

Science Base Chapter:

Food and Nutrient Intakes, and Health: Current Status and Trends

Subcommittee 1

Subcommittee 1 Membership

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Introduction

- Chapter provides a broad examination of
 - food and nutrient intakes by the U.S population,
 - the food and eating environment,
 - prevalence of chronic health conditions.
- Provides an understanding of the relationship of food intake and the food environment to nutrition-related health conditions.
- Documents high rates of diet-related health conditions and provides compelling reasons to study them in greater detail.
- Provides context for actions to facilitate and implement behavior change and adoption of healthy eating practices in the U.S. population.

Taken together, our analyses inform the remaining chapters in the report, which will provide the contextual and scientific foundation for the 2015 Dietary Guidelines for Americans.

Topics Addressed

- Nutrient intakes/nutrients of concern for under or over-consumption
- Food groups—current intakes and trends
- Food categories—current intakes and sources of energy, nutrients, and food group intakes
- Eating behaviors—current intakes and trends
- Prevalence and trends in health conditions
- Dietary patterns composition

Methodology

Data analyses (21 questions)

- National Health and Nutrition Examination Survey (NHANES), including What We Eat in America (WWEIA)
- Additional data sources:
 - SEER/NCI; SEARCH for Diabetes in Youth Study; CDC population-based birth defects surveillance system; National Health Interview Survey; Alzheimer's Association; other CDC publications

Food pattern modeling analyses (7 questions)

- In addition, brought forward summaries from analyses by previous DGACs for several questions.

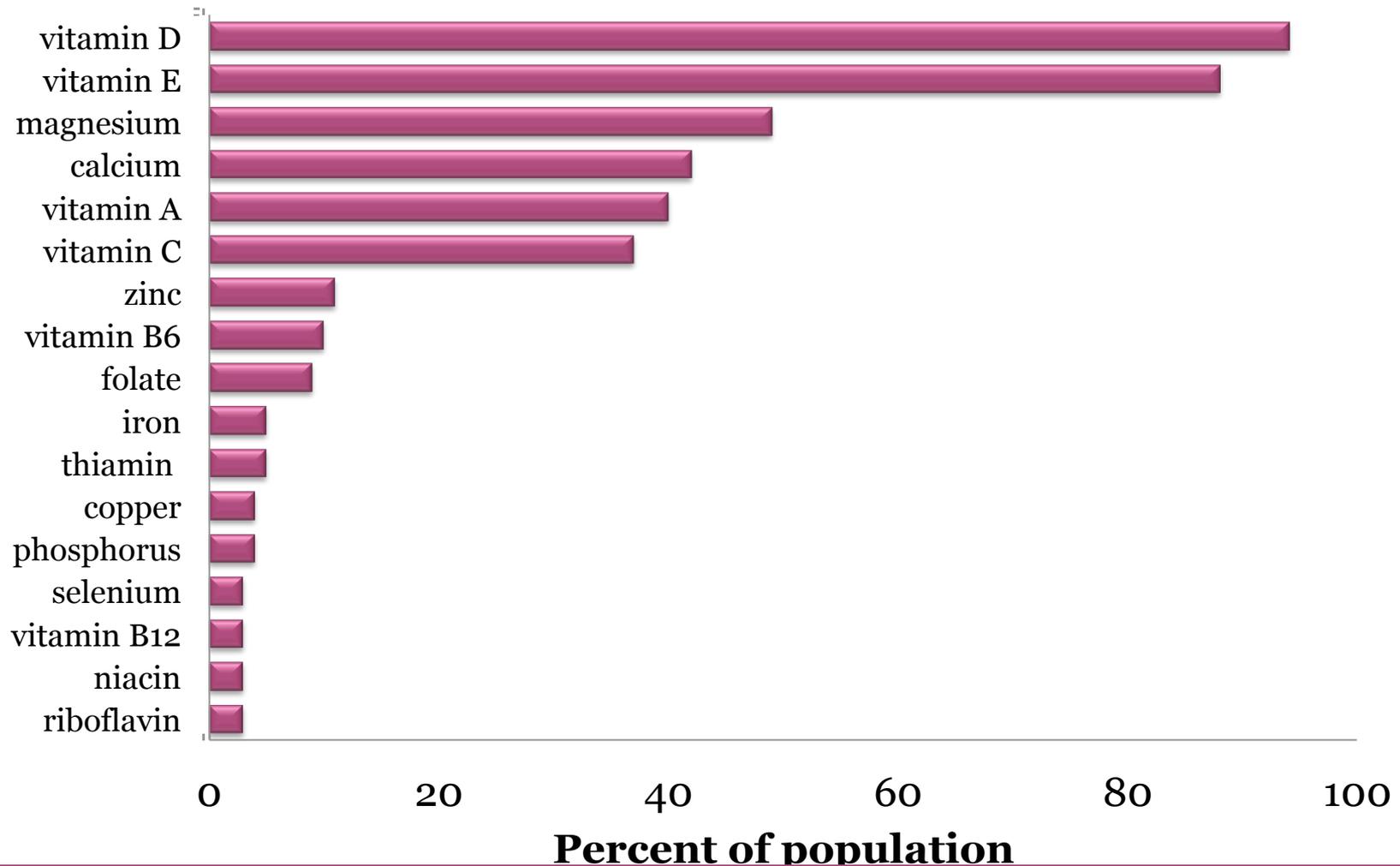
Status Update

- No substantive changes since the work was previously reported in a public meeting.

Nutrient Intakes and Nutrients of Concern

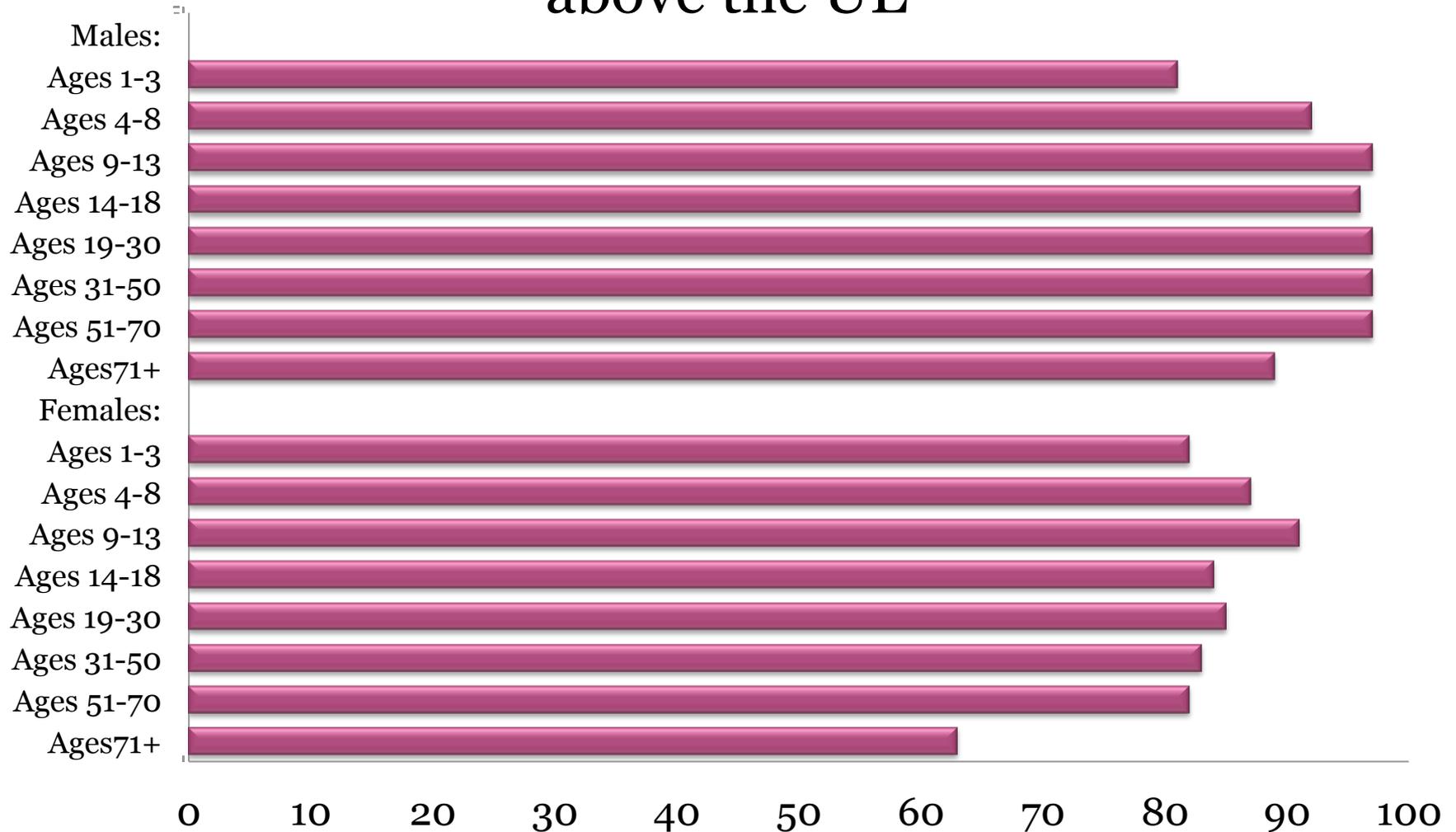
- Based on intake data, together with nutritional biomarker and health outcomes data, identified nutrients that may pose a public health concern:
 - Vitamin D, calcium, potassium, and fiber are underconsumed across the entire US population.
 - Iron is underconsumed for adolescent and premenopausal females.
 - Sodium is overconsumed across the entire US population
 - Saturated fat is overconsumed and may pose the greatest risk to those > 50 years old.
- Cholesterol is not considered a nutrient of concern for overconsumption.

