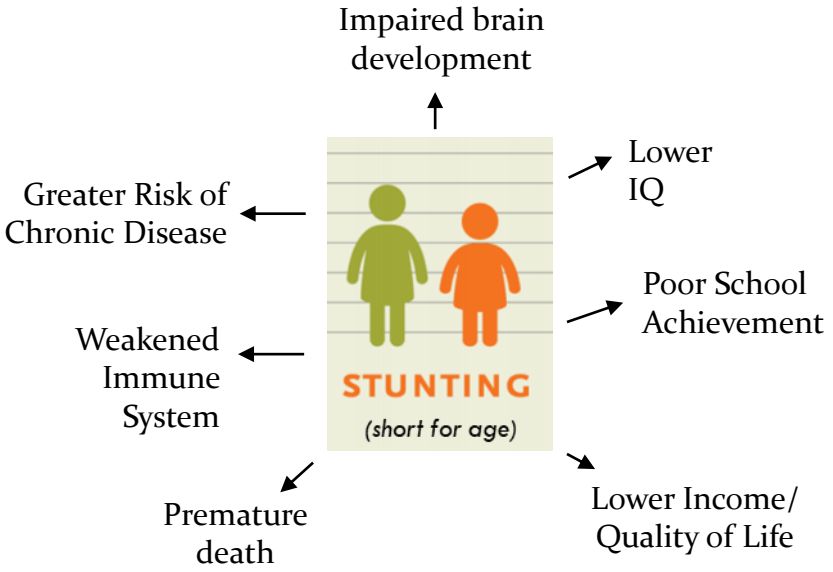
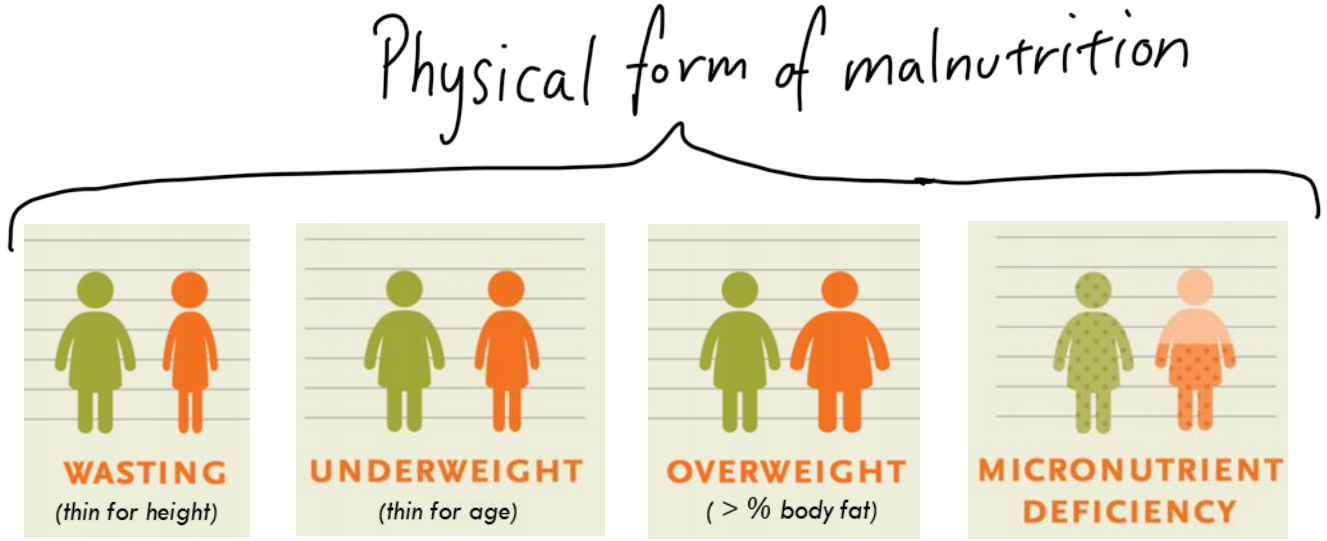
Planning a Healthy Diet

Chapter 2

Where do we begin…?

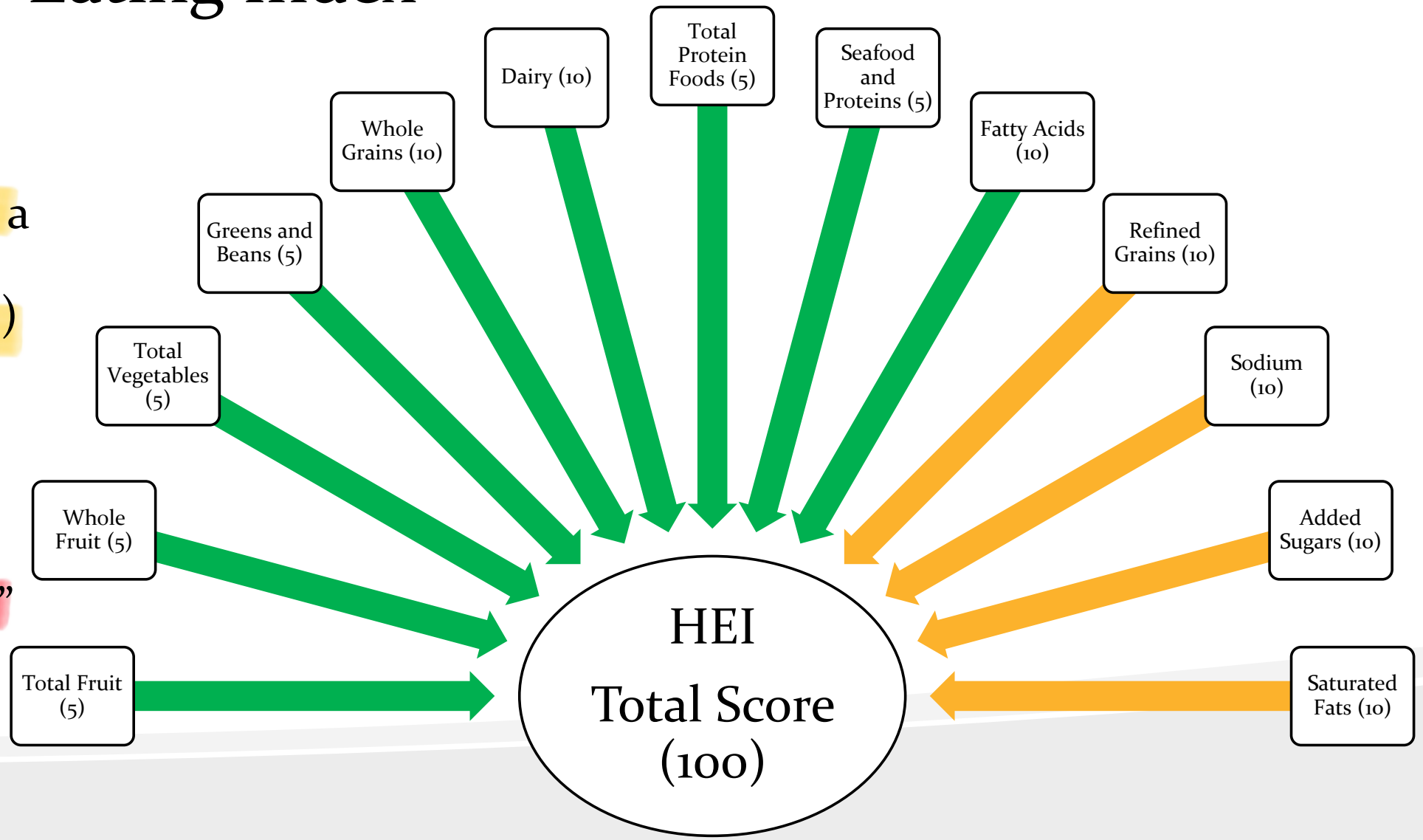
- Chronic nutrient imbalances → malnutrition and health risks
- Malnutrition = lack of proper nutrition resulting from:
  - Undernutrition: less energy (kcals) / nutrients than what is needed
  - Overnutrition: more energy (kcals) / nutrients beyond what is needed
- Forms of malnutrition:





Healthy Eating Index

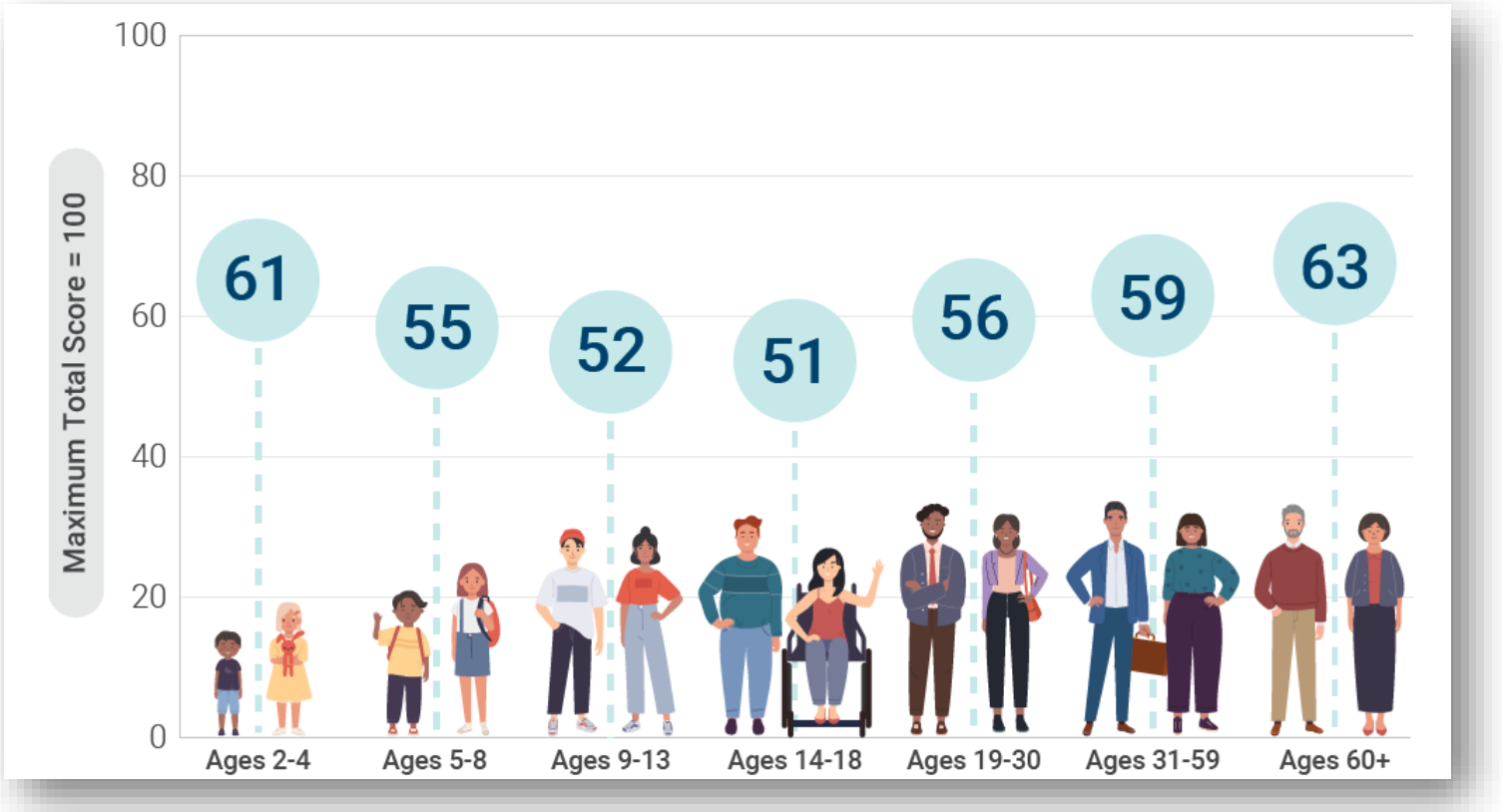
- Measures diet **quality** (how well a diet meets recommendations)
- Higher scores = higher intake of key nutrients + lower intake of "nutrients to limit"
- "Perfect score" = 100



Graphic courtesy of Dr. Matthew Landry

How are we doing? (not great…)

Healthy Eating Index (HEI)



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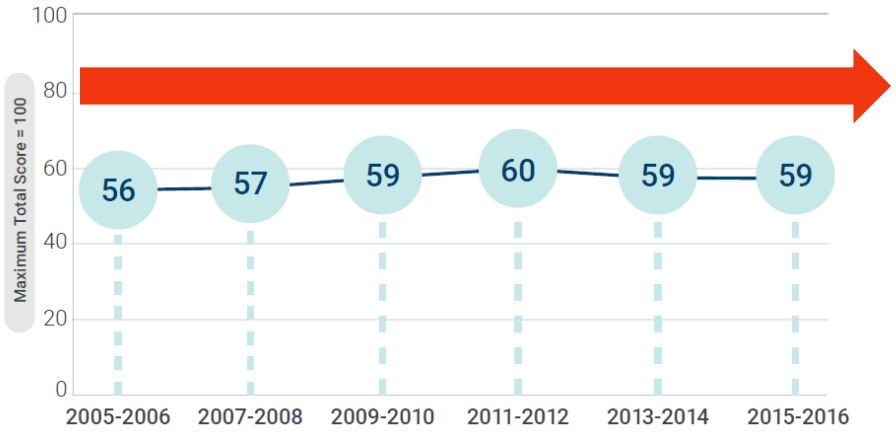
2020 HEI Average Score



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

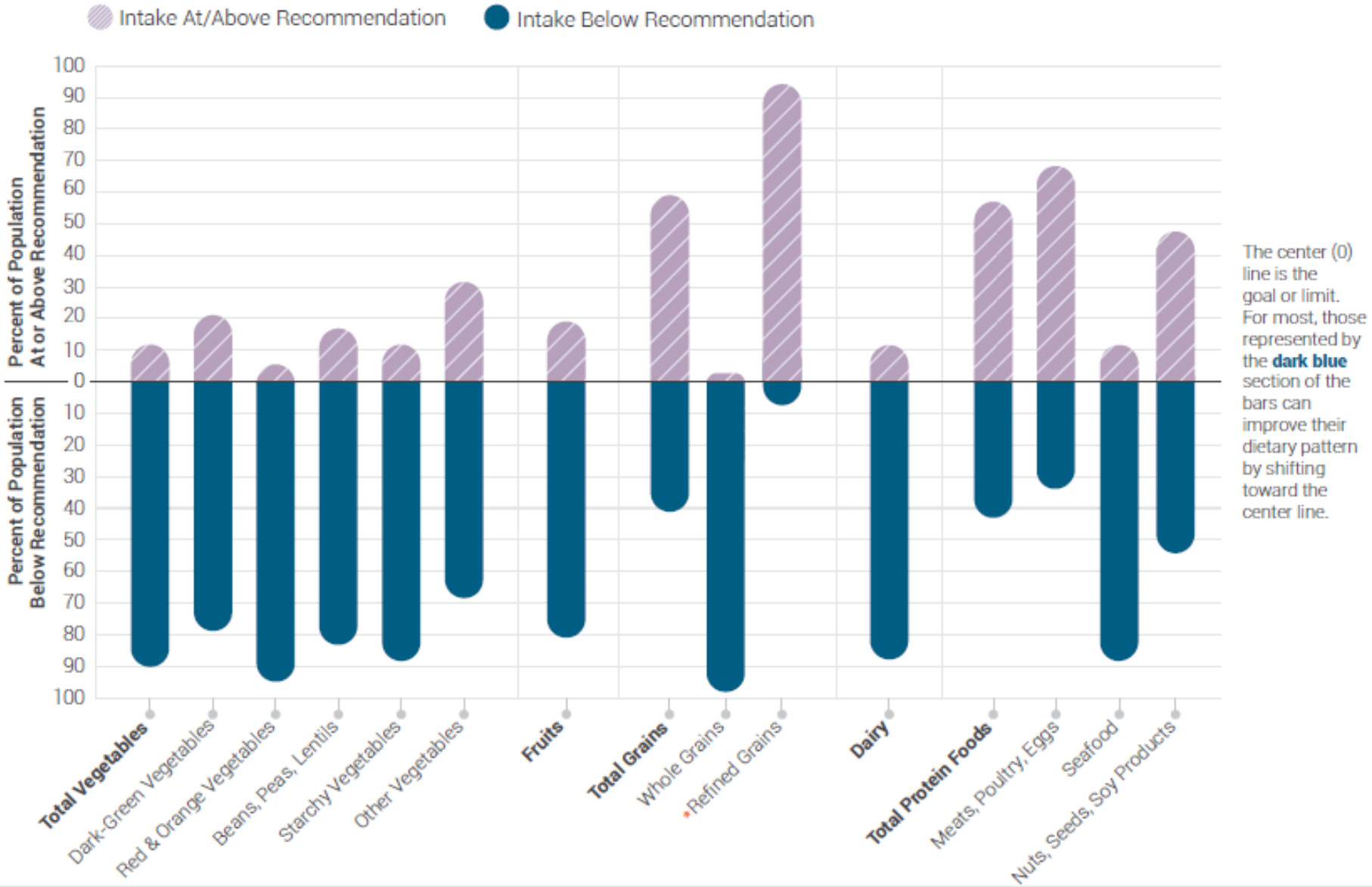
Why the low score?

Most Americans lack sufficient:

- Dietary fiber
- Vit D
- Calcium
- Potassium

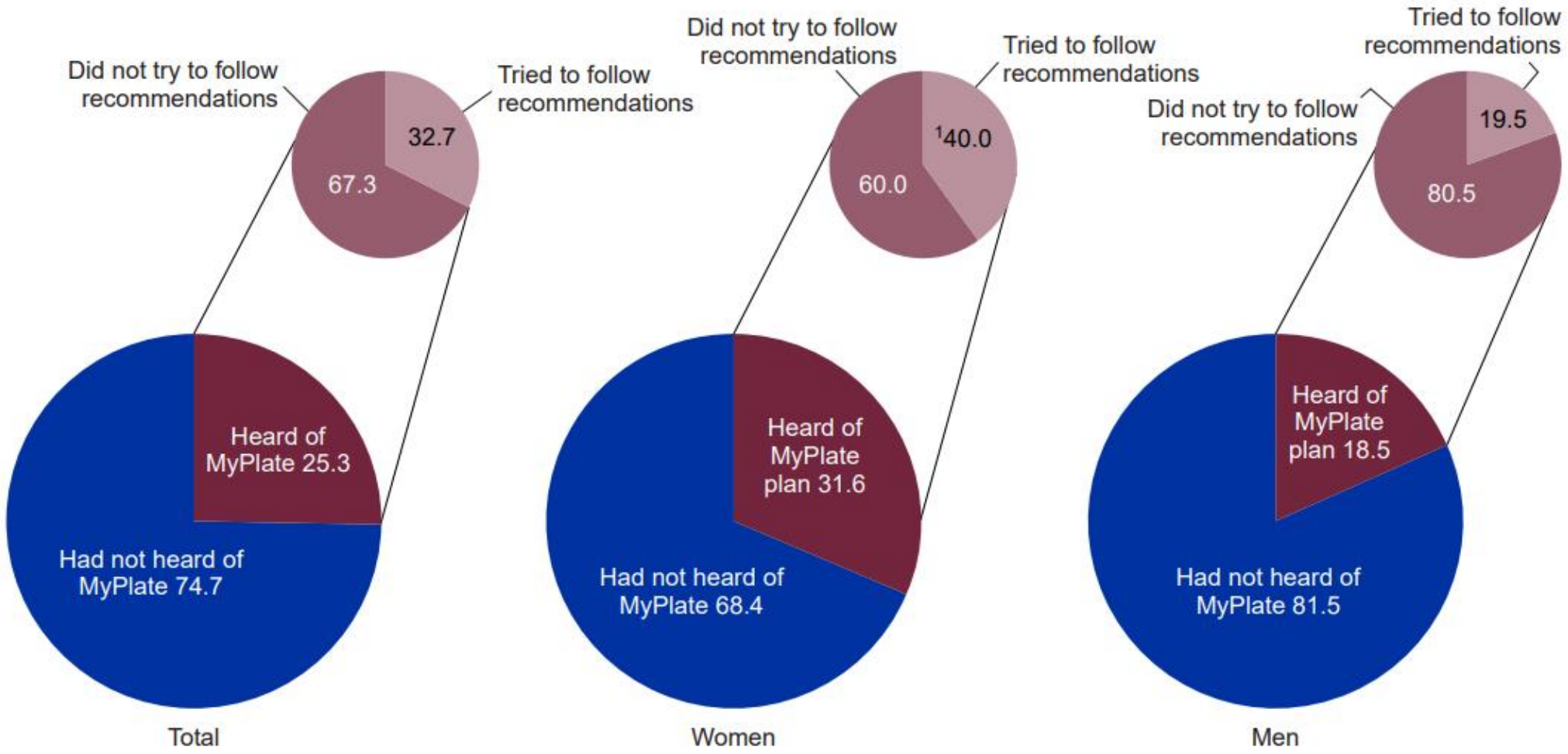
Most Americans consume too much:

- Sodium
- Saturated fat
- Added sugar
- Refined grains



https://www.dietaryguidelines.gov/figures-infographics#HEI

And most people don't know about recommendations…



National Center for Health Statistics, national Health and Nutrition Examination Survey, 2017-March 2020

How are Dietary Recommendations Created?

Nutrient Recommendations: 1) Establish nutrient adequacy

- Adequacy: Meeting requirements for normal physiological functioning
  - First, we need to know:
    - ✓ The function of the nutrient
    - ✓ Whether the nutrient is required in the diet

- ✓ **Essential Nutrient** = Body either can't make it or can't make enough of it; these MUST be supplied by the diet
- ✓ **Non-essential Nutrients** = Body can make sufficient amounts of it; these are not needed/required in the diet

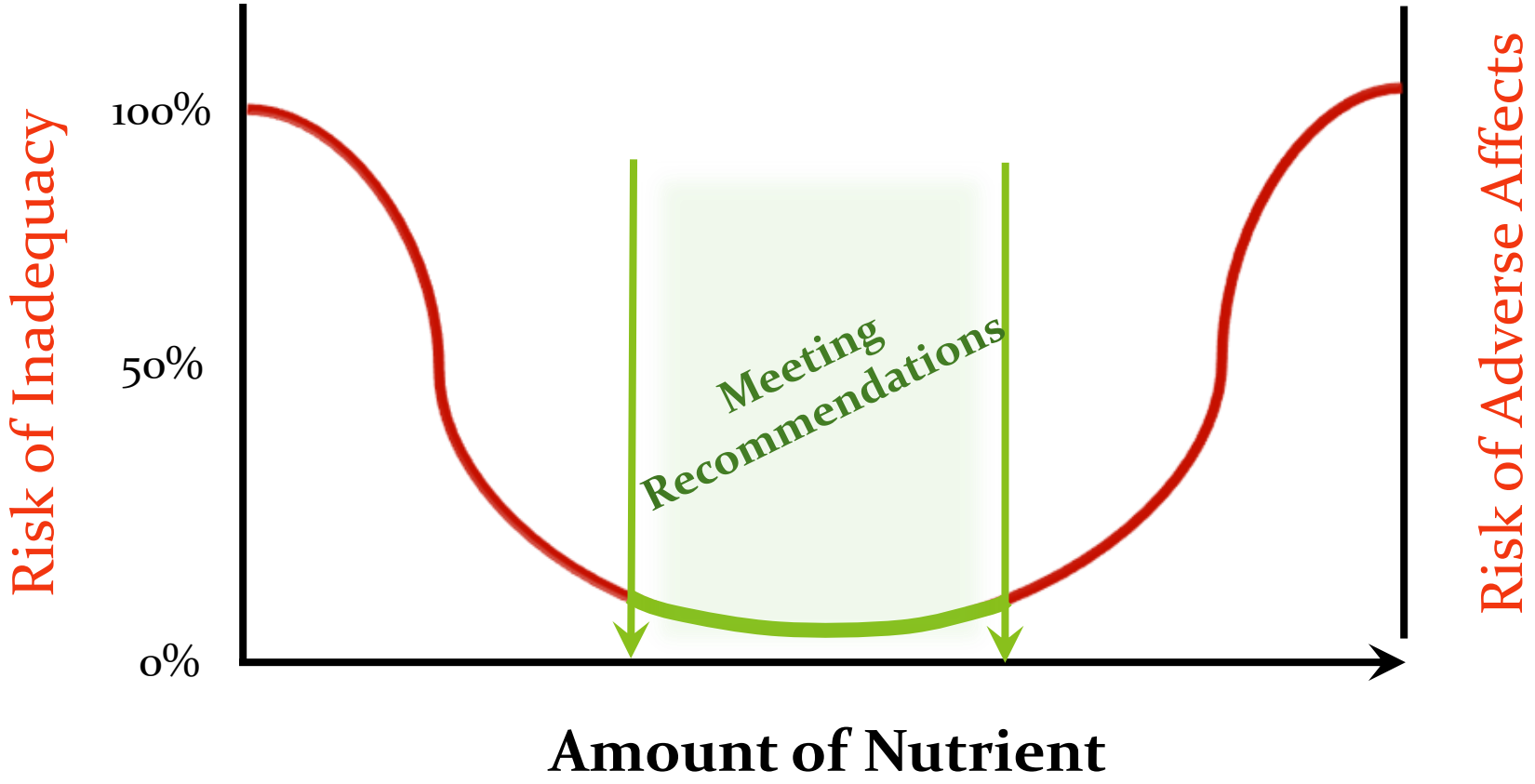
Setting the Recommendations

Nutrient Recommendations: 2) Prevent inadequacy

3) Prevent overconsumption

- Inadequacy: Intake is under requirements (but doesn't impact health)
- Deficiency: Intake is far below requirements; negative health consequences
- Toxicity: Intake far above the upper limit; negative health consequences

Setting the Recommendations



Unique Recommendations for Every Nutrient

Each nutrient has a different implications for adequacy, deficiency, and toxicity (recommendations set accordingly)

- Calcium:
  - Adequacy: peak bone density
  - Deficiency: weak, porous, brittle bones
  - Toxicity: kidney stones
- Carbohydrates:
  - Adequacy: normal brain activity
  - Deficiency: low energy, brain fog
  - Toxicity: none (but excess can lead to weight gain)

Dietary Reference Intakes (DRIs)

- Set of reference values for ***nutrients*** that help with:
  - Assessing nutrient intakes and monitoring nutritional health of Americans across 22 life-stage groups
    - ✓ Prevent nutrient deficiencies
    - ✓ Decrease chronic disease risk
  - Developing nutrition labels
  - Developing dietary guidelines and food guides
  - Ensuring foods and supplements contain safe levels of nutrients
  - Creating patient and consumer counseling and educational programs
- Recommendations apply to *healthy people*
  - No diseases or chronic conditions
  - Assumes higher level of physical activity (than current average)

Dietary Reference Intakes (DRIs)

- DRIs created by the Institutes of Medicine (IOM) in 1994
  - Continually added (e.g. Sodium & Potassium)
  - Continually revised (e.g. Calcium, Vit D)
- DRIs have 5 main components:
  - Estimated Average Requirements (EAR)
  - Recommended Dietary Allowance (RDA)
  - Adequate Intake (AI)
  - Tolerable Upper Limits (UL)
  - Estimated Energy Requirements (EER)

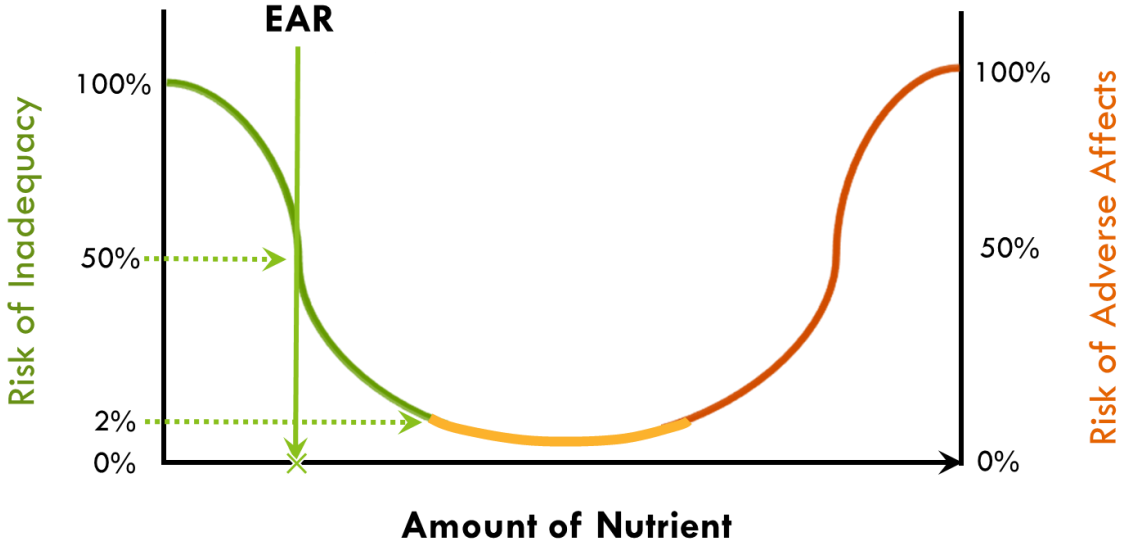
1997	1998	2000	2001	2004	2005	2011	2019
Calcium	Thiamin	Vitamin C	Vitamin K	Water	Energy	Calcium	Sodium
Phosphorus	Riboflavin	Vitamin E	Vitamin A	Potassium	CHO	Vitamin D	Potassium
Magnesium	Niacin	Selenium	Arsenic	Sodium	Fiber		
Vitamin D	Vitamin B6	Carotenoids	Boron	Chloride	Fat		
Fluoride	Folate		Chromium	Sulfate	Fatty Acids		
	Vitamin B12		Copper		Cholesterol		
	Pantothenic Acid		Iodine		Protein		
	Biotin		Iron		Amino Acids		
	Choline		Manganese				
			Molybdenum				
			Nickel				
			Silicon				
			Vanadium				
			Zinc				

