



Dietary Guidance Toward Adopting Greater Plant-Based Intakes: The U.S. Experience

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The US Dietary Guidance Experience : Outline

2020 US Dietary Guidelines Advisory Committee

- AHA Heart Disease and Stroke Statistics – 2020 Update
- DGAC Process and Topics
- Committee Findings – Chapters 8,9,12

2021 AHA Dietary Guidance to Improve Cardiovascular Health

- Evidence-based Dietary Guidelines
- Healthy proteins – prioritizing plant protein

Summary: Key Evidence-Based Dietary Factors

- **Favorable:** PUFA, Fiber, Plant-Based dietary pattern
- **Unfavorable:** SFA, Sodium, Sugar, Red/Processed Meat

Future Directions

- Precision Nutrition for Health
- Artificial Intelligence: data driven diet assessment links to biomarkers

Circulation

AHA STATISTICAL UPDATE

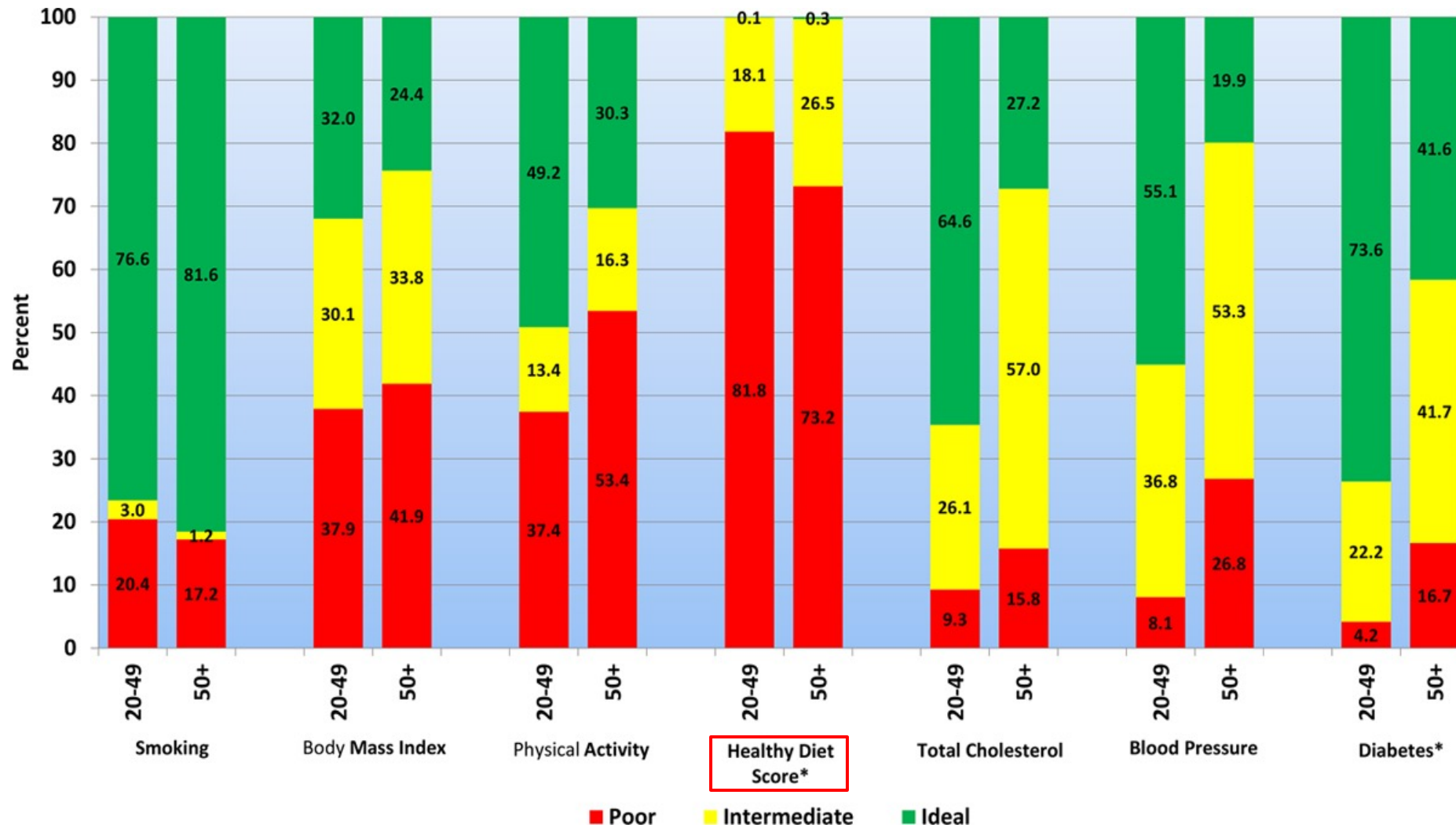
Heart Disease and Stroke Statistics— 2020 Update