Percent of population ages 2+ with usual intakes below EAR



What We Eat in America, NHANES 2007-10

Sodium: Percent of age/sex group with usual intakes above the UL



What We Eat in America, NHANES 2007-10

Nutrient Intakes—Supplements, Caffeine

- Overconsumption of nutrients from foods and beverages, including fortified foods, is rare.
- However, folate, calcium, iron, and vitamin D may be overconsumed in some supplement users, especially those taking high-dose supplements.
- In general, caffeine intakes do not exceed what are currently considered safe levels for any age group.

Adequacy of the USDA Food Patterns

USDA Food Patterns provide food-based guidance. The Patterns meet nutrient adequacy goals across a broad range of age and energy levels.

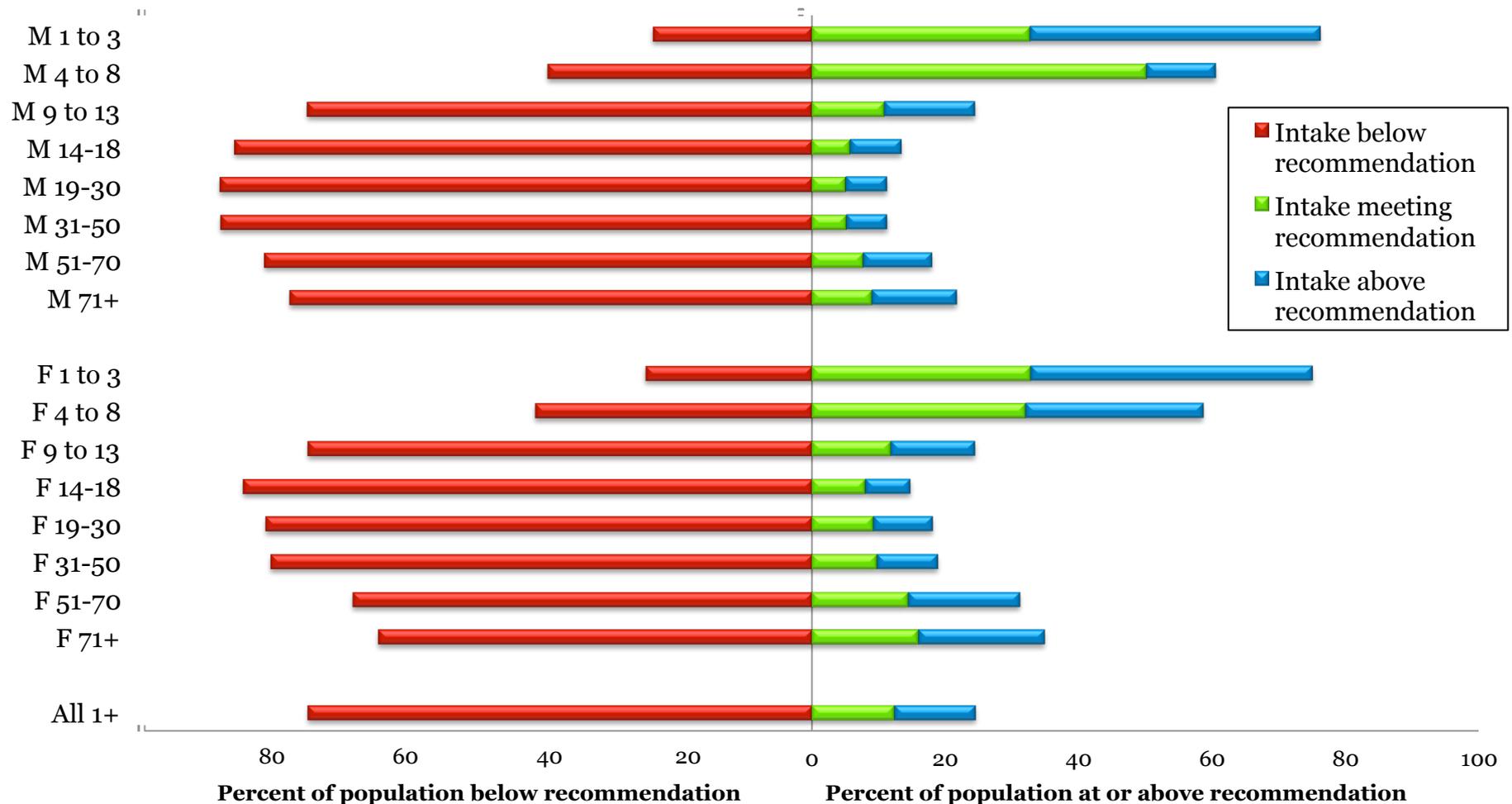
- When adjusted for the food choices of young children, Patterns meet their nutrient needs.
- Patterns do not meet recommendations for potassium (AI) and vitamin D (RDA).
 - Additional fortification or supplementation strategies may be needed to reach RDA levels for vitamin D intake.
- Recommended amounts of food groups and their component subgroups fall within the broad range of usual food group intakes for the U.S. population.

