-related diseases and affected the way individuals purchased food. A publication by the Economic Research Service (ERS) showed that U.S. households shifted away from full-service restaurant meals and purchased more foods and beverages at grocery stores and other food-at-home establishments.[90]

The lack of federal data collection during this time and the need for understanding what, if any, impact COVID-19 had on dietary intakes led federal staff to conduct an evidence scan exploring published

evidence on dietary patterns during COVID-19 (March 2020-December 2022).[91] The evidence scan revealed insufficient research, including no nationally representative studies, to warrant further investigation of food and beverage intakes during COVID-19. Although too few research studies were identified to elucidate associations between COVID-19 and changes in dietary intakes, the Committee recognizes that dietary patterns could have been affected. However, any potential changes in intakes are not represented in this report.

The COVID-19 pandemic also impacted the use of health care services and reporting for the prevalence of chronic conditions. According to the Centers for Disease Control and Prevention (CDC), the use of health care services declined for preventive, routine, and emergency care.[92] This presents a challenge as preventive care can help improve chronic disease prevalence; and some conditions, like obesity, had significantly higher rates during the first year of the COVID-19 pandemic compared to pre-pandemic.[93] Additionally, fewer people received recommended cancer screenings during the pandemic. According to the Surveillance, Epidemiology, and End Results Program (SEER), due to delays in cancer screening and diagnosis, cancer incidence rates for all cancers combined fell 10 percent in 2020 compared to 2019.[94] This decline impacted SEER's modeling for cancer trends. Therefore, no 2020 cancer data were considered by the Committee, and instead, 2021 incidence and 2022 mortality data were included.

Data Strengths

The Committee's data analysis work relied on nationally representative data, collected primarily from the NHANES survey and its WWEIA component, which has a primary purpose of assessing the health and nutritional status of U.S. adults and children. The importance of NHANES and the valuable data it collects cannot be overstated, especially as it related to this Committee's work. These data were used to describe the current health and dietary intakes in the United States to inform practical, relevant, and achievable recommendations. As a key advantage, NHANES relies on laboratory data to determine the prevalence of nutritional biomarkers and physical examination data for health condition prevalence, rather than self-reported information. In addition, NHANES collects dietary intake information using a rigorous 5-step multiple pass method, which enhances the reliability of the dietary recall. To determine mean and usual dietary intake distributions of food groups, food subgroups, and nutrients, as well as the percent of the population at/above or below recommendations, the Committee relied on the National Cancer Institute method, which helps to mitigate some of the measurement error that is inherent to dietary assessment.[95]

To ensure the data were comprehensive and allow for application of a health equity lens, the Committee requested and analyzed data that considers the sociodemographic variables described previously. More than 4,700 pages of new data tables are included in the federal data analysis supplements, and 45 existing data publications were considered in the development of this report and the Committee's recommendations. The 2025 Committee examined an amount of data that surpassed that which was reviewed by all prior Committees.

Data Limitations

The data analysis approach used the most recent, nationally representative data possible and provided a basic understanding of dietary intakes and the prevalence of nutrition-related chronic health conditions in the United States but was not without methodological limitations in the data collection, analysis, and interpretation. The Committee considered several such limitations as data were synthesized, conclusions were developed, and advice to the Departments was proposed.

First, dietary intake data are subject to measurement error such as by self-reported intake, proxy interviews, or variation in the FNDDS food composition data. In addition to the standard concerns regarding measurement error when assessing diet (e.g., underreporting), little is known about measurement error due to proxy interviews, which were the source of dietary recall data for infants and young children. Proxy interviews were typically provided by a parent; however, this may not be the person most familiar with the infant's dietary intake, particularly if the infant was in childcare for the recalled day. Furthermore, little is known regarding potential differences in the measurement error of groups by food security or income status where misreporting may potentially vary from food secure or higher income groups.

Second, due to sample sizes and data availability, variation exists across analyses such as data sources used, data years analyzed, sociodemographic groups examined, and definitions applied for categories within certain sociodemographic groups. When stratifying data by sociodemographic groups, sample size is often small due to NHANES' current structure for sampling population groups of interest, and some estimates may be less reliable due to large standard error. To obtain reliable estimates, multiple cycles of data over longer time frames were combined for many population estimates, including infants, young children, pregnancy, and lactation. Despite this approach, many estimates remain less reliable, such as beverage patterns during pregnancy and lactation. The use of multiple data cycles is potentially problematic due to the dynamic nature of the food supply, changes in the food environment, trends in intake, and potential lags in the FNDDS to reflect the food supply in a timely manner. In addition, non-NHANES, self-reported data sources may have been used for certain sociodemographic groups to obtain chronic disease estimates that were not available in NHANES laboratory or physical examination data. For the purposes of the Committee's data analysis work, data that were less reliable—such as when the sample was small, confidence interval was wide, and/or relative standard error was large—were not included in this report or considered in conclusion statements for the data analysis questions.

Third, for most analyses, statistical testing for significance was not completed. Although variation between groups may exist, data were not available to determine if differences are statistically meaningful. Data points that did not have statistical testing were not described with any statements of directionality (e.g., higher or lower) or importance (e.g., significant). Data points with statistical testing are described with directionality when the p-value is below the threshold for statistical significance included in that analysis.

