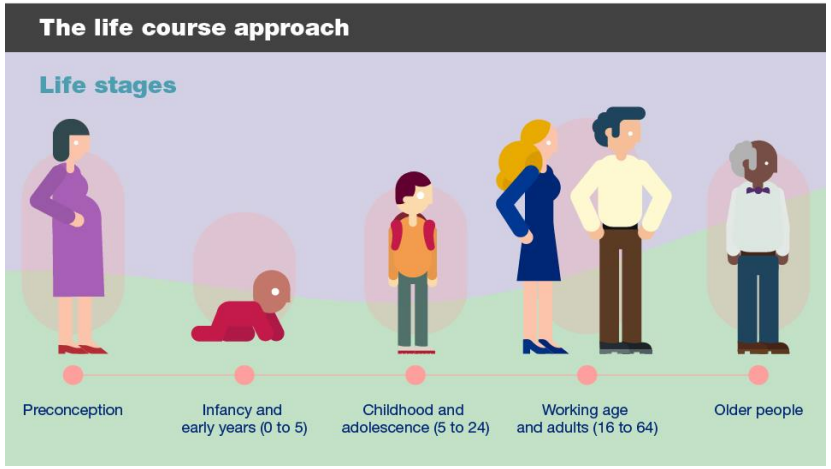
Disclosures for: Jill Reedy
No disclosures

AFFILIATION/FINANCIAL INTERESTS	CORPORATE ORGANIZATION
Grants/Research Support:	
Scientific Advisory Board/Consultant:	
Speakers Bureau:	
Stock Shareholder:	
Other Financial or Material Support/Honorarium:	



Dietary Pattern Assessment over the Life Course

Session 1: Setting the Stage on Dietary Patterns and Chronic Disease

Jill Reedy, PhD, MPH, RDN
Chief, Risk Factor Assessment Branch
Epidemiology and Genomic Research Program, Division of Cancer Control and Population Sciences
National Cancer Institute
August 15, 2023

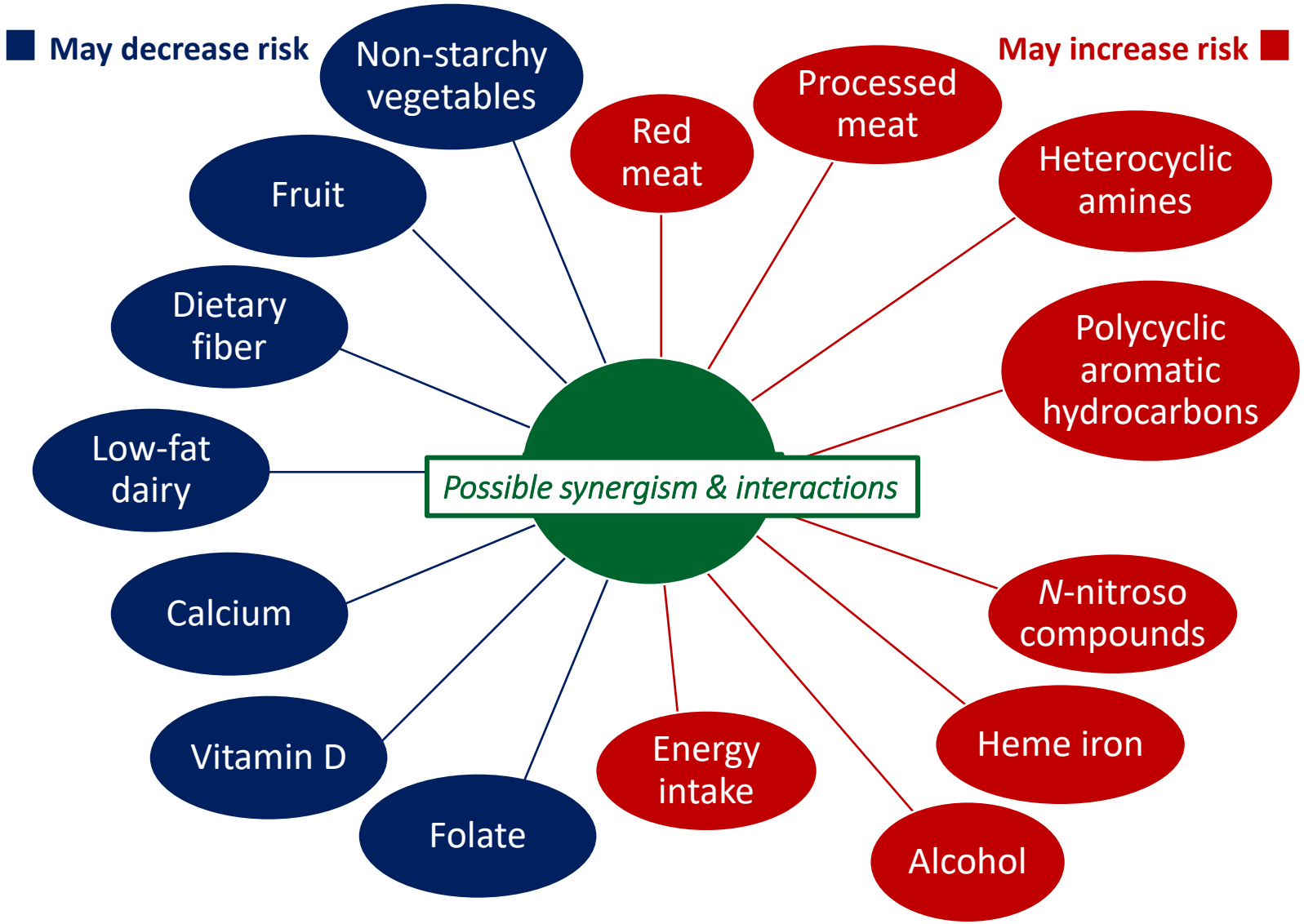
Dietary Patterns Methods Project: Acknowledgements