Food groups—Current Intakes

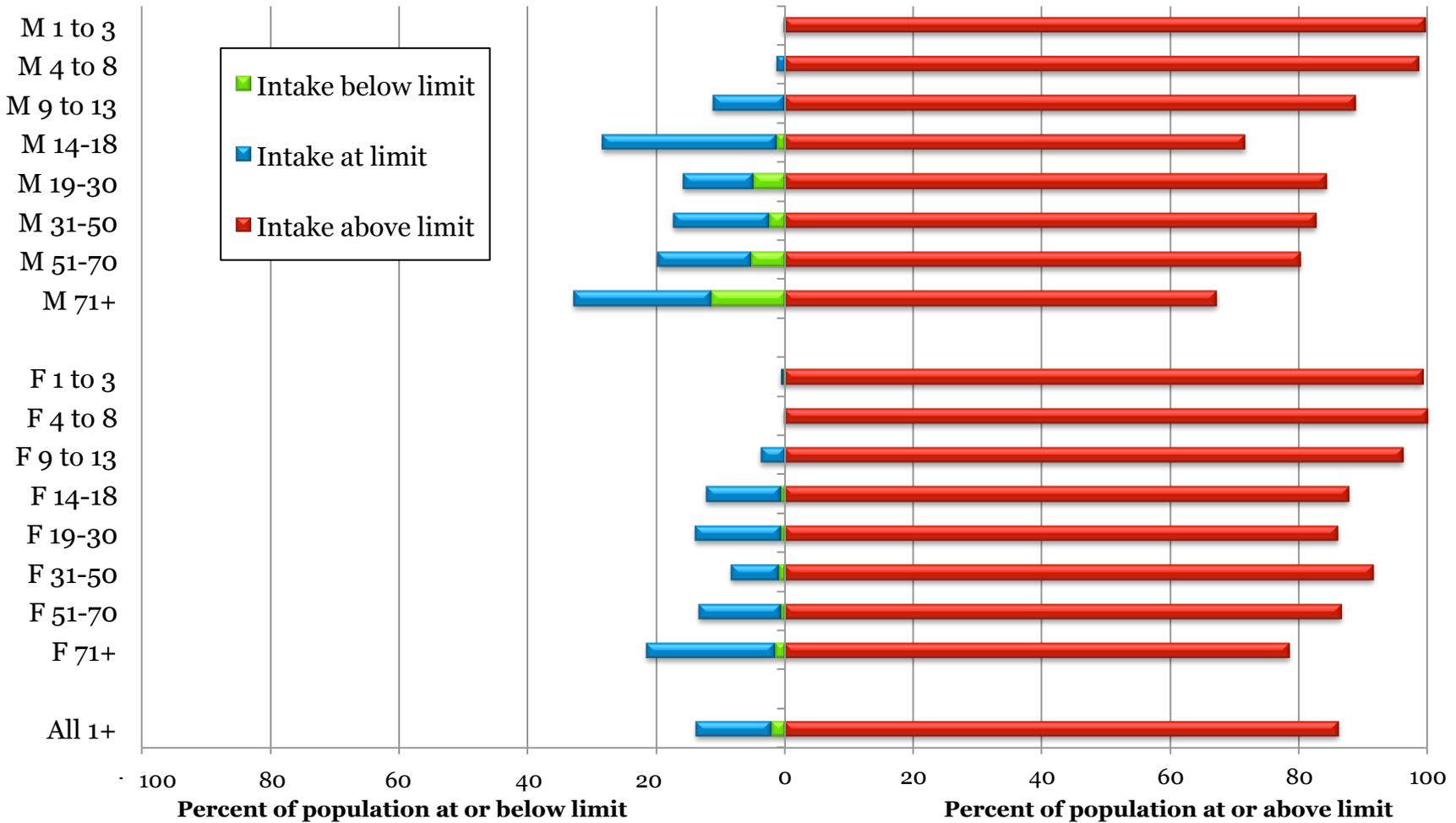
Food groups include fruits, vegetables, grains, dairy, and protein foods, and are based on the USDA Food Pattern classification. Limits for solid fats and added sugars (empty calories) are also part of the patterns.

- Across all age and sex groups, the vast majority of the U.S. population does not meet recommended intakes for fruit, vegetables, whole grains, and dairy food groups.
- Across all age and sex groups, the vast majority of the U.S. population exceeds recommended intakes of refined grains, solid fats, and added sugars.
- Many young children consume recommended amounts of fruit and dairy foods, but these intakes drop as children reach school age and beyond.

Total fruits: Estimated percentage of persons below, at, or above recommendation



Empty Calories*: Estimated percentage of persons below, at, or above limits



*Empty calories are the total of calories from solid fats + added sugars

Food Groups—Trends over Time

The U.S. population has made few dietary changes over the time period from 2001-04 to 2007-10:

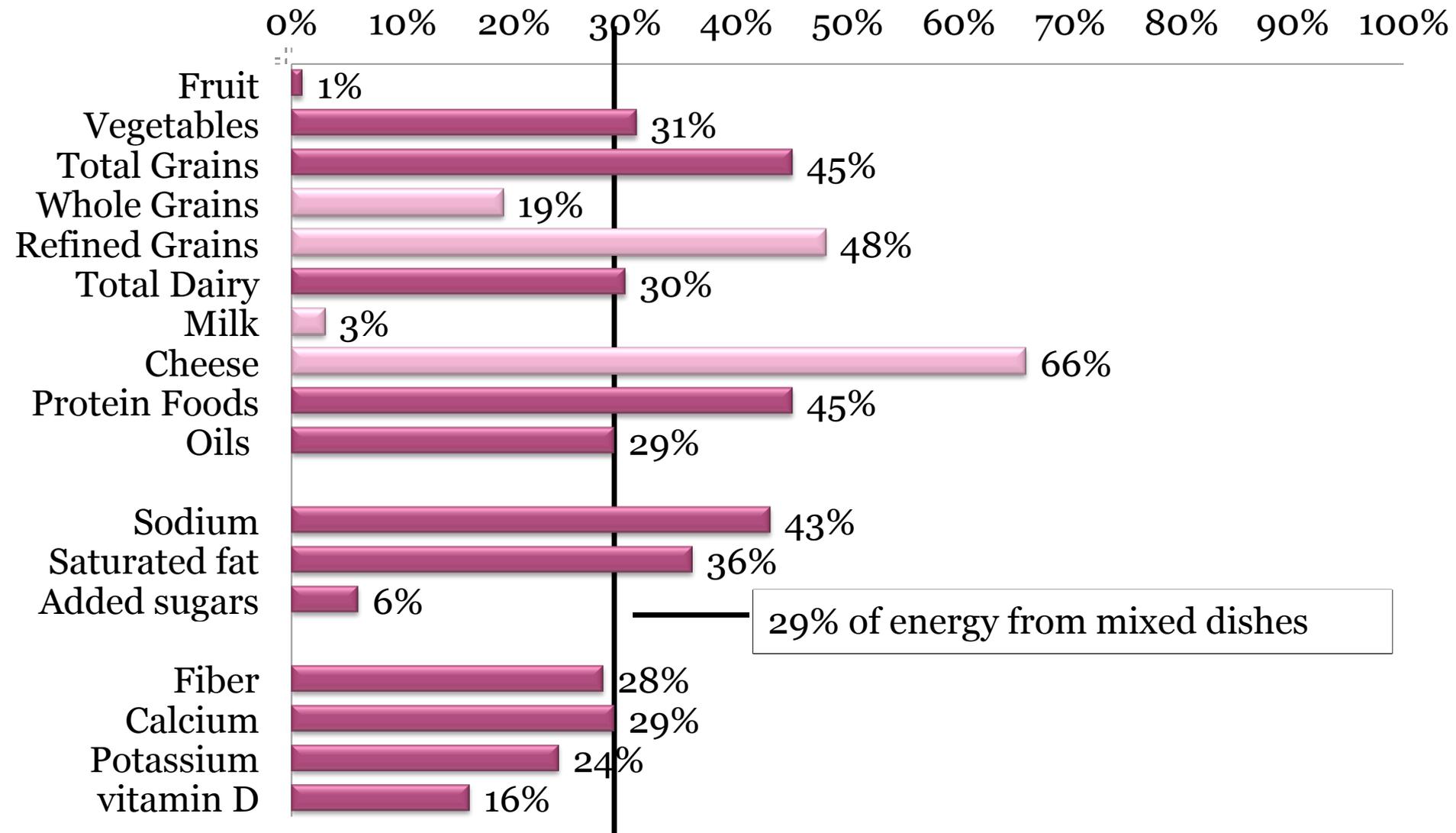
- Fruit intake—low but stable
- Vegetable intake has declined
- Whole grain intake increased, but still low, and refined grain intake decreased, but still high.
- Dairy intake—low but stable for most groups.
- Added sugars intake has decreased but still exceeds the limit in the USDA food patterns.

Food Categories—sources of energy and food groups

Food categories identify and group foods as consumed. Nine major categories and 32 subcategories analyzed.