Estimated Average Requirement (EAR)

- Average daily amount of a nutrient that is estimated to meet the **requirements** of **50%** of healthy people
  - The EAR amounts are specific to:
    - ✓ Life stage
    - ✓ Biological sex
    - ✓ Population (as a whole)

Why EAR amounts are specified.

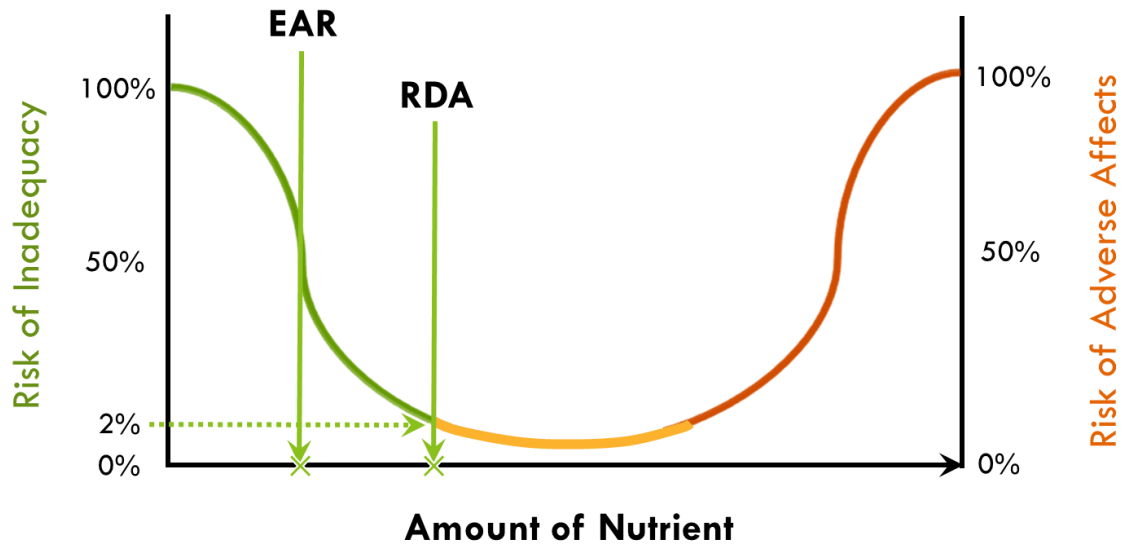
- If you consume < EAR over time:
  - ✓ Nutrient stores decline
  - ✓ Can lead to nutrient inadequacy
  - ✓ Can lead to nutrient deficiencies and health problems



Recommended Dietary Allowance (RDA)

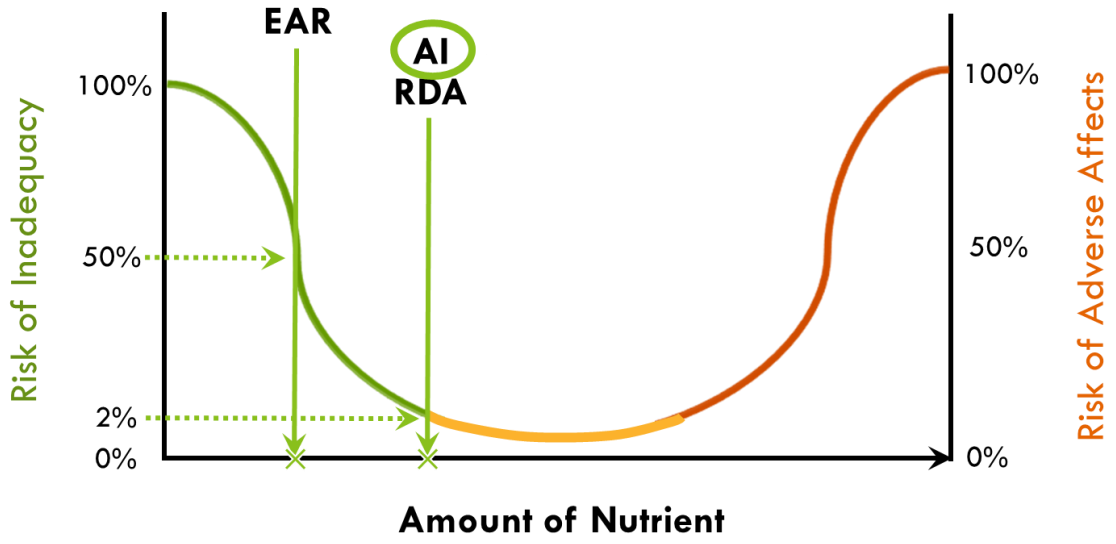
- Average daily amount of a nutrient that is **recommended** to meet the needs of **98%** of healthy people
  - The RDA amounts are specific to:
    - ✓ Life stage
    - ✓ Biological sex
    - ✓ Individuals (not population-level)
  - EAR is needed to set the RDA
  - RDA = minimum amount needed by *most people*

The only change from EAR to RDA



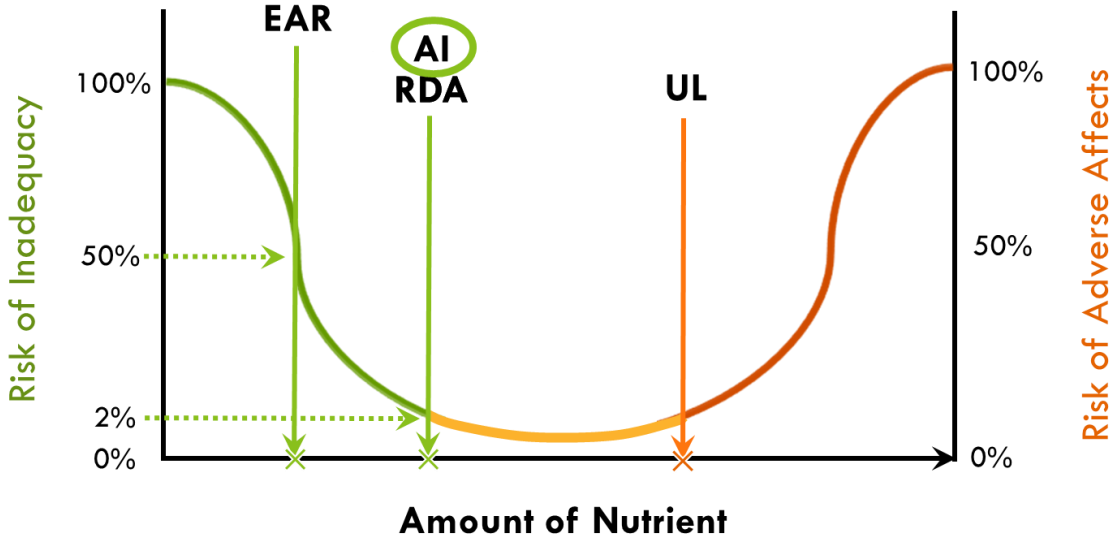
Adequate Intake (AI)

- Average daily amount of a nutrient that is recommended **when the RDA can't be set**
- Relies on scientific judgements
  - Not based on clinical trials, etc.
  - Less valid, less rigorous



Tolerable Upper Limit (UL)

- **Maximum daily amount** of a nutrient that appears safe for most healthy people
- Beyond UL = likely to be toxic or cause adverse health effects
- UL helps protect against overconsumption
  - Example: Dietary supplement over-use