A Report From the American Heart Association

Virani SS, Alonso A, Benjamin EJ, Bittencourt MS, Callaway CW, Carson AP, Chamberlain AM, Chang AR, Cheng S, Delling FN, Djousse L, Elkind MSV, Ferguson JF, Fornage M, Khan SS, Kissela BM, Knutson KL, Kwan TW, Lackland DT, Lewis TT, Lichtman JH, Longenecker CT, Loop MS, Lutsey PL, Martin SS, Matsushita K, Moran AE, Mussolino ME, Perak AM, Rosamond WD, Roth GA, Sampson UKA, Satou GM, Schroeder EB, Shah SH, Shay CM, Spartano NL, Stokes A, Tirschwell DL, VanWagner LB, Tsao CW; American Heart Association Council on Epidemiology and Prevention Statistics Committee and Stroke Statistics Subcommittee.
Circulation. 2020 Jan 29:CIR0000000000000757. Epub ahead of print.

Less than 1% of
Americans are in ideal
cardiovascular health.

Prevalence of Poor, Intermediate, and Ideal Cardiovascular Health for Each of The 7 Metrics of Cardiovascular Health in The AHA 2020 Goals Among US Adults Aged 20 to 49 and ≥ 50 Years



*Healthy diet score based on consumption of: fruits & vegetables, seafood, sodium, SSBs, whole grains, nuts/seeds & legumes, processed meats, and SFA

Process to Update the Dietary Guidelines

Step 1: Review of the science by a Federal advisory committee.

- USDA/HHS convene a Dietary Guidelines Advisory Committee.
- The Committee conducts an independent review of the current scientific evidence and submits a report of its findings to the Secretaries.
- The scientific report is then posted for public and Federal agency review and comment.



The report is available at [DietaryGuidelines.gov](https://www.dietaryguidelines.gov)

The Committee's Scientific Review



Data Analysis

More than 150 analyses of Federal data sets

Food Pattern Modeling

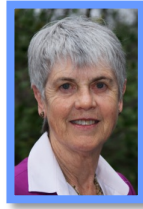
Several analyses across the life span – and representing, for the first time, 6- to 24-month life stage



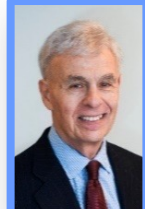
NESR Systematic Review

More than 270,000 citations screened and nearly 1,500 original research articles included in 33 original systematic reviews

2020 Dietary Guidelines Advisory Committee



Barbara Schneeman, PhD
University of California-Davis
Chair



Ronald Kleinman, MD*
Harvard Medical School
Vice Chair



Jamy Ard, MD
Wake Forest School of Medicine



Regan Bailey, PhD, MPH, RD
Purdue University



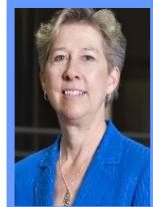
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Teresa Davis, PhD
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Kathryn Dewey, PhD
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What's the difference between the Dietary Guidelines Advisory Committee Report & the Dietary Guidelines for Americans?

COMMITTEE REPORT VS DIETARY GUIDELINES



An overview of the latest available science on a variety of nutrition topics

WHAT IS IT?



Recommendations on what the average American should eat and drink to promote health and prevent chronic disease

WHO WRITES IT?



The Dietary Guidelines Advisory Committee, a balanced group of nutrition science experts



U.S. Department of Agriculture (USDA) and U.S. Department of Health and Human Services (HHS)

WHO IS THE AUDIENCE?



U.S. Department of Agriculture (USDA) and U.S. Department of Health and Human Services (HHS)



Nutrition policymakers and health professionals

HOW IS IT USED?