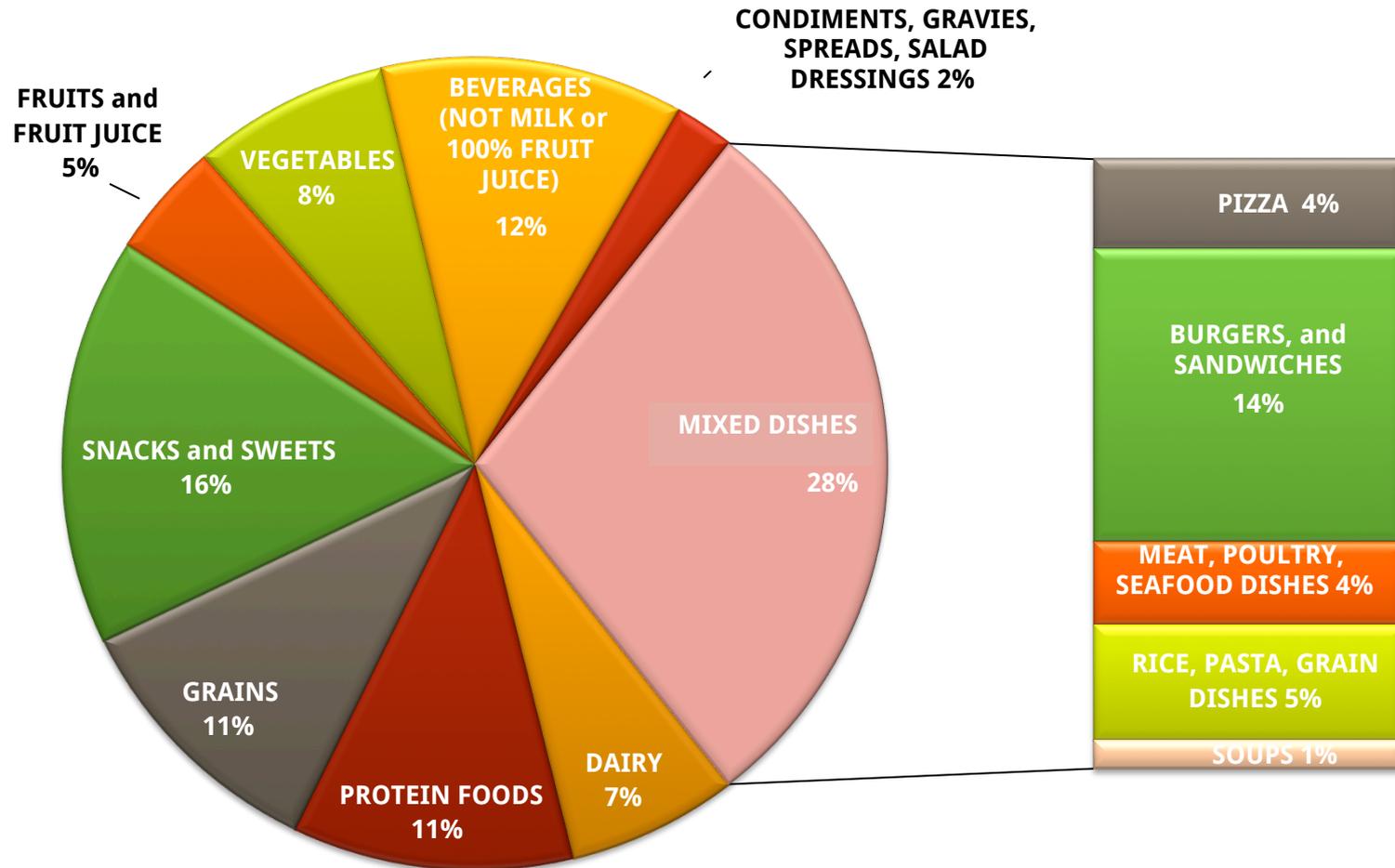
- Mixed dishes (e.g., sandwiches, burgers, pizza, pasta/rice/ meat/ poultry mixed dishes, stir-fries, soups)
 - Major contributor to 3 food groups—grains, vegetables, and protein foods.
 - Contributes heavily to intake of energy, saturated fat, and sodium.
- Fruit and fluid milk intake seldom consumed as part of mixed dishes.
- Beverages contribute 19% of total energy intake.
 - Major sources are sugar-sweetened beverages, milk and milk drinks, and 100% fruit juices.

Percent of Total Intake from Mixed Dishes



What We Eat in America, NHANES 2009-10

Food sources of energy: Percent from major food categories

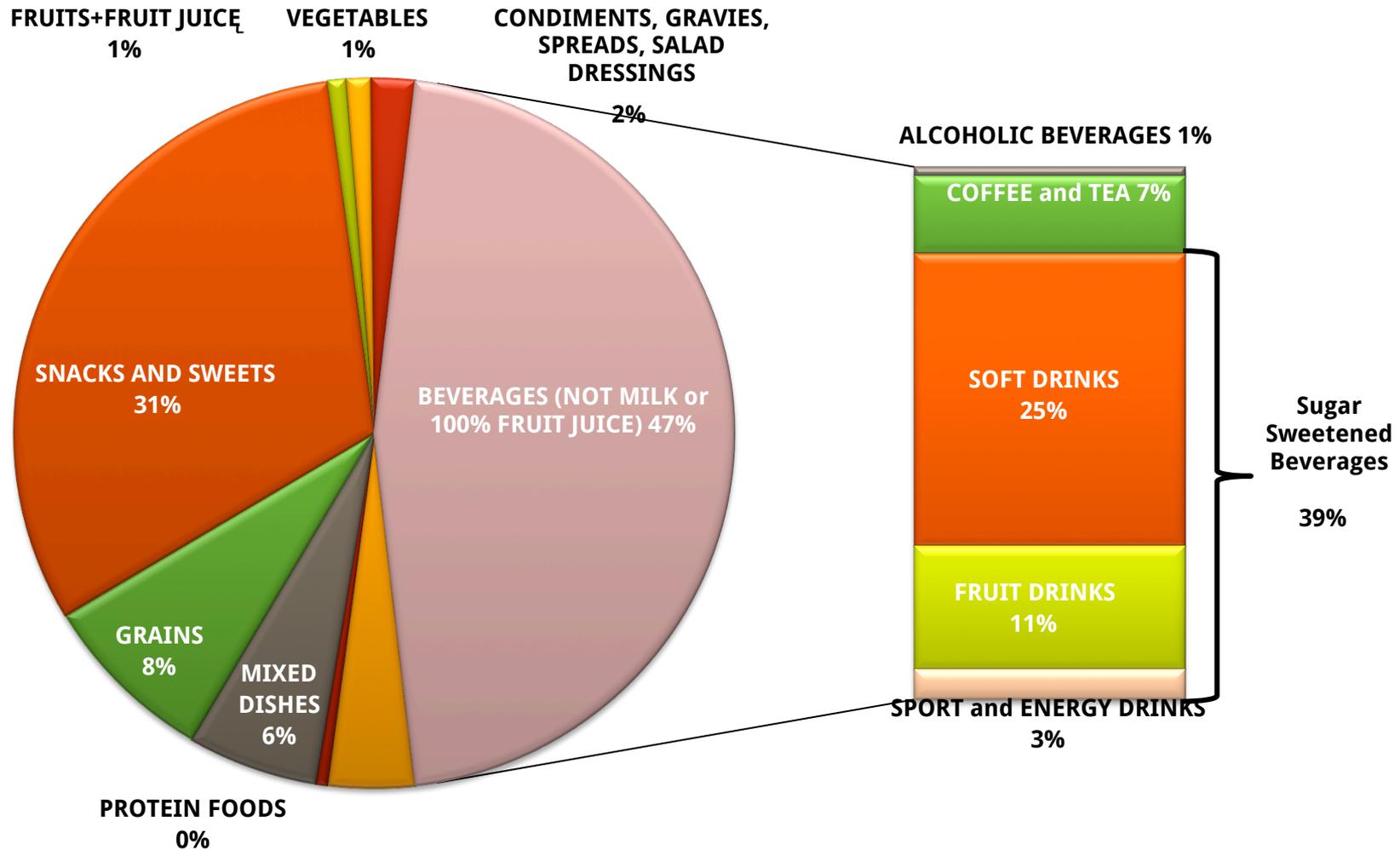


What We Eat in America, NHANES 2009-10

Food Categories—sources of sodium, saturated fat, and added sugars

- Mixed dishes are the largest contributor to intake of sodium and saturated fat.
 - Within mixed dishes, the sub-category of burgers and sandwiches is the largest contributor for both.
- Sodium is ubiquitous in the food supply and many food categories contribute to intake.
- Snacks and sweets are a major contributor to added sugars and saturated fat intake.
- Beverages supply almost half of added sugars intake.