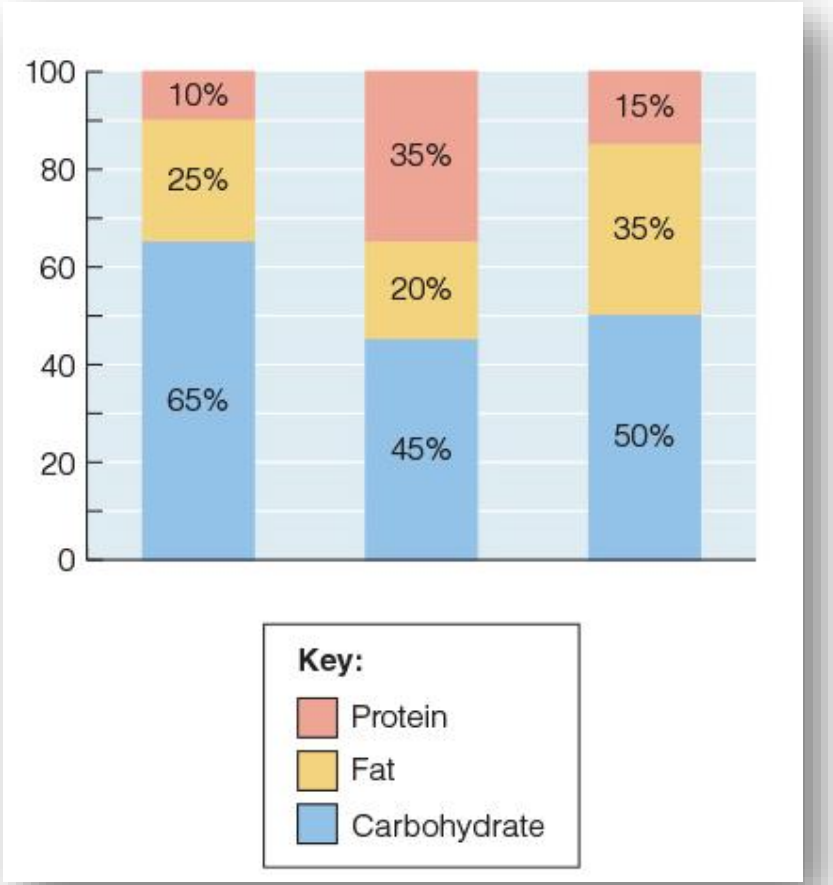


Estimated Energy Requirements (EER)

- Average energy intake (kcals) to maintain energy balance
  - Energy balance: calories consumed = calories used (energy in = energy out)
  - EER applies to:
    - ✓ Healthy body weight
    - ✓ Physically active
- **No UL for kcals**
  - Excess kcals (above EER) are not 'toxic'
  - Excess kcals (above EER) do not cause immediate adverse effects
  - But…habitual excess kcals (above EER) → weight gain, increased risk of obesity

Acceptable Macronutrient Distribution Ranges (AMDR)

- Adequate intake of energy and nutrients:
  - Support health
  - Reduce risk of chronic diseases
- Ranges:
  - 45-65% kcalories from carbohydrate
  - 20-35% kcalories from fat
  - 10-35% kcalories from protein



Using Nutrient Recommendations

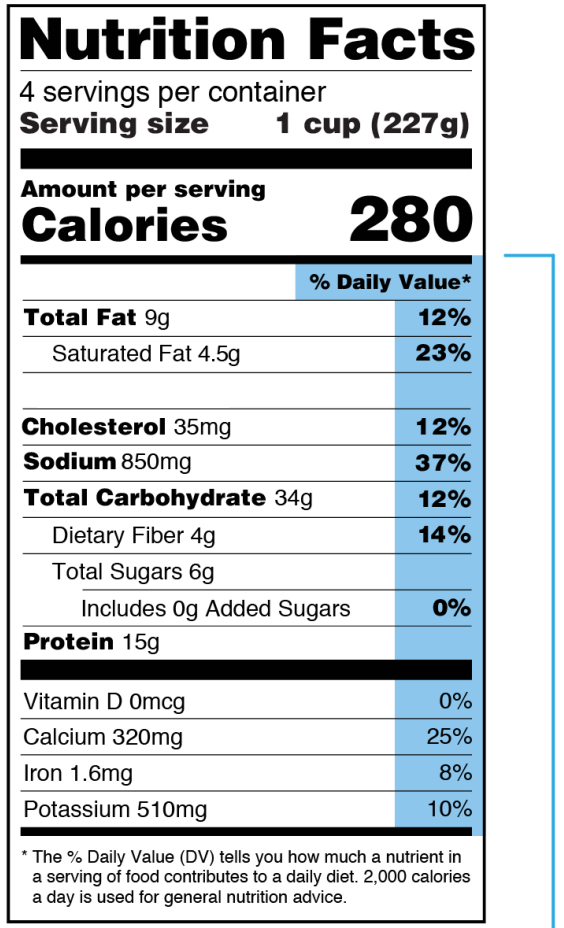
- Estimates apply to **healthy people**
- **Recommendations** – not **optimal levels** but amounts to prevent inadequacy, deficiency, and reduce chronic disease risks
- Goals are intended to be met through **diet** (**e.g., foods/beverages**)
- Apply to **average** daily intakes **over time**
- Each DRI component serves a **unique purpose**
- Specific to **United States**
- Many DRI recommendations are based on **life stage** and **biological sex**

% Daily Value (DVs)

- % DV = How much a certain nutrient in 1 serving of food contributes to the total daily diet *and* meeting <u>average</u> DRIs
- Based on 2,000 kcal diet
- Labels helps inform consumers on what to eat/drink
  - ✓ ≤ 5% DV of a nutrient/serving = LOW (e.g., "low fat")
  - ✓ ≥ 20% DV of a nutrient/serving = HIGH (e.g., "high fiber")

LOW and HIGH labels can both be helpful

- ✓ LOW is 'helpful' for things to consume in moderation
- ✓ HIGH is 'helpful' for things recommended to consume more of



Nutrition Facts

4 servings per container

Serving size **1 cup (227g)**

Amount per serving

Calories **280**

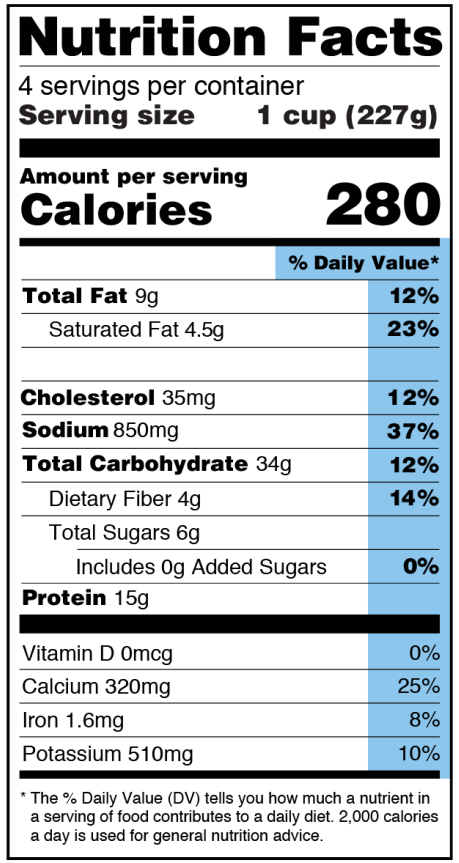
	% Daily Value*
Total Fat 9g	**12%**
Saturated Fat 4.5g	**23%**
Cholesterol 35mg	**12%**
Sodium 850mg	**37%**
Total Carbohydrate 34g	**12%**
Dietary Fiber 4g	**14%**
Total Sugars 6g	
Includes 0g Added Sugars	**0%**
Protein 15g	
Vitamin D 0mcg	0%
Calcium 320mg	25%
Iron 1.6mg	8%
Potassium 510mg	10%

* The % Daily Value (DV) tells you how much a nutrient in a serving of food contributes to a daily diet. 2,000 calories a day is used for general nutrition advice.

% Daily Value

Look closely…

- Why do you think there is no DV% for some nutrients?



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% Daily Value

- Protein %DV is missing
- Total sugar %DV is missing
- Most of the Micronutrients aren't even listed

Nutrients of Public Health Concern:
Essential nutrients that are either UNDER or OVER consumed by nearly all Americans

What are MY DRIs?

- DRI Tables contain nutritional and energy goals for age-sex groups
- **Find them in your textbook!**
- **Or HERE** (under DRI Tables)

Table A2-2
Estimated Calorie Needs per Day, by Age, Sex, and Physical Activity Level, Ages 2 and Older

AGE	Males	Females
2		
3		
4		
5		
6		
7		
8		
9		
10		
11		
12		
13		
14		
15		
16		
17		
18		
19-20		
21-25		
26-30		
31-35		

Table A1-1
Daily Nutritional Goals, Ages 6 Through 11 Months and 12 Through 23 Months

Table A1-2
Daily Nutritional Goals, Ages 2 and Older

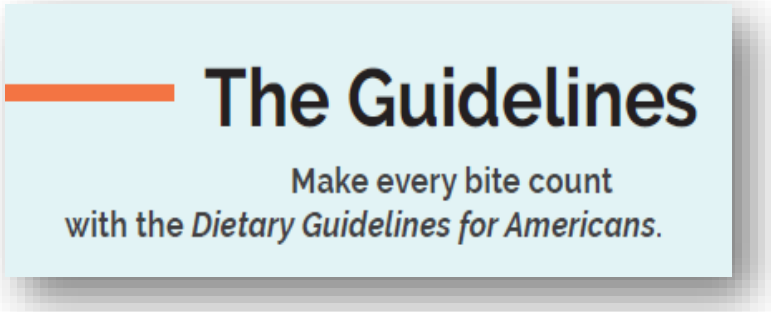
Table A1-3
Daily Nutritional Goals for Women Who Are Pregnant, by Age Group and Trimester

Table A1-4
Daily Nutritional Goals for Women Who Are Lactating, by Age Group and Months Postpartum

MACRONUTRIENTS, MINERALS & VITAMINS		Age Group (Years)					
		14-18		19-30		31-50	
		Months Postpartum					
		0-6	7-12	0-6	7-12	0-6	7-12
Calorie Level Assessed	Source of Goal[a]	2,200	2,200	2,400	2,400	2,200	2,200
Macronutrients							
Protein (% kcal)	AMDR	10-30	10-30	10-35	10-35	10-35	10-35
Protein (g)	RDA	71	71	71	71	71	71
Carbohydrate (% kcal)	AMDR	45-65	45-65	45-65	45-65	45-65	45-65
Carbohydrate (g)	RDA	210	210	210	210	210	210
Fiber (g)	14g/1,000kcal	31	31	34	34	31	31
Added sugars (% kcals)	DGA	<10	<10	<10	<10	<10	<10
Total lipid (% kcal)	AMDR	25-35	25-35	20-35	20-35	20-35	20-35
Saturated Fatty Acids (% kcal)	DGA	<10	<10	<10	<10	<10	<10
18:2 Linoleic acid (g)	AI	13	13	13	13	13	13
18:3 Linolenic acid (g)	AI	1.3	1.3	1.3	1.3	1.3	1.3
Minerals							
Calcium (mg)	RDA	1,300	1,300	1,000	1,000	1,000	1,000

Dietary Guidelines for Americans (DGAs)

- **DGAs**: Developed by nutrition scientists/physicians after reviewing scientific evidence; updated every 5 years (now: 2020-2025 version)
- Food-based recommendations for healthy individuals, to help:
  - Meet nutrient needs
  - Promote health
  - Prevent disease
- Uses:
  - National School Lunch & Breakfast Programs
  - Federal foodservice (hospitals, correction facilities, military)
  - Food industry (for developing new products, etc.)