Informs USDA and HHS as they develop the Dietary Guidelines for Americans

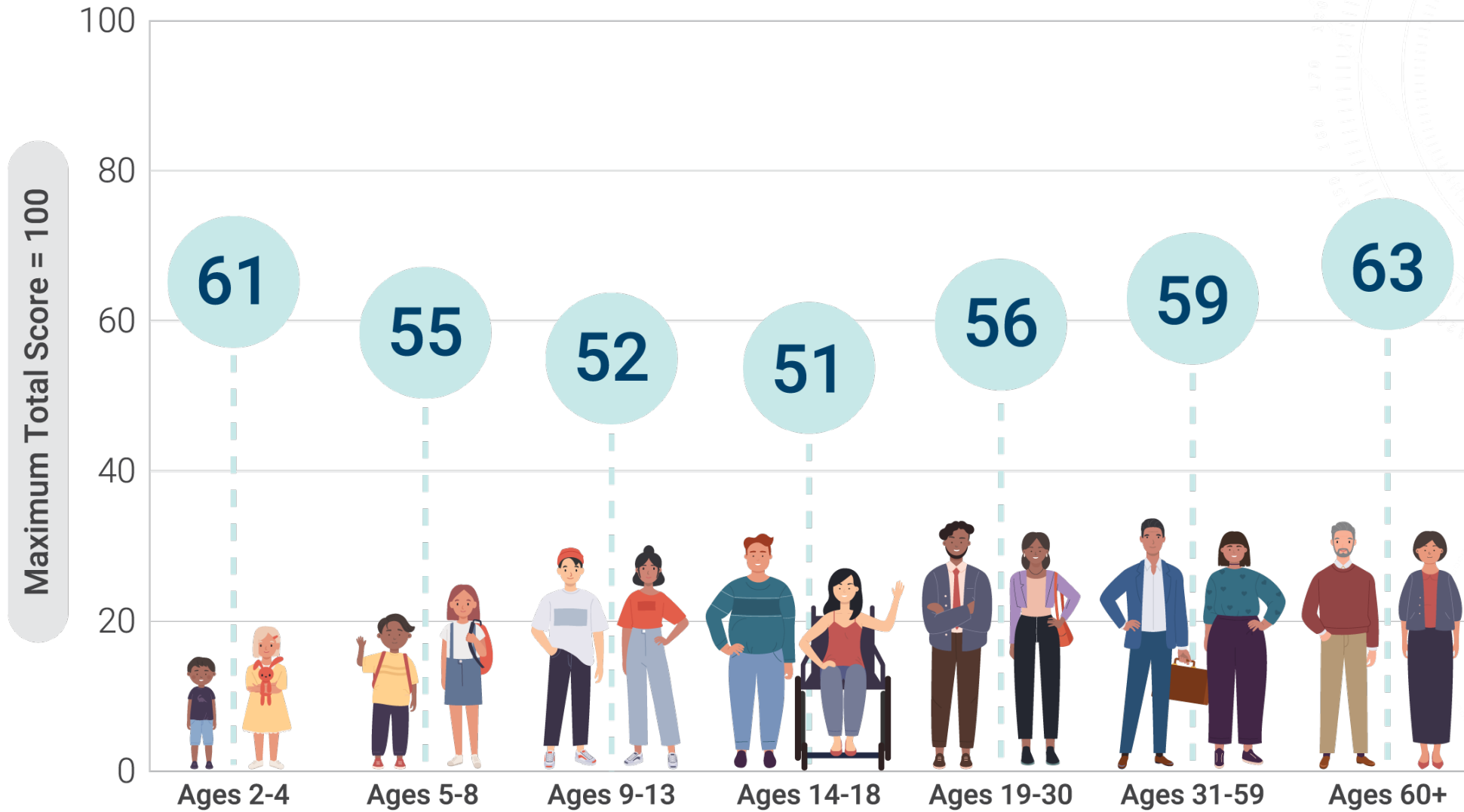


Used as the basis for federal nutrition policy; built on by medical professionals to meet specific needs; developed into nutrition resources for the general public; and much more

[Dietaryguidelines.gov](https://www.dietaryguidelines.gov)



Most Americans Do Not Follow the *Dietary Guidelines*



Organization of the 2020 Dietary Guidelines Advisory Committee

Advisory Committee Review of Scientific Evidence

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

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

Data Analysis and Food Pattern Modeling



Example of Findings from Systematic Reviews

Committee Findings: Dietary Patterns (Chapter 8, p 39-40)

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



Health outcome of interest

Grade

Lower risk of disease

Higher risk of disease

<i>Health Outcome of Interest:</i>	All-cause mortality	Cardiovascular disease ^a	Growth, size, body composition and risk of overweight and obesity ^a	Type 2 diabetes ^a	Bone health ^a	Colorectal Cancer ^b	Breast Cancer (Post-menopausal) ^b	Lung Cancer ^b	Neurocognitive health
<i>Grade:</i>	<i>Strong (adults)</i>	<i>Strong (adults); Limited (children)</i>	<i>Moderate (adults); Limited (children)</i>	<i>Moderate (adults)</i>	<i>Moderate (adults)</i>	<i>Moderate (adults)</i>	<i>Moderate (adults)</i>	<i>Limited (adults)</i>	<i>Limited (adults)</i>
Dietary patterns associated with lower risk of disease consistently included the following components.									
Components									
Fruits	X	X	X	X	X	X	X	X	X
Vegetables	X	X	X	X	X	X	X	X	X
Whole grains/cereal	X	X	X	X	X	X	X	X	
Legumes	X	X	X (adults)		X	X		X	X
Nuts	X	X (adults)			X				X
Low-fat dairy	X	X	X		X	X		X	
Fish and/or seafood	X	X	X (adults)		X	X		X	X
Unsaturated vegetable oils	X	X	X (adults)						X
Lean meat	X					X		X	
Poultry	X								
Dietary patterns associated with higher risk of disease consistently included the following components.									
Red meat	X	X (adults)	X (adults)	X		X			
Processed meat	X	X	X	X	X	X			
High-fat meat								X	
High-fat dairy	X			X					
Animal-source foods							X		
Saturated fats		X (adults)	X (adults)			X			

Committee Findings: Dietary Patterns (Chapter 8)

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



Committee Advice: Dietary Fats and Seafood (Chapter 9)

Fats and Dietary Cholesterol:

- Intake of saturated fats should be limited to **less than 10% of energy** per day by replacing them with unsaturated fats.
- Dietary cholesterol intake should be as low as possible.