Food sources of added sugars: Percent from major food categories

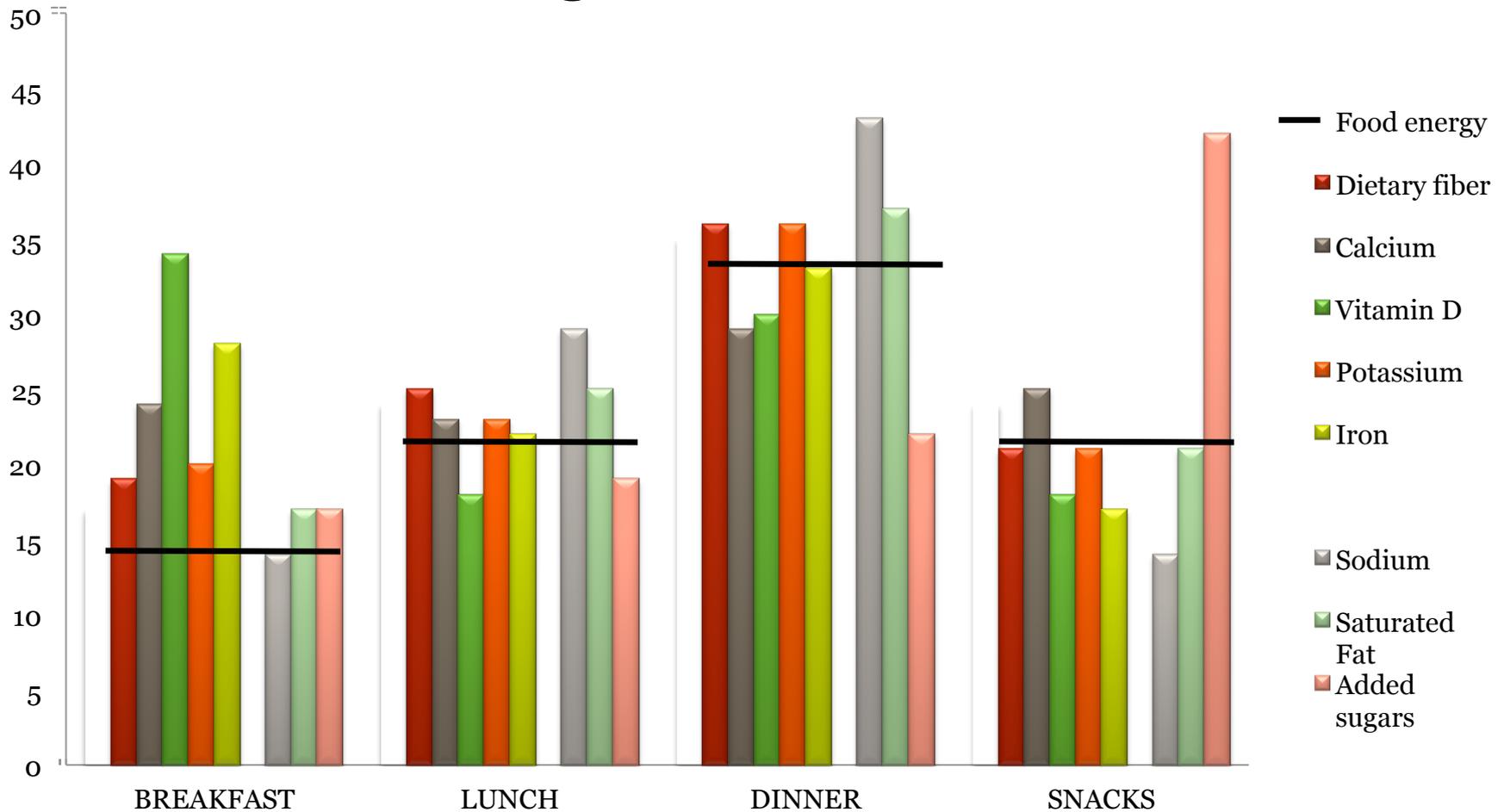


Eating Behaviors—Meals and Snacks

- The majority of the U.S. population consumes three meals a day plus at least one snack.
 - Children ages 2-5 years—most likely to consume three meals a day.
 - Adolescent females, young adult males, non-Hispanic Blacks, Hispanics, and individuals with lower incomes—least likely to consume three meals a day.
- Breakfast tends to have a higher overall dietary quality compared to other meals and snacks. Adolescents and young adults are the least likely to eat breakfast.
- Snacks contribute about one-fourth of daily energy intake and are lower in nutrients of concern relative to energy intake than are meals.

Percent of Total Daily Intake from each Eating Occasion

Males and Females Ages 2+



What We Eat in America NHANES 2009-10

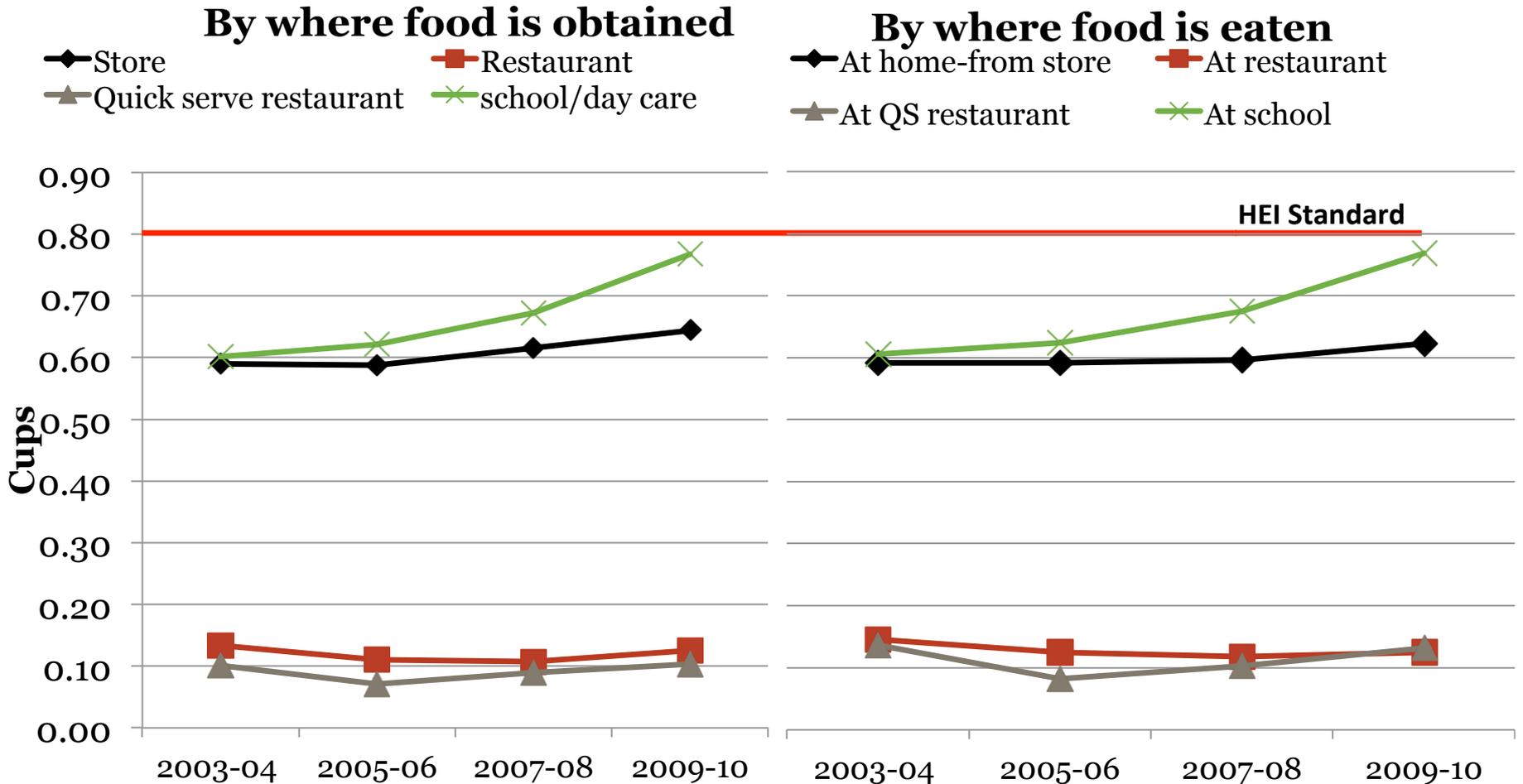
Food and Nutrient Intakes, and Health: Current Status and Trends

Eating Behaviors—Location of Purchase

- About two-thirds of the calories consumed by the U.S. population are purchased at a store, such as a grocery store or supermarket, and consumed in the home.
- The percent of calories eaten away from home has remained about the same since 2003-2004.
- Food group content and nutrient quality vary by where food is obtained.
- No matter where the food is obtained, diet quality of the U.S. population is low in fruit, vegetables, dairy, whole grains, and high in sodium, saturated fats, refined grains, solid fats, and added sugars.