2020 Key Guidelines

1) Follow a healthy dietary pattern at every life stage.

Three Recommended Dietary Patterns:

- Types and proportions of foods Americans typically consume in appropriate portions
- **Healthy US**:
  - Nutrient-dense options across all food groups
- **Healthy Vegetarian:**
  - No meat
  - Protein: includes seafood, eggs, dairy, and plant-based protein sources (e.g., beans)
- **Mediterranean:**
  - Developed from pattern originating in Greece, Italy, Spain, etc.
  - Emphasizes whole foods
  - Limits ultra-processed foods

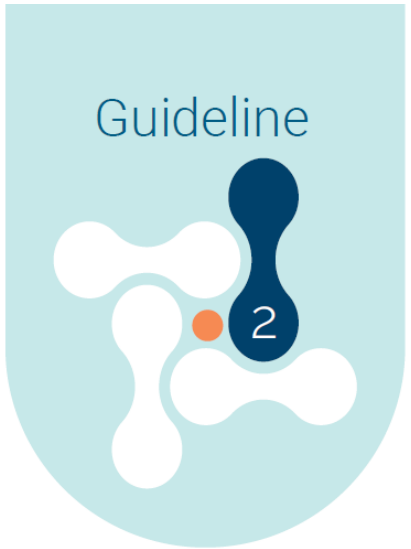
2020 Key Guidelines

1) Follow a healthy dietary pattern at every life stage.

Recommended Dietary Patterns:	Healthy US	Vegetarian	Mediterranean
Vegetables (cup eq/d)	✓	✓	✓
Dark Green (cup eq/wk)	✓	✓	✓
Red & Orange (cup eq/wk)	✓	✓	✓
Starchy & Others (cup eq/wk)	✓	✓	✓
Fruits (cup eq/d)	✓	✓	↑
Grains (oz eq/d)	✓	↑	✓
Whole Grains (oz eq/d)	✓	↑	✓
Refined Grains (oz eq/d)	✓	✓	✓
Dairy (cup eq/d)	✓	✓	↓
Protein Foods (oz eq/d)	✓	↓	↑
Meats/Poultry/Eggs (oz eq/wk)	✓	↓↓	✓
Seafood (oz eq/wk)	✓	↑↑	↑↑
Nuts/Seeds/Soy (oz/wk)	✓	↑↑	✓
Vegetable OR Protein Foods (cup eq/d) Beans/Peas/Lentils (cup/oz eq/wk)	✓	↑	✓
Oils (g/d)	✓	✓	✓
Limit on calories for other things (%)	✓	✓	✓

2020 Key Guidelines

2) Customize and enjoy nutrient-dense food + beverage choices to reflect personal preferences, cultural traditions, and budgetary considerations



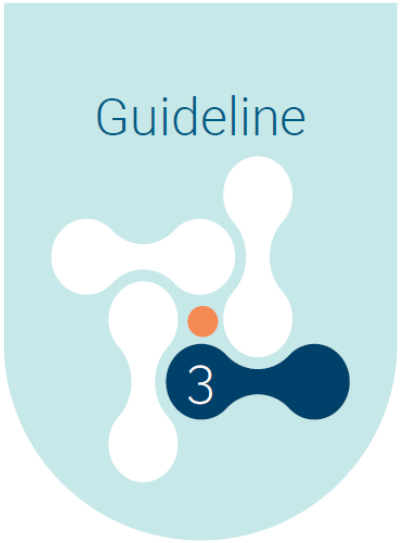
- **Nutrient Dense**: Foods/beverages *high* in <u>nutrients</u> but relatively *low* in <u>kcals</u>.
- **Energy Dense**: Foods/beverages *high* in <u>kcals</u>.

<u>High Nutrient Density</u>
(Low Energy Density)

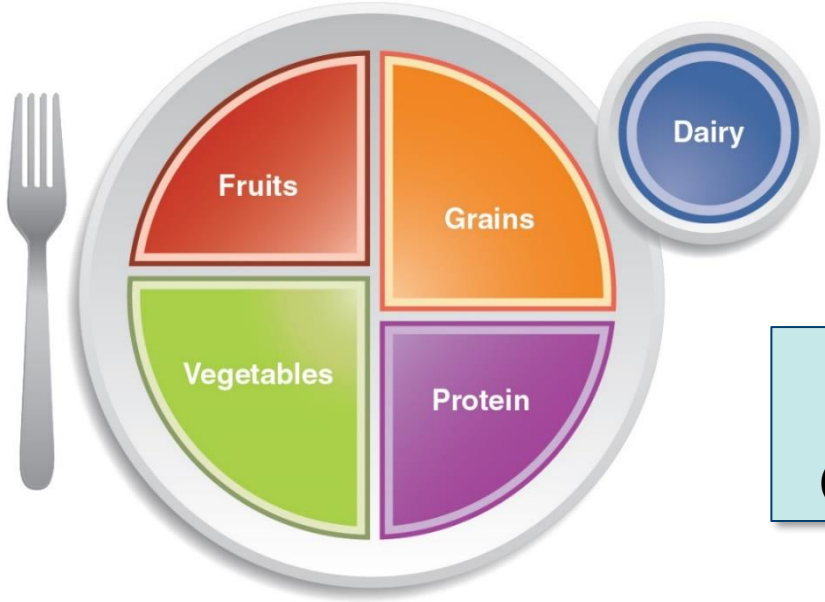
<u>Low Nutrient Density</u>
(High Energy Density)

2020 Key Guidelines

3) Focus on meeting food group needs with nutrient-dense foods + beverages, and stay within calorie limits.



- **Food Groups**: Categories of foods and beverages with shared nutritional properties (per USDA)
- **MyPlate**: Diet-planning tool, visual organization for each eating occasion



Discretionary Foods (everything else)

2020 Key Guidelines

Prioritize:

- Vegetables (whole; variety)
- Fruits (whole; variety)
- Grains (50% as whole grain)
- Dairy
  - fat-free or low-fat milk, yogurt, & cheese
  - lactose-free versions
  - fortified soy beverages & yogurt alternatives
- Protein foods
  - lean meats, poultry, & eggs
  - seafood
  - beans, peas, & lentils
  - nuts, seeds, and soy products
- Oils (vegetable oils & oils in foods)

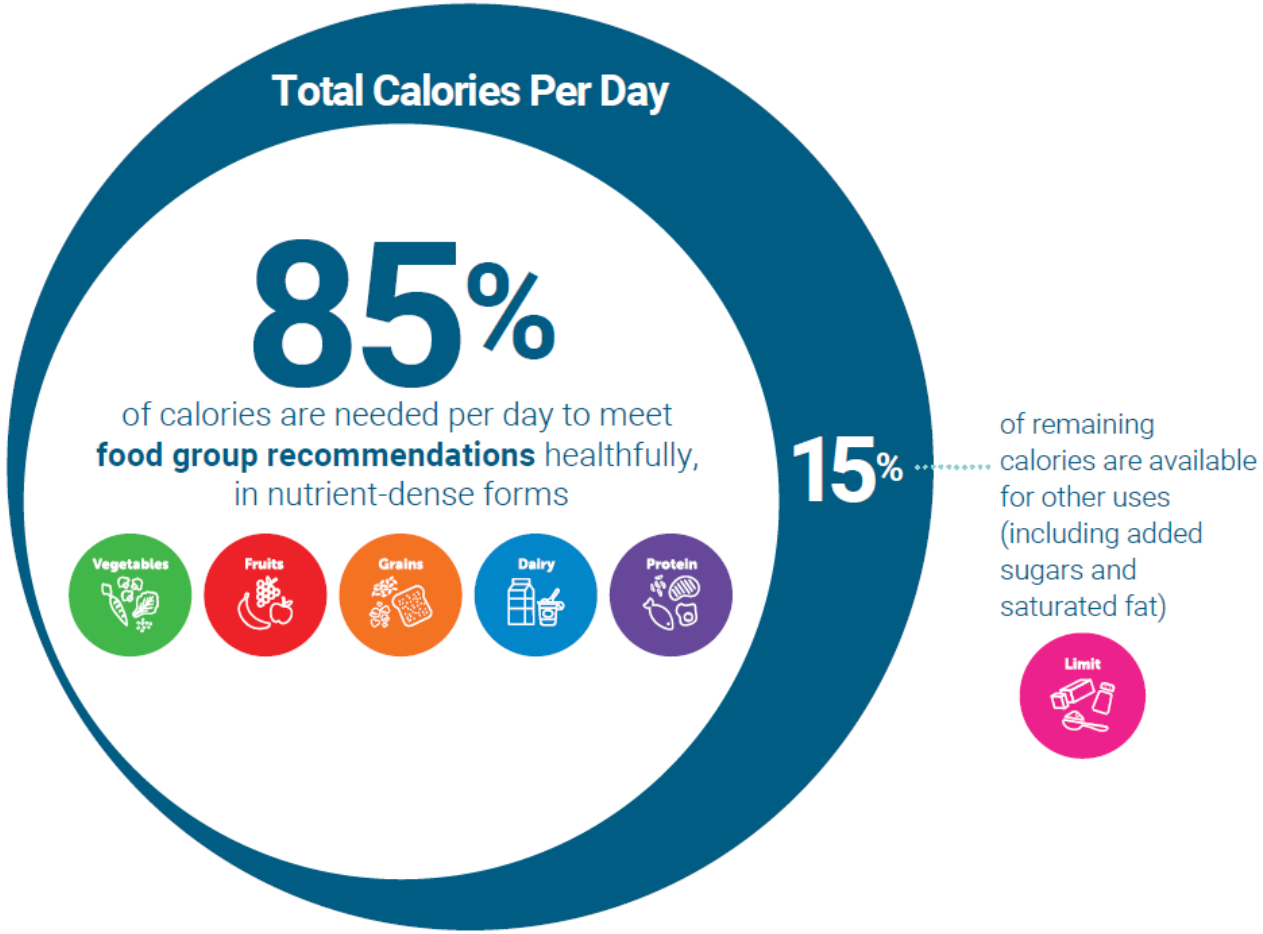
Consume in Moderation*:

- Added sugar: <10% of kcals, ages 2+
- Saturated fat: <10% of kcals, ages 2+
- Sodium: <2,300 mg/d, ages 14+
- Alcoholic beverages:
  - Do not drink, or:
  - ≤ 2 drinks/day for men
  - ≤ 1 drink/day for women

*Also called “components to limit”

2020 Key Guidelines

85-15 Tip for Healthy Eating:



- Example: 2000 kcal diet
  - 85% = 1,700 kcal (food groups)
  - 15% = 300 kcal ('discretionary')
    - ✓ Added sugars
    - ✓ Saturated fat
    - ✓ Alcohol

What are MY DGAs?

- DGA Tables contain food group goals for age-sex groups
  - Includes food groups to prioritize
  - Includes "components to limit"
- **Find these in your textbook!**
- **Or HERE** (download PDF)

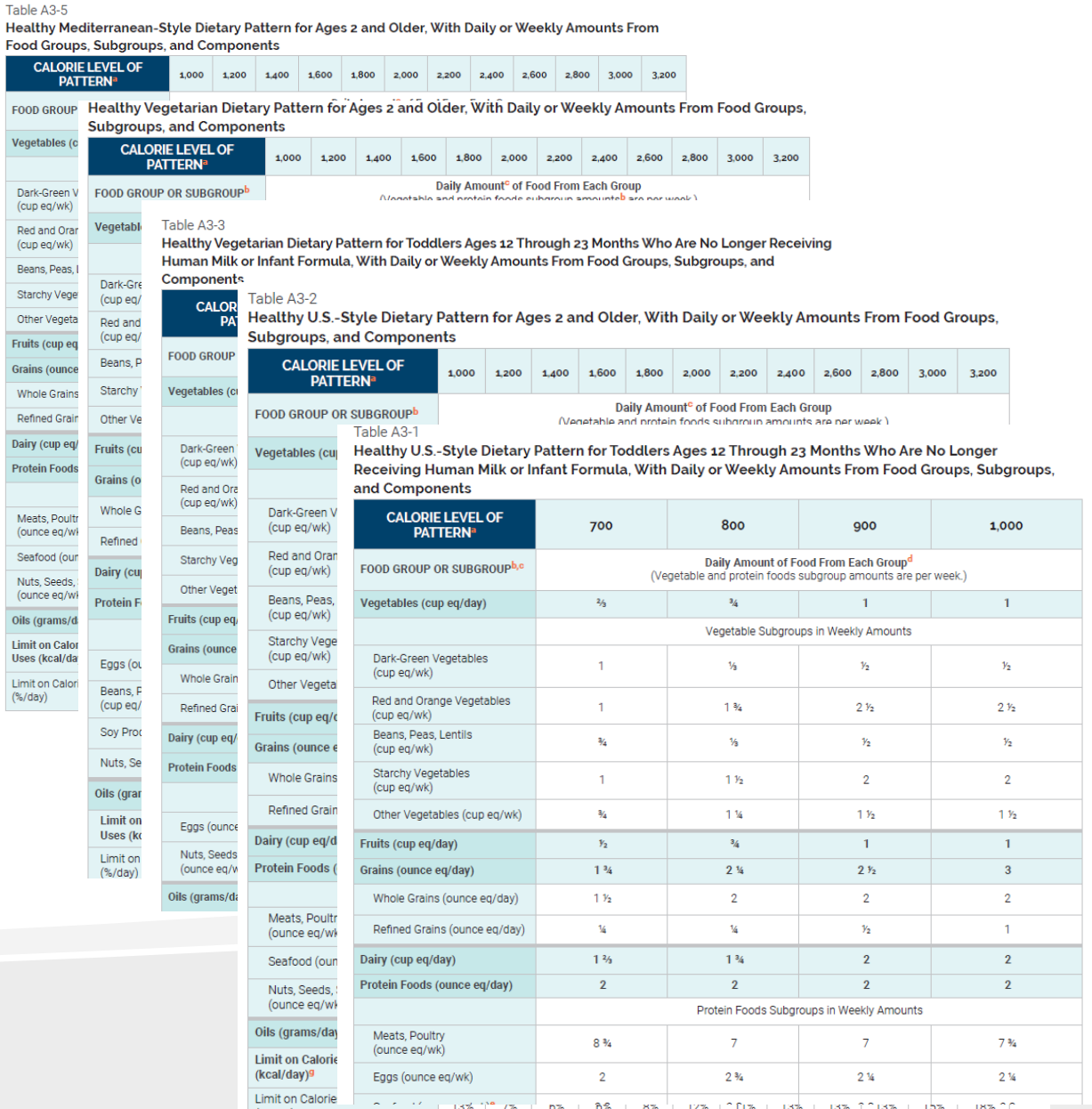


Table A3-5
Healthy Mediterranean-Style Dietary Pattern for Ages 2 and Older, With Daily or Weekly Amounts From Food Groups, Subgroups, and Components

CALORIE LEVEL OF PATTERN[a]	1,000	1,200	1,400	1,600	1,800	2,000	2,200	2,400	2,600	2,800	3,000	3,200

Table A3-3
Healthy Vegetarian Dietary Pattern for Ages 2 and Older, With Daily or Weekly Amounts From Food Groups, Subgroups, and Components

CALORIE LEVEL OF PATTERN[a]	1,000	1,200	1,400	1,600	1,800	2,000	2,200	2,400	2,600	2,800	3,000	3,200
FOOD GROUP OR SUBGROUP[b]	Daily Amount[c] of Food From Each Group (Vegetable and protein foods subgroup amounts[b] are per week.)											

Table A3-2
Healthy Vegetarian Dietary Pattern for Toddlers Ages 12 Through 23 Months Who Are No Longer Receiving Human Milk or Infant Formula, With Daily or Weekly Amounts From Food Groups, Subgroups, and Components

Table A3-1
Healthy U.S.-Style Dietary Pattern for Ages 2 and Older, With Daily or Weekly Amounts From Food Groups, Subgroups, and Components

CALORIE LEVEL OF PATTERN[a]	1,000	1,200	1,400	1,600	1,800	2,000	2,200	2,400	2,600	2,800	3,000	3,200
FOOD GROUP OR SUBGROUP[b]	Daily Amount[c] of Food From Each Group (Vegetable and protein foods subgroup amounts are per week.)											

Table A3-1
Healthy U.S.-Style Dietary Pattern for Toddlers Ages 12 Through 23 Months Who Are No Longer Receiving Human Milk or Infant Formula, With Daily or Weekly Amounts From Food Groups, Subgroups, and Components

CALORIE LEVEL OF PATTERN[a]	700	800	900	1,000
FOOD GROUP OR SUBGROUP[b,c]	Daily Amount of Food From Each Group[d] (Vegetable and protein foods subgroup amounts are per week.)			
Vegetables (cup eq/day)	⅔	¾	1	1
	Vegetable Subgroups in Weekly Amounts			
Dark-Green Vegetables (cup eq/wk)	1	⅓	½	½
Red and Orange Vegetables (cup eq/wk)	1	1 ¾	2 ½	2 ½
Beans, Peas, Lentils (cup eq/wk)	¾	⅓	½	½
Starchy Vegetables (cup eq/wk)	1	1 ½	2	2
Other Vegetables (cup eq/wk)	¾	1 ¼	1 ½	1 ½
Fruits (cup eq/day)	½	¾	1	1
Grains (ounce eq/day)	1 ¾	2 ¼	2 ½	3
Whole Grains (ounce eq/day)	1 ½	2	2	2
Refined Grains (ounce eq/day)	¼	¼	½	1
Dairy (cup eq/day)	1 ⅔	1 ¾	2	2
Protein Foods (ounce eq/day)	2	2	2	2
	Protein Foods Subgroups in Weekly Amounts			
Meats, Poultry (ounce eq/wk)	8 ¾	7	7	7 ¾
Eggs (ounce eq/wk)	2	2 ¾	2 ¼	2 ¼

Additional Diet Planning Principles (DGAs):

1.) Energy Balance

energy intake = energy expenditure

10,000 kcals/d intake needs

1,200 kcals/d intake needs

2.) Food-First Mentality

- All nutrient needs *can* (*and should*) be fulfilled with foods, not supplements, for most individuals.