Seafood intake for children:

- Two or more servings of cooked seafood per week are recommended for ages 2 years and older to ensure intake of key nutrients and as part of an overall healthy dietary pattern; serving sizes vary based on age (FDA guidance).
- For those that do not consume seafood, regular intake of other foods high in omega-3 fatty acids, such as flaxseeds, walnuts, soy oil, algae and eggs that contain omega-3 fatty acids, is appropriate.

Committee Evidence: Added Sugar (Chapter 12)

- Recommend **less than 6% of energy from added sugars** to achieve a dietary pattern that is nutritionally adequate while avoiding excess energy.





Dietary
Guidelines
for Americans

2020 - 2025



Make Every
Bite Count With
the *Dietary
Guidelines*



Figure 1-6

Dietary Intakes Compared to Recommendations: Percent of the U.S. Population Ages 1 and Older Who Are Below and At or Above Each Dietary Goal

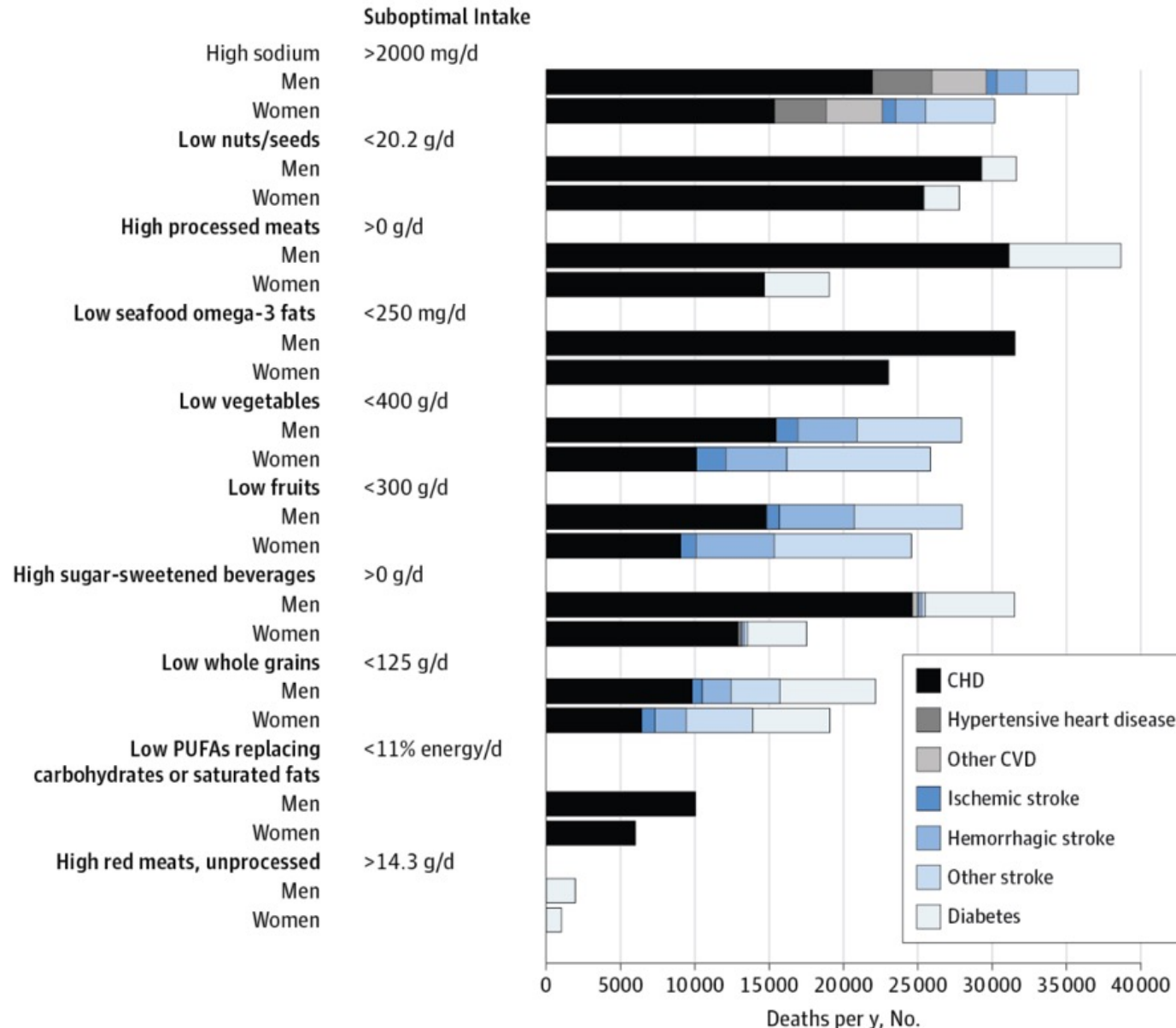


***NOTE:** Recommended daily intake of whole grains is to be at least half of total grain consumption, and the limit for refined grains is to be no more than half of total grain consumption.