Fruit Group Density

Cups per 1000 kcal by where obtained and eating location



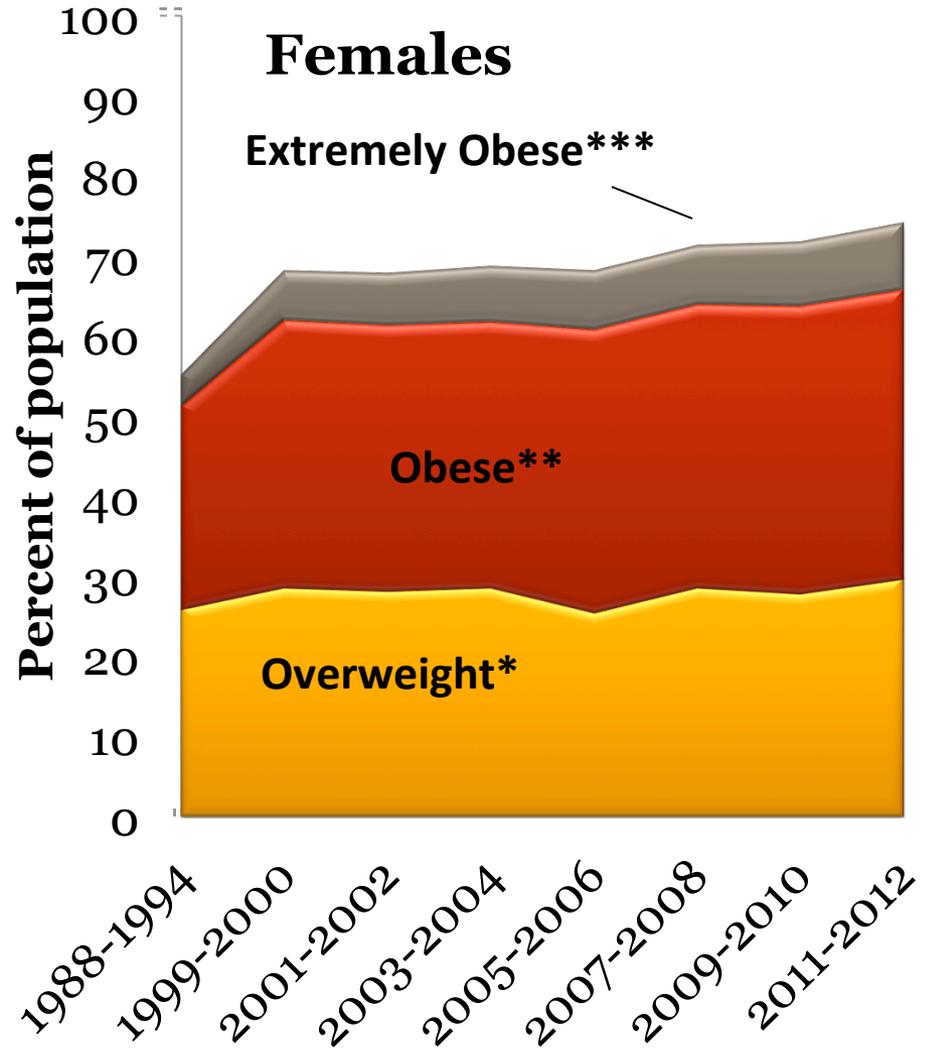
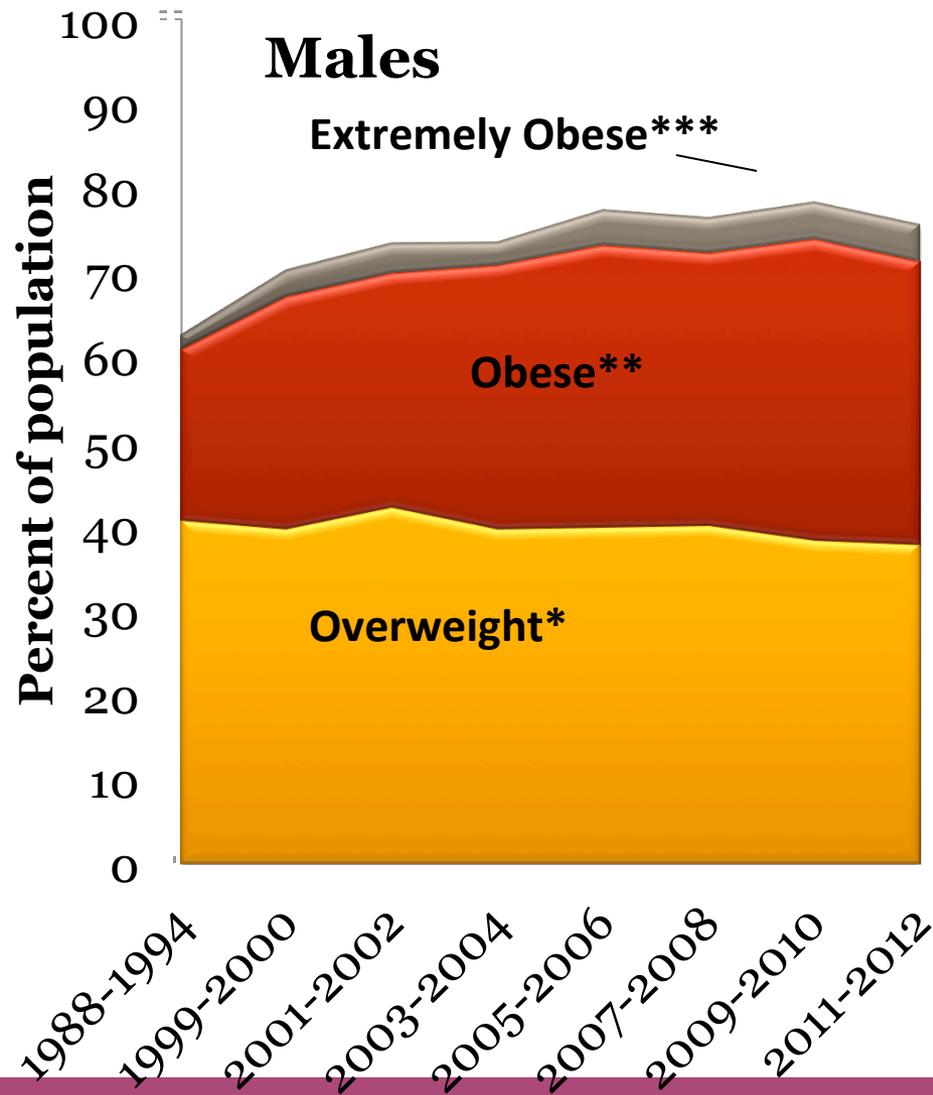
What We Eat in America, NHANES 2003-04, 2005-06, 2007-08, 2009-10

Food and Nutrient Intakes, and Health: Current Status and Trends

Health Conditions—Overweight and Obesity

- Current rates of overweight and obesity are extremely high among children, adolescents, and adults. These high rates have persisted for more than 25 years.
 - About 65% of adult females and 70% of adult males are overweight or obese.
 - Rates of overweight and obesity are highest in adults 40+ years, and vary by race/ethnicity.
- Abdominal obesity is present in U.S. adults of all ages, increases with age, and varies by sex and race/ethnicity.
- Nearly one in three youth, ages 2 to 19 years, is now overweight or obese and these rates vary by age and ethnicity.