In Real Life

- How do we plan a meal, considering:
  1. Time
  2. Skills
  3. Seasonality/origin of produce
  4. Available recipes and knowledge
  5. Cost

Additional Diet Planning Principles (DGAs):

3.) Portion Size

- Target 1 serving/eating occasion but tailor this depending on your needs
- Read serving sizes on packages
- Estimate with your hand!

InstaPoll: Portion Size Confusion

The USDA created ‘appropriate’ portion sizes (serving sizes) for all foods. Does this mean that all packaged foods/snacks are single (one) serving?

- Go and grab a snack from your pantry!
- Look at the nutrition label
- Is it 1 serving/package?
  - Yes, 1 serving
  - No, it’s more than 1 serving
  - I don’t have any snacks to check…

Additional Diet Planning Principles (DGAs):

4.) Moderation

- Consume energy-dense (low-nutrient) foods only occasionally
  - ✓ Ultra-processed foods
  - ✓ Discretionary calories: ≤15% of the diet should come from these foods

Ultra-processed foods: Foods that contain many ingredients, including:

- Additives to improve palatability (taste/flavor) and increase shelf-life
- High amounts of kcals, sodium, added sugar and saturated fat
- Sometimes key nutrients (e.g., fiber, micronutrients) – breakfast cereals, etc.

Additional Diet Planning Principles (DGAs):

5.) Variety

- Increased variety within food groups: all foods are NOT equal

Milk: High in Leucine
vs
Meat: High in Tryptophan

Oranges: High in Vit C
vs
Bananas: High in Vit B6

Asparagus: High in Folate
vs
Red Bell Peppers: High in Vit C
vs
Sweet Potatoes: High in Vit A

Diet-Planning How To's

- Identify your preferred DGA pattern
- Identify your preferred foods within the 5 food groups
- Identify which nutrient-rich foods
- Consider foods you ***enjoy***
- Choose a ***variety of foods from each food group***
- Make dietary improvements ***little by little***
- ***Be mindful*** of ultra-processed foods
- Take the time to get to know your food!

What's on my label (back-of-package)?

overconsumption (obesity)

overconsumption (CVD)

overconsumption

underconsumption

Nutrition Facts

8 servings per container

Serving size **2/3 cup (55g)**

Amount per serving

Calories **230**

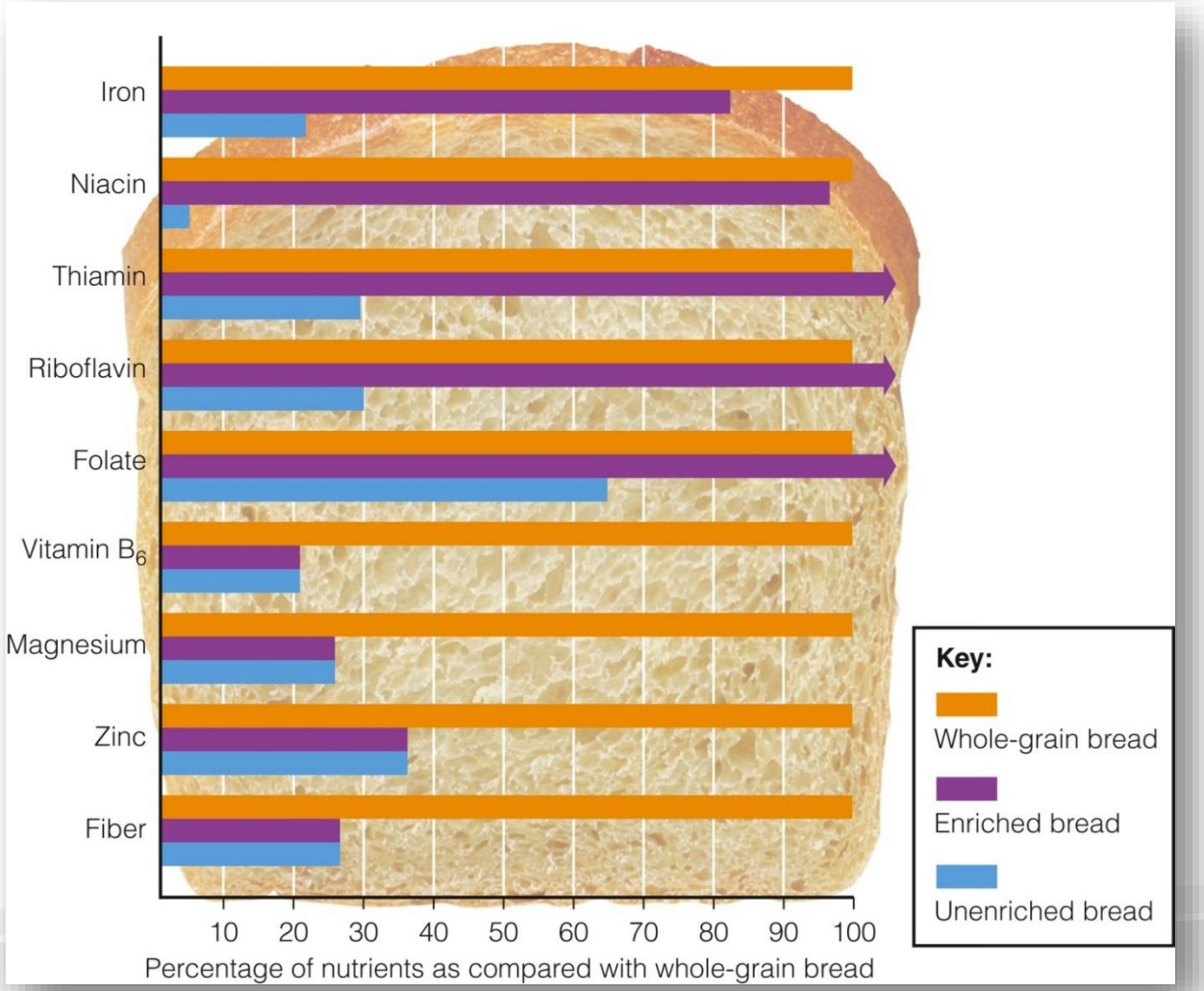
	% Daily Value*
Total Fat 8g	**10%**
Saturated Fat 1g	**5%**
Trans Fat 0g	
Cholesterol 0mg	**0%**
Sodium 160mg	**7%**
Total Carbohydrate 37g	**13%**
Dietary Fiber 4g	**14%**
Total Sugars 12g	
Includes 10g Added Sugars	**20%**
Protein 3g	
Vitamin D 2mcg	10%
Calcium 260mg	20%
Iron 8mg	45%
Potassium 240mg	6%

* The % Daily Value (DV) tells you how much a nutrient in a serving of food contributes to a daily diet. 2,000 calories a day is used for general nutrition advice.

Ingredient list:

- List of *all* ingredients
- Descending order of predominance by weight
- Common allergens

What's with all those ingredients in my bread…?



- Grains
  - Whole-grain products
    - High nutrients and dietary fiber
  - Enriched
    - Replaces some nutrients lost during processing
    - Doesn't replace *all* lost nutrients or dietary fiber
  - Refined
    - Many nutrients and fiber lost during processing
  - Fortified
    - Nutrients added that weren't previously in the food (e.g., calcium in soy milk)

Whitney & Rolfes, Understanding Nutrition (15th ed.)

What's on my label (front-of-package)?

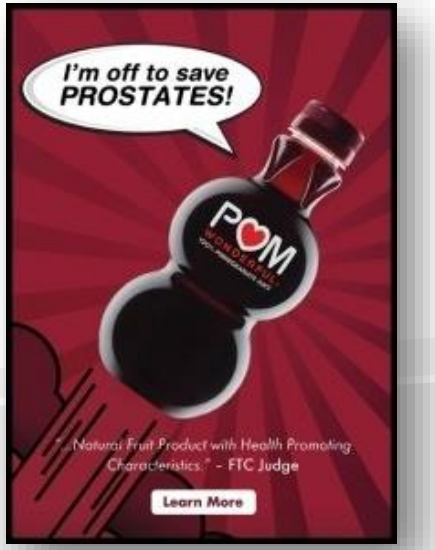
- Nutrient claims
  - FDA regulated and approved
  - Highlights the quantity or quality of a specific nutrient
  - Example:
    - ✓ "*High Protein*": > 10 g protein
    - ✓ "*Good Source of Protein*": 5-9.5 g protein"
- Health claims
  - FDA regulated and approved
  - Relationship between food and disease/health condition
  - Example: *"Diets low in sodium may reduce the risk of high blood pressure"*

What's on my label (front-of-package)?

- Structure-Function claims
  - Made *without* FDA approval
  - Doesn't name specific diseases (e.g., hypertension), but alludes to health benefits
  - Example:
    - ✓ "*Builds strong bones*"
    - ✓ "*Heart-healthy*"
    - ✓ "*Supports immunity*"

Misleading Labels

- Food labeling confusion
  - False or misleading labels, certifications
    - ✓ Organic, Non-GMO, Gluten-free ≠ Healthy
    - ✓ High protein or high fiber ≠ Healthy
    - ✓ Low carbohydrate, low sugar, low fat ≠ Healthy
    - ✓ Generalized health claims



Food Label Requirements

- Legal requirement for virtually all packaged foods
- Exceptions:
  - Few nutrients (coffee, tea, spices)
  - Small businesses
  - Prepared and sold in same establishment
- Restaurants
  - Kcals, saturated fat, sodium
  - Portion sizes (2-3 times larger)

Whitney & Rolfes, Understanding Nutrition (15th ed.)

InstaPoll

- Practice!
  - Find a food item in your home and read the packaging.
    - Serving size?
    - Enriched/fortified/refined/whole?
    - Ingredients (Most? Least?)?
    - What type(s) of claims are made on the front-of-package label?
    - Anything misleading or confusing?