Data Source: Analysis of What We Eat in America, NHANES 2013-2016, ages 1 and older, 2 days dietary intake data, weighted. *Recommended Intake Ranges:* Healthy U.S.-Style Dietary Patterns (see [Appendix 3](#)).

45% of cardiometabolic deaths in 2012 were attributable to suboptimal intake

Absolute cardiometabolic mortality attributable to dietary habits in the United States in 2012



AHA SCIENTIFIC STATEMENT

2021 Dietary Guidance to Improve Cardiovascular Health: A Scientific Statement From the American Heart Association

Alice H. Lichtenstein, DSc, FAHA, Chair*; Lawrence J. Appel, MD, MPH, FAHA, Vice Chair*; Maya Vadiveloo, PhD, RD, FAHA, Vice Chair; Frank B. Hu, MD, PhD, FAHA; Penny M. Kris-Etherton, PhD, RD, FAHA; Casey M. Rebholz, PhD, MS, MNSP, MPH, FAHA; Frank M. Sacks, MD, FAHA; Anne N. Thorndike, MD, MPH, FAHA; Linda Van Horn, PhD, RD, FAHA; Judith Wylie-Rosett, PhD, RD, FAHA; on behalf of the American Heart Association Council on Lifestyle and Cardiometabolic Health; Council on Arteriosclerosis, Thrombosis and Vascular Biology; Council on Cardiovascular Radiology and Intervention; Council on Clinical Cardiology; and Stroke Council

ABSTRACT: Poor diet quality is strongly associated with elevated risk of cardiovascular disease morbidity and mortality. This scientific statement emphasizes the importance of dietary patterns beyond individual foods or nutrients, underscores the critical role of nutrition early in life, presents elements of heart-healthy dietary patterns, and highlights structural challenges that impede adherence to heart-healthy dietary patterns.

Table. Evidence-Based Dietary Guidance to Promote Cardiovascular Health

1.	Adjust energy intake and expenditure to achieve and maintain a healthy body weight
2.	Eat plenty of fruits and vegetables, choose a wide variety
3.	Choose foods made mostly with whole grains rather than refined grains
4.	Choose healthy sources of protein a. Mostly protein from plants (legumes and nuts) b. Fish and seafood c. Low-fat or fat-free dairy products instead of full-fat dairy products d. If meat or poultry are desired, choose lean cuts and avoid processed forms

Table. Evidence-Based Dietary Guidance to Promote Cardiovascular Health Continued

5.	Use liquid plant oils rather than tropical oils (coconut, palm, and palm kernel), animal fats (eg., butter and lard,) and partially hydrogenated fats
6.	Choose minimally processed foods instead of ultra-processed foods*
7.	Minimize intake of beverages and foods with added sugars
8.	Choose and prepare foods with little or no salt
9.	If you do not drink alcohol, do not start; if you choose to drink alcohol, limit intake
10.	Adhere to this guidance regardless of where food is prepared or consumed

Why Prioritize Plants?

- Dietary patterns rich in red meat have been associated with higher CVD incidence and mortality, plus BMI and waist circumference.
- Replacing red & processed meats with alternative foods like unprocessed poultry, fish, nuts and legumes is associated with a lower risk of total and CVD mortality.
- In general, heart-healthy dietary patterns, those patterns associated with low CVD risk, contain primarily fruits and vegetables, foods made with whole grains, healthy sources of protein...

Why Prioritize Plants?

- A recent systematic review that compared high and low intake of legumes concluded that higher intake was associated with lower CVD risk.
- Higher nut intake was associated with lower risk of CVD, CHD, and stroke mortality and incidence.
- Dietary fiber found in plant foods, including fruits, vegetables, whole grains, nuts, seeds, beans, and legumes, is consistently inversely associated with lower risk of metabolic syndrome,¹⁰⁵ cardiometabolic risk,¹⁰⁶ and CVD.
- Plant-based dietary patterns have traditionally centred on replacing animal-source foods with plant-based whole foods such as legumes and nuts
- Replacing animal-source foods with plant-based whole foods has the additional benefit of lowering the diet's carbon footprint, thus contributing to planetary health.