Trends in Overweight and Obesity: Adult Males and Females ages 20+



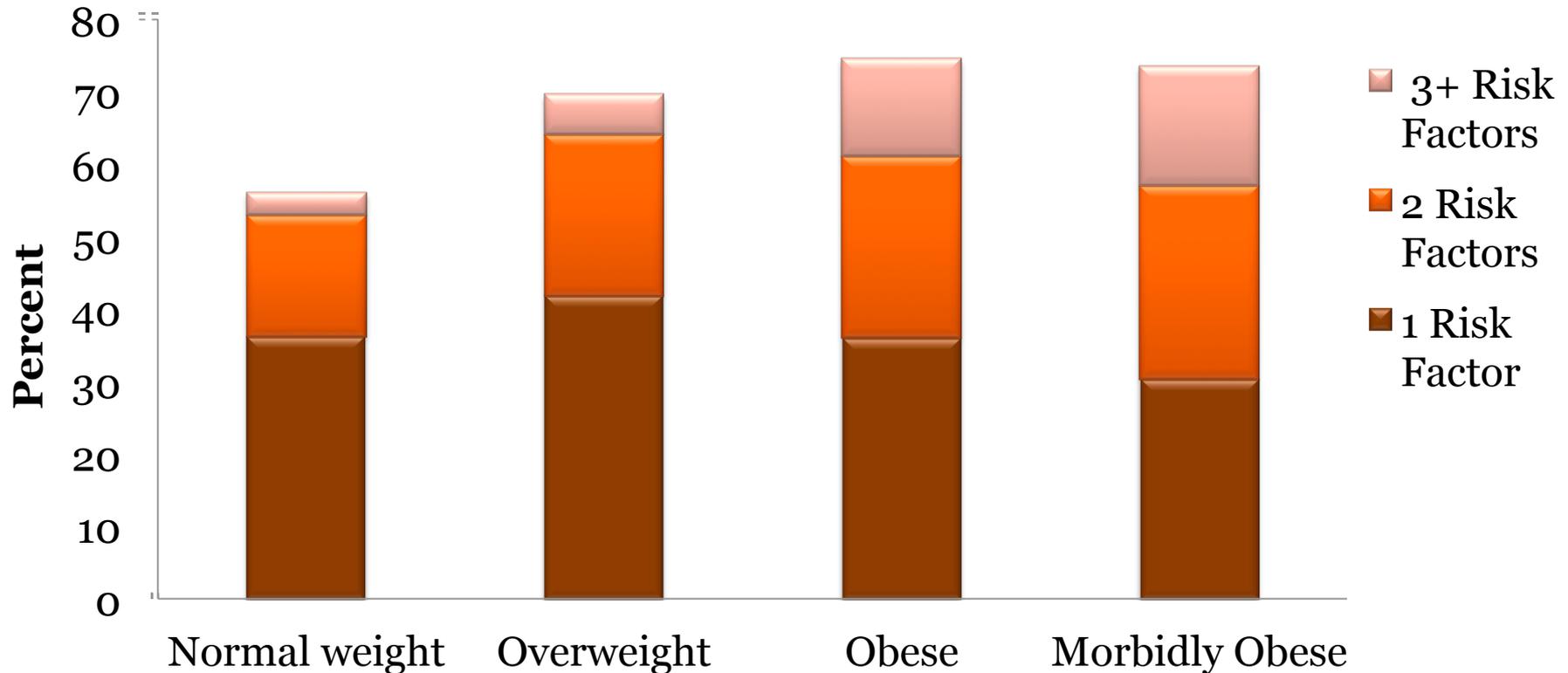
NHANES 1988-94, 1999-02 through 2011-12

*BMI = 25 to <30 **BMI = 30 to <40 ***BMI = 40 and over

Health Conditions—Risk Factors

- At least one cardio-metabolic risk factor in
 - 56% of adults who are normal weight,
 - 70% of adults who are overweight,
 - 75% of those who are obese.
- Rates of elevated blood pressure, dyslipidemia, and diabetes are highest in adults with elevated abdominal obesity.
- 90% of children with type 2 diabetes are overweight or obese.
 - 93% of children with type 2 diabetes are 12 to 19 years old.

Prevalence of Number of CVD Risk Factors by Weight Category, among Adults 18 Years and Older



Risk factors included: total diabetes; total hypertension; total dyslipidemia; and self-reported smoking

Saydah et al., Obesity, 2014 (NHANES 2007 -2010)

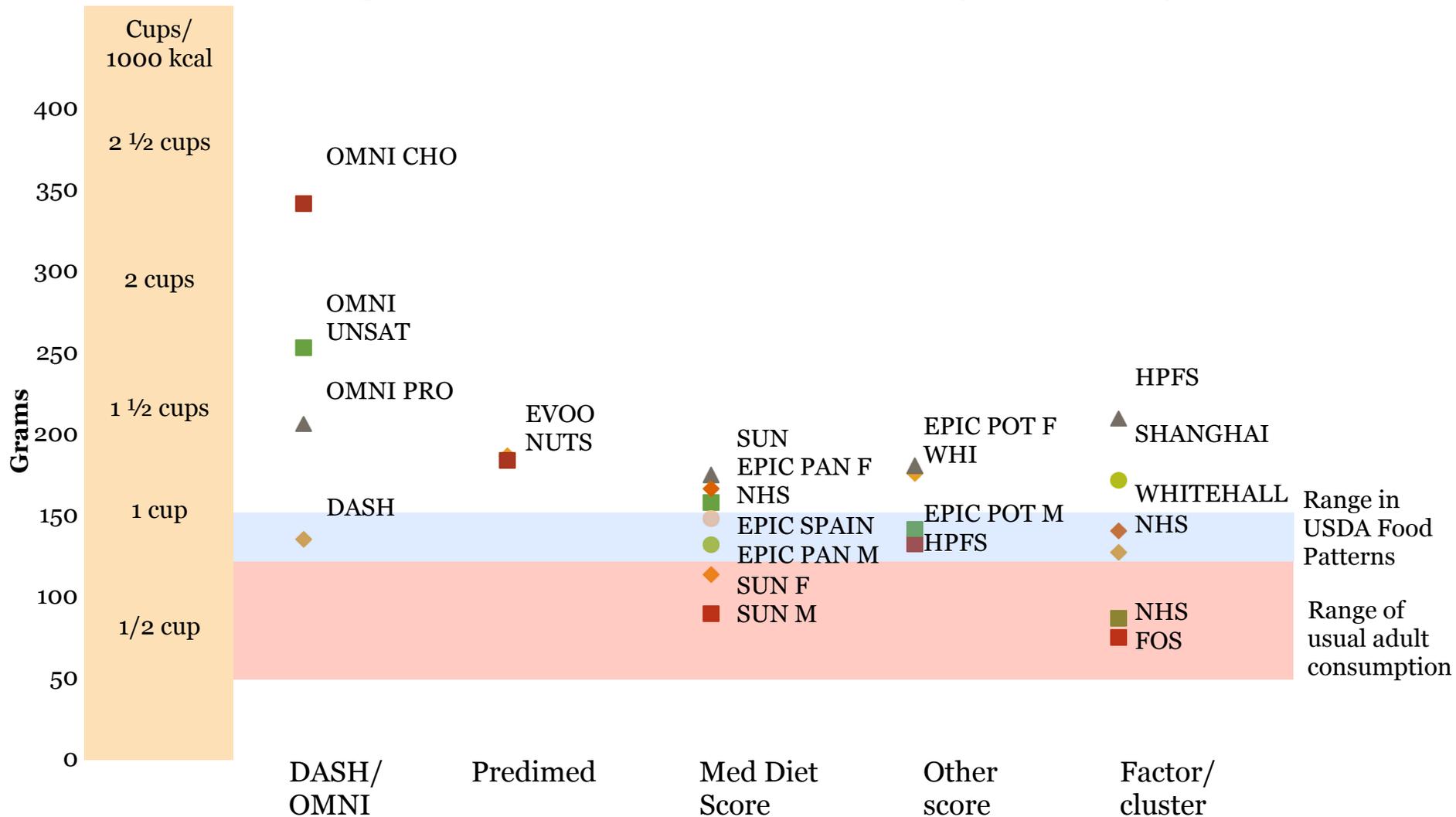
Health Conditions

- At all ages, rates of chronic disease are linked to overweight and obesity.
- Adults have high rates of high blood pressure, CVD, diabetes, and various forms of cancer.
- Children and adolescents also have nutrition-related chronic diseases, including borderline high blood pressure and type 2 diabetes.
- Prevalence of osteoporosis and of low bone mass increases with age, particularly in post-menopausal women.
- Nutrition-related neurological and psychological conditions are a growing concern.
- Congenital anomalies are a relatively rare, but important pregnancy outcome.