Fourth, with regard to the process of identifying nutrients and dietary components of public health concern, the framework uses a 5 percent cut-off for the assessment of risk of dietary inadequacy or excess in the population. Although this cut-off provides a threshold that is sufficiently low, it is an arbitrary value

that does not capture the full spectrum of dietary intakes among sociodemographic groups for some nutrients, such as protein. Data show that 7 percent of individuals ages 1 year and older are below the EAR for dietary protein, thus the Committee has identified this nutrient as underconsumed. However, this is close to the threshold of 5 percent. When further stratifying the data, it becomes apparent that this percentage is driven by certain age-sex groups, including females ages 14 through 18 years (23 percent below the EAR) and females ages 71 years and older (14 percent below the EAR). All other age-sex groups have intakes 9 percent or less below the EAR. Intakes of dietary protein as a nutrient are distinct from intakes of Protein Foods as a food group. Although multiple food groups contribute dietary protein as a nutrient, data on Protein Foods Group and Subgroup intakes provide complementary insight into common sources of dietary protein. At least half of individuals in most age-sex groups have Protein Food intakes at or above recommendations, except for individuals ages 9 through 13 years, females ages 14 through 30 years, and females ages 60 years and older.

Lastly, data limitations related to interpretation were considered. The Committee recognizes the complexity of the data for average intakes of food groups and subgroups. Although the average intake data help describe, in general, how intakes compare to recommendations, these data fail to capture the range of usual intake distributions within the population. For example, data show that for most age-sex groups, the average intake of Nuts, Seeds, and Soy Products (5.6 oz eq per week) are at or above recommendations. However, usual intake distribution data show that half of individuals ages 1 year and older consume only 2.8 oz eq of Nuts, Seeds, and Soy Products per week, although for most calorie levels in the *Dietary Guidelines* Dietary Patterns, the recommendation is at least 5 oz eq per week. In this case, a small percentage of the population (95th percentile) is consuming a relatively high amounts of Nuts, Seeds, and Soy Products (19.6 oz eq per week). This skews the average intake data, so it appears that most individuals are meeting the recommendation when they are not. Intakes of Nuts, Seeds, and Soy Products may be more complex due to the prevalence of food allergies. Data on the percentage at, above, and below recommendations help provide clarity on the intakes of food groups in the population. These interpretation challenges were taken into the consideration as the Committee developed its conclusion statements and recommendations. Additionally, complex factors that were not captured in the data contributed to the results. For example, these data did not capture that members of one sociodemographic group also have other identities and characteristics and are shaped by social systems (i.e., intersectionality). Also, the data were cross-sectional and cannot be used to determine trends over time or cause-and-effect relationships. Research and other recommendations related to these limitations are described in **Part E. Chapter 2: Future Directions**.

Committee's Advice to the Departments

The data analyses described in this chapter include the prevalence of diet-related chronic health outcomes, indicators, and other diet-related conditions; dietary patterns and beverage patterns; food group, food subgroup, nutrient, and dietary component intakes; and the classification of nutrients of public health concern and nutrients posing special challenges in the U.S. population and among certain life stage and sex groups. These data do not show causality, and therefore the Committee integrated the findings

with the systematic review and food pattern modeling results presented in **Part D: Evidence on Diet and Health** to consider implications for public health programs and interventions. Nonetheless, the cross-sectional data analysis results herein are useful for informing practical, relevant recommendations for the diverse U.S. population to achieve dietary recommendations and thereby improve their health. The Committee provides the following recommendations to the Departments as they develop the *Dietary Guidelines for Americans, 2025-2030*:

- Although most individuals in the United States have poor diet quality, the Committee recommends recognizing differences by sociodemographic groups including age, sex, race and/or ethnicity, and food security status. Mean HEI-2020 scores range from 48 to 64 (out of 100) among age-sex and sociodemographic groups, illustrating that meaningful differences exist in the alignment of dietary patterns with the *Dietary Guidelines*. The *Dietary Guidelines for Americans, 2025-2030* should continue to report current dietary intakes by age and life stage—as done in the lifespan approach of the *Dietary Guidelines for Americans, 2020-2025*—while also expanding to consider other sociodemographic groups where variation in dietary intakes was noted in this report.
- Recommendations should continue to consider the poor health and high prevalence of nutrition-related chronic diseases among older adults, as well as the high prevalence of indicators of poor health among children, adolescents, and younger adults. The Committee found that prediabetes affected nearly 40 percent of children and adolescents ages 12 through 19 years, obesity impacted nearly 20 percent of children and adolescents ages 2 through 19 years, and obesity impacted around 40 percent of adults ages 20 years and older. These estimates, along with the other chronic disease data examined by the Committee, indicate the importance of elevating diet and nutrition as national public health priorities. The recommendations of the *Dietary Guidelines for Americans, 2025-2030* should continue to promote health and reduce chronic disease risk, with the aim to prevent new disease incidence.
- The Committee supports the existing special considerations in the *Dietary Guidelines for Americans, 2020-2025* based on the nutrients and dietary components of public health concern and posing special challenges, as these have remained consistent with the 2020 Committee's work. Continued emphasis should be placed on life stages that are particularly vulnerable due to increased nutrient needs or substantial health risks associated with underconsumption. Several nutritional concerns exist for infants, adolescents (especially females), and individuals who are pregnant or lactating, who are all experiencing rapid growth and development. Left unaddressed, nutrient shortfalls during these life stages have the potential to impact health in the short-term, throughout the lifespan, and for future generations. Thus, dietary recommendations to support these groups in meeting their nutritional needs should continue to be prioritized.

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