Figure. Dietary Patterns to Promote Cardiovascular Health

EMPHASIZE

- Fruits and vegetables
- Whole grain foods
- Healthy sources of proteins; fish and seafood, legumes and nuts, low-fat/fat-free dairy, poultry and if desired lean meat
- Liquid plant oils (eg, soybean oil and canola oil)



MINIMIZE

- Beverages and foods with added sugars
- Ultra-processed foods
- Processed meats
- Food high in salt
- Alcoholic beverages
- Tropic oils

- Adjust energy intake to achieve and maintain a healthy body weight
- Follow this guidance regardless of where food is prepared or consumed

Additional Benefits of Heart Healthy Dietary Patterns

- 1. Nutrient profile rich in plant-based protein, fiber, nutrient dense**
2. Low in undesirable fatty acids; SFA, TF, Dietary Cholesterol
3. Reduced risk of other chronic conditions:
 - a. Type 2 Diabetes (T2D)
 - b. Cognitive decline
 - c. Kidney function decline
 - d. Low environmental impact (low animal protein sources)

Challenges to Dietary Adherence

Socioeconomic Factors/Food Insecurity

Structural Racism/Neighborhood Segregation

Targeted Marketing of Unhealthy Foods and Beverages

Overweight and Obesity

Prevention screening starting in 2-19 year olds (35% have BMI>35)

1. **Assess:** BMI Calculation
2. **Advise:** highlight overweight/obesity immediately as noted
3. **Agree:** use SMART (Specific, Measureable, Achievable, Realistic and Timed) Approach in shared decision making
4. **Assist:** in identifying challenges and facilitators
5. **Arrange:** ongoing follow-up; ways to overcome barriers

Life Course Targets

Pregnancy

- 1. Assess:** preferably initiate weight control preconception
- 2. Advise:** CVD-related risks of pregnancy/focus on weight gain goals
- 3. Agree:** share goal setting on all lifestyle behaviors
- 4. Assist:** mother and family as needed; WIC, referrals for lactation
- 5. Arrange:** regular prenatal care

Life Course Targets

Childhood & Adolescence

- 1. Assess:** health behaviors throughout developmental stages for all risk factors; diet, physical activity, tobacco exposure, BMI and environmental conditions
- 2. Advise:** caregivers; motivational interviewing; encourage focus on health factors; fitness weight for height (not appearance)
- 3. Agree:** partner with child/adolescents; SMART goal targets
- 4. Assist:** behaviorally; brainstorm solutions
- 5. Arrange:** services; referrals as needed

Nutrition for Precision Health

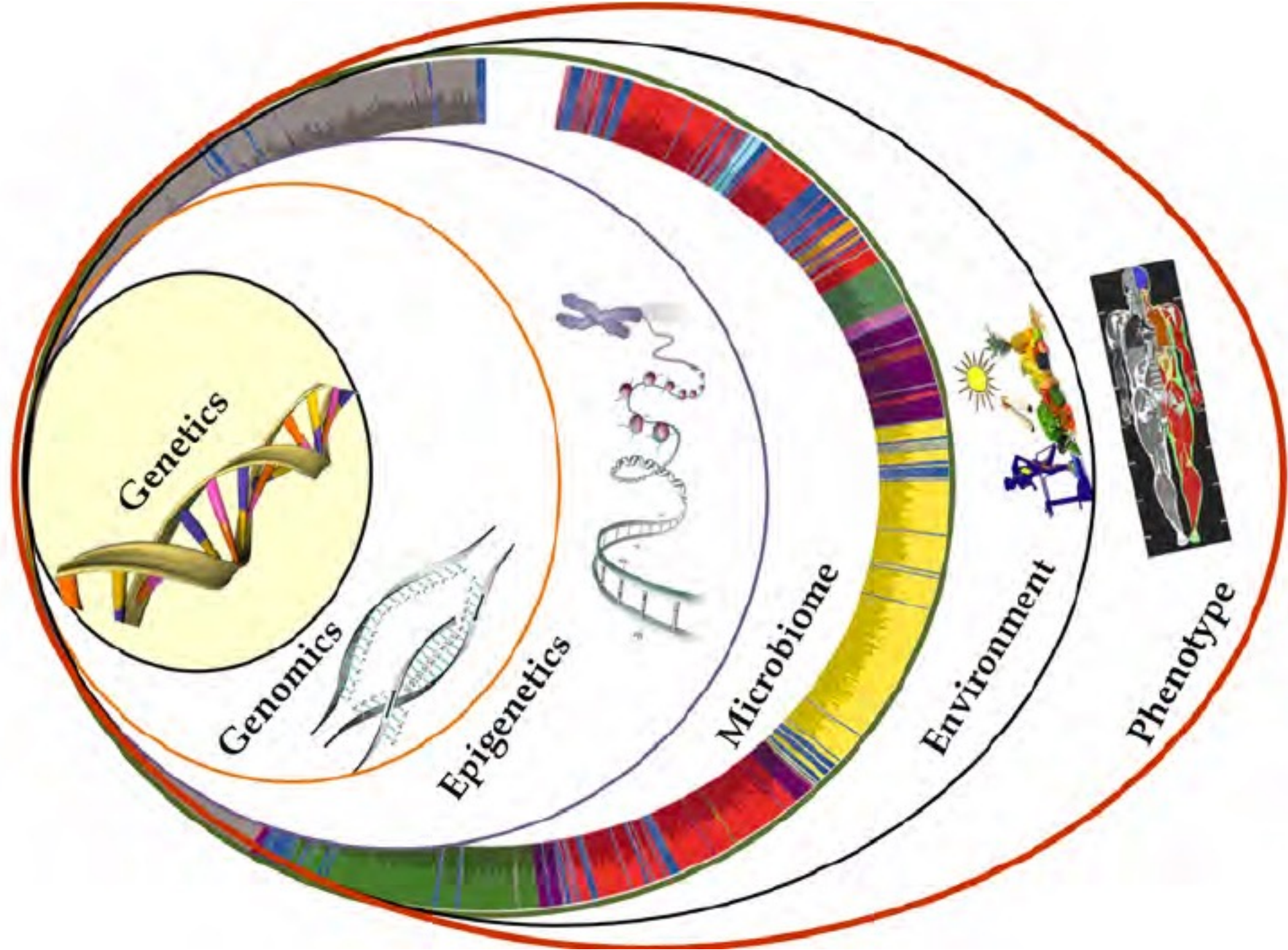
powered by the All of Us Research Program