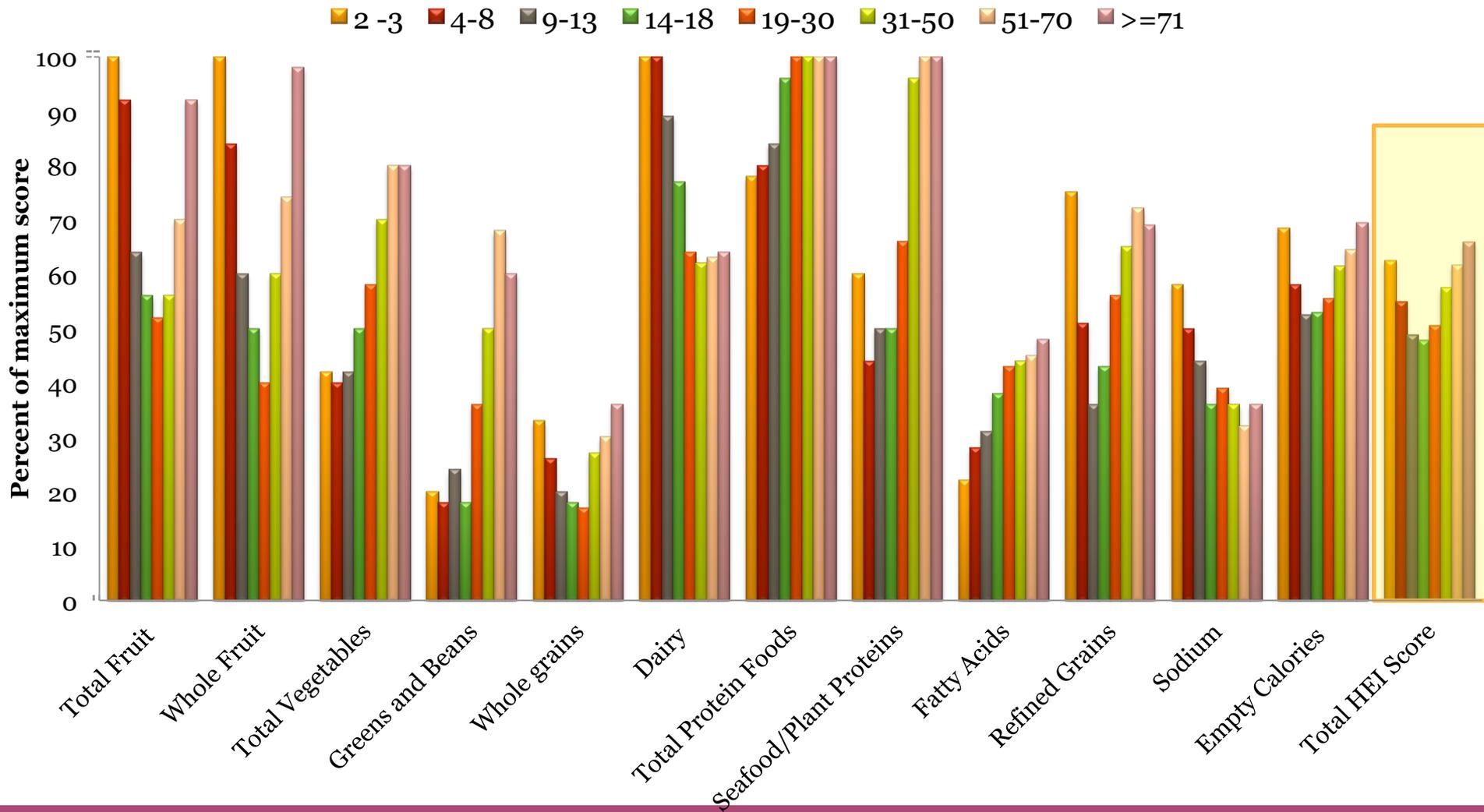
Dietary Patterns Composition

- Dietary patterns observed to have health benefits in intervention and cohort studies had certain common elements.
- A healthful diet can be achieved by following a variety of dietary patterns.
- In many cases, the ranges of intake in dietary patterns with positive health benefits are close to those recommended by the USDA Food Patterns.
- The data from the intervention trials and the cohort studies examined provide empirical data that the USDA Food Patterns provide an evidence-based guide to healthy patterns of food consumption.

Fruit intake (g/1000 kcal) for Healthy Dietary Patterns



Average HEI-2010 scores for Americans by age group



What We Eat in America, NHANES 2009-10

Dietary Patterns—Intakes vs. Recommendations

- Average HEI score in the U.S. population is 57 points out of a total of 100 points.
- The best component scores were for: total protein foods, seafood and plant proteins, dairy.
- The poorest component scores were for: whole grains, sodium, fatty acid ratio, greens and beans, and empty calories.
- Best HEI scores: Young children ages 2 -3 years, middle aged, and older adults.
- Poorest HEI scores: Preadolescents and adolescents.

Dietary Patterns—USDA Food Patterns

- Food Pattern Modeling demonstrates that healthy eating patterns can be achieved with:
 - Healthy U.S.-style Pattern
 - Healthy Mediterranean-style Pattern
 - Healthy Vegetarian Pattern
- Although some differences exist across the three eating patterns, comparable amounts of nutrients can be obtained by consuming nutrient-dense foods while maintaining energy balance.

Chapter Summary

- The US population has low intakes of certain key nutrients – vitamin D, potassium, fiber, calcium, and for females also iron. These low intakes are a public health concern because inadequate intakes are linked to health problems.
- The US population overconsumes sodium and saturated fat. Excess intakes of these nutrients are also linked to health problems.
- Many of the food groups that are good sources of underconsumed nutrients are consumed in low amounts by the U.S. population.
- Many of the food groups and food categories that have high levels of sodium, saturated fat, and added sugars are consumed in high amounts.

Chapter Summary

The US population purchases and consumes food in a variety of locations.

- The diet quality is low regardless of where food is purchased or consumed.

Rates of diet-related chronic conditions are high.

- Obesity, CVD, CVD risk factors, diabetes, cancer, and osteoporosis are all very common. Improving diet quality will help reduce risk of these diseases with major morbidity, mortality and health care expenditures.

Research Recommendations

- Nutrition Surveillance, NHANES/WWEIA needs more respondents from a variety of racial/ethnic minority groups, more non-U.S. born residents and increase the number of pregnant women and older Americans - all of these groups are currently under-represented.
- Research is needed to understand the driving forces behind the decline in diet quality that begins in mid childhood, through adolescence, through adulthood.
- Improvements are needed in the quantity and quality of food composition databases.

Research Recommendations

- Investigate the validity, reliability and reproducibility of new biomarkers of dietary intake and nutritional status.
- Evaluate the effects of fortification and supplement use on consumer behavior related to intakes of nutrients of public health concern.
- Understand the health effects from high-dose dietary supplements.
- Develop standardized research definitions for meals and snacks.
- Understand better the food landscape – where foods are purchased and consumed and how the food environment effects nutritional status.
- Understand better the concept of dietary patterns and develop standardized methods for dietary patterns research.

Special Thanks

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Discussion