Pre-Application Webinar

February 11, 2021
11 am EST



National Institutes of Health



Nutrition for Precision Health

Powered by the *All of Us* Research Program



Primary goal: to develop algorithms to predict individual responses to foods and dietary patterns

- Using comprehensive set of microbiome, genomic, physiological, metabolic, behavioral, cognitive, contextual, electronic health record, survey, and environmental data
- In large and diverse population of participants (*All of Us* Research Program)

Proposal overview

1



Examine **baseline diet** in an **observational study** followed by a mixed meal challenge test

10,000 *All of Us* participants

2



Examine responses to 3 short-term intervention diets in free-living **controlled feeding** studies

1,000-2,000 Module 1 participants

3



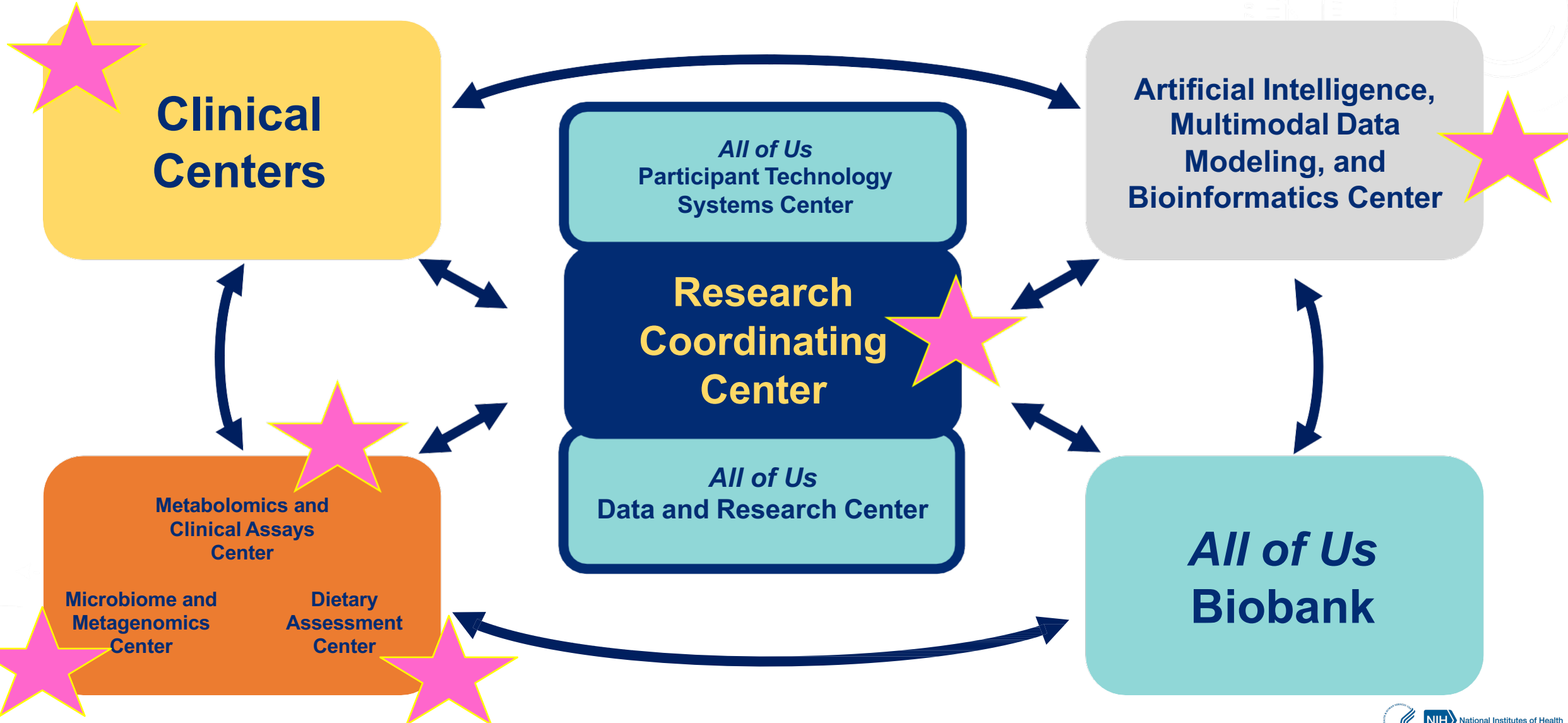
Examine responses to 3 short-term intervention diets in **domiciled controlled feeding** studies

500-1,000 Module 1 participants

In all 3 modules

- Collect microbiome, physiological, metabolic, behavioral, cognitive, and environmental data, and leverage existing genomic, EHR, and survey data, and conduct mixed meal challenges to model the impact of diet and dietary patterns on physiological responses
- Use machine learning and artificial intelligence to develop predictive algorithms

Program structure

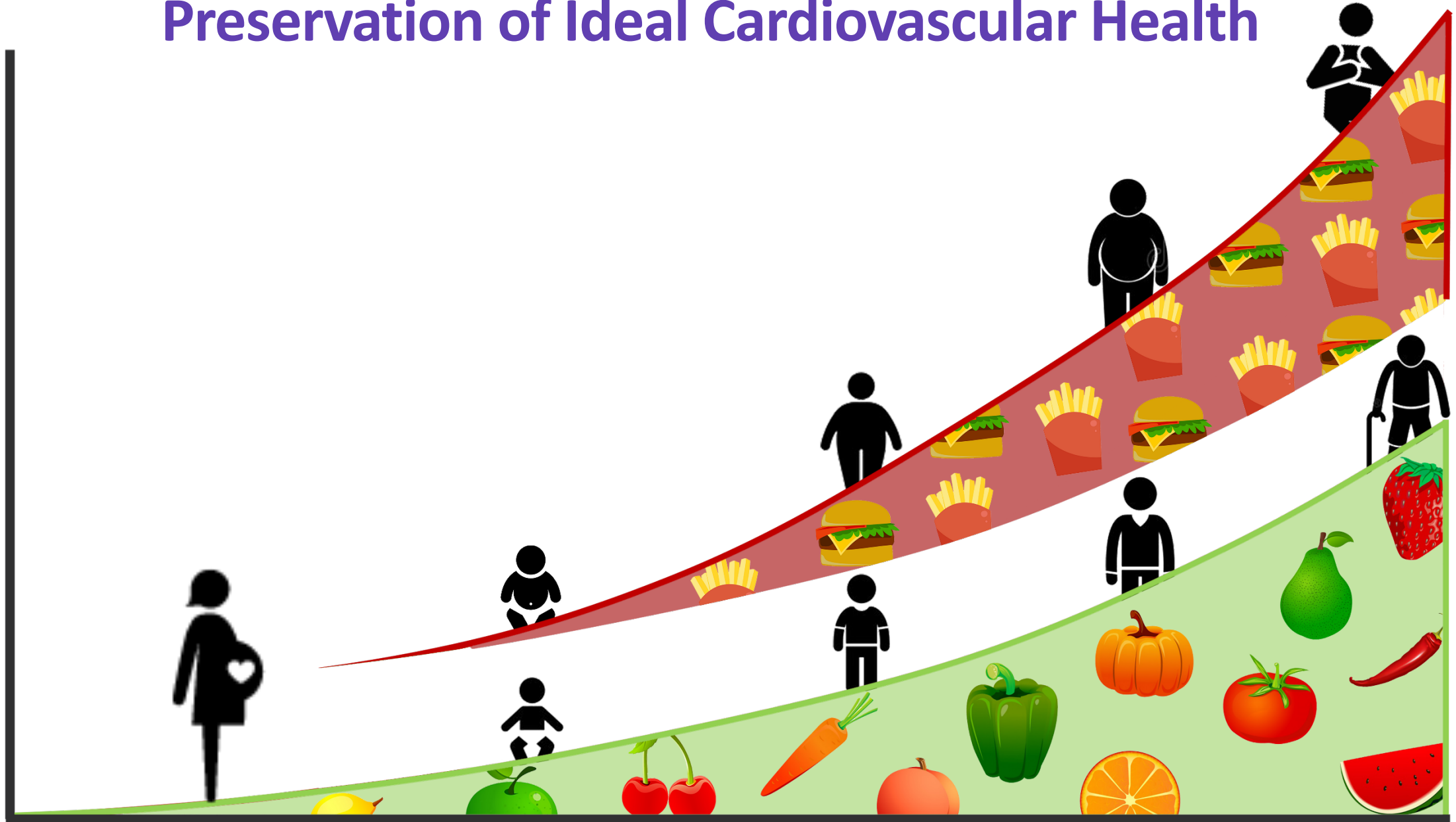


Future Role of Precision Nutrition within Improved Dietary Patterns and Adherence for All

Relevance of dietary adherence towards reducing Cardiovascular risk and improving health for all across the life course.

Preservation of Ideal Cardiovascular Health

Cardiovascular Disease Risk



Age (follow-up years)

References

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