- University of South Carolina
  - Angela Liese
- University of Hawaii
  - Carol Boushey
  - Brook Harmon
  - Reynolette Ettienne-Gittens
- Fred Hutchinson Cancer Research Center
  - Marian Neuhouser
- NCI and Federal Partners
  - Susan Krebs-Smith
  - Amy Subar
  - Jennifer Lerman
  - Kirsten Herrick
  - Marissa Shams-White
  - Lauren O’Connor
  - Stephanie George
  - TusaRebecca Pannucci
  - Edwina Wambogo
  - Paige Miller Gianturco
  - Maggie Wilson Vinyard
  - Meghan Zimmer

Outline

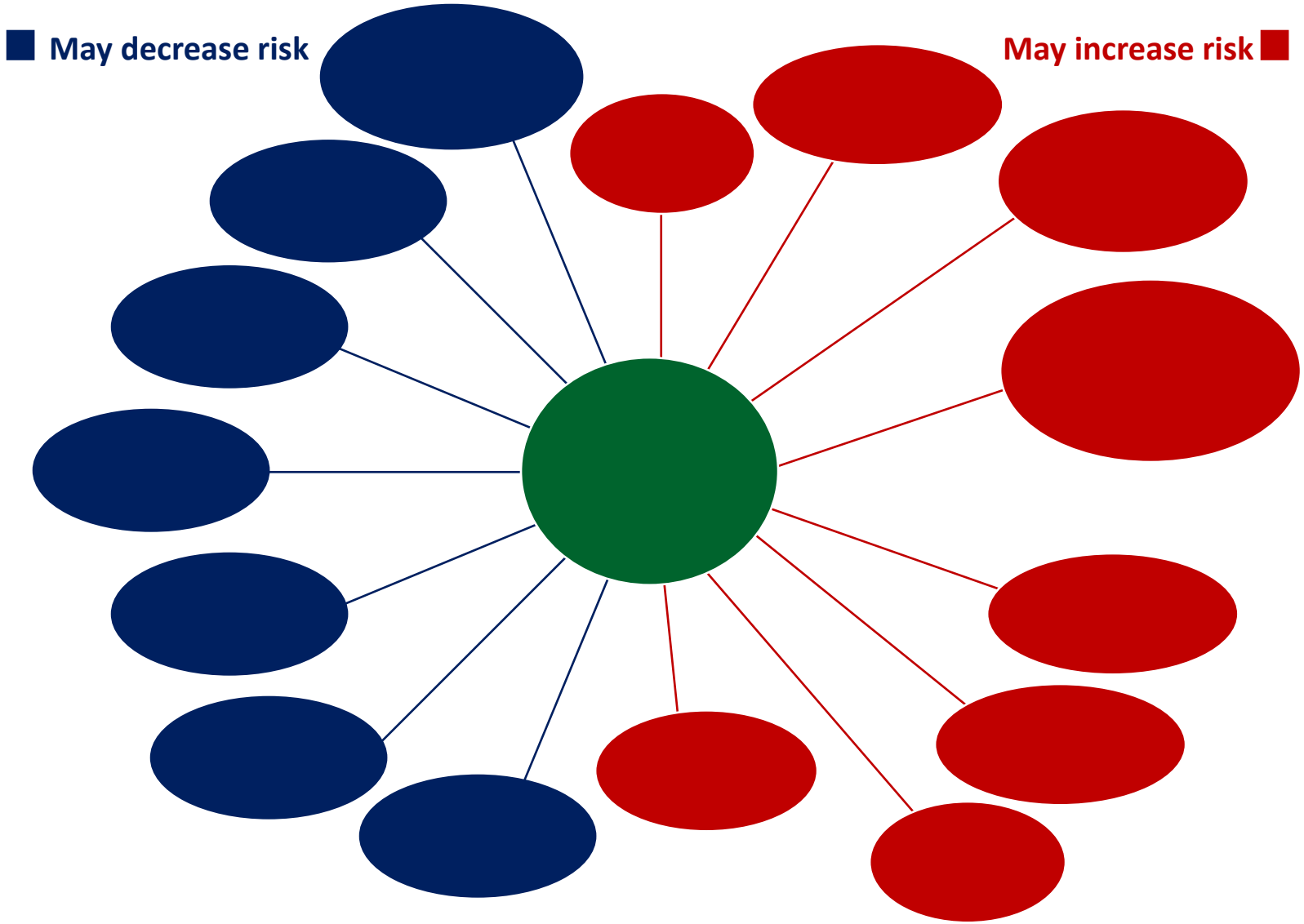
Outline

Diet and cancer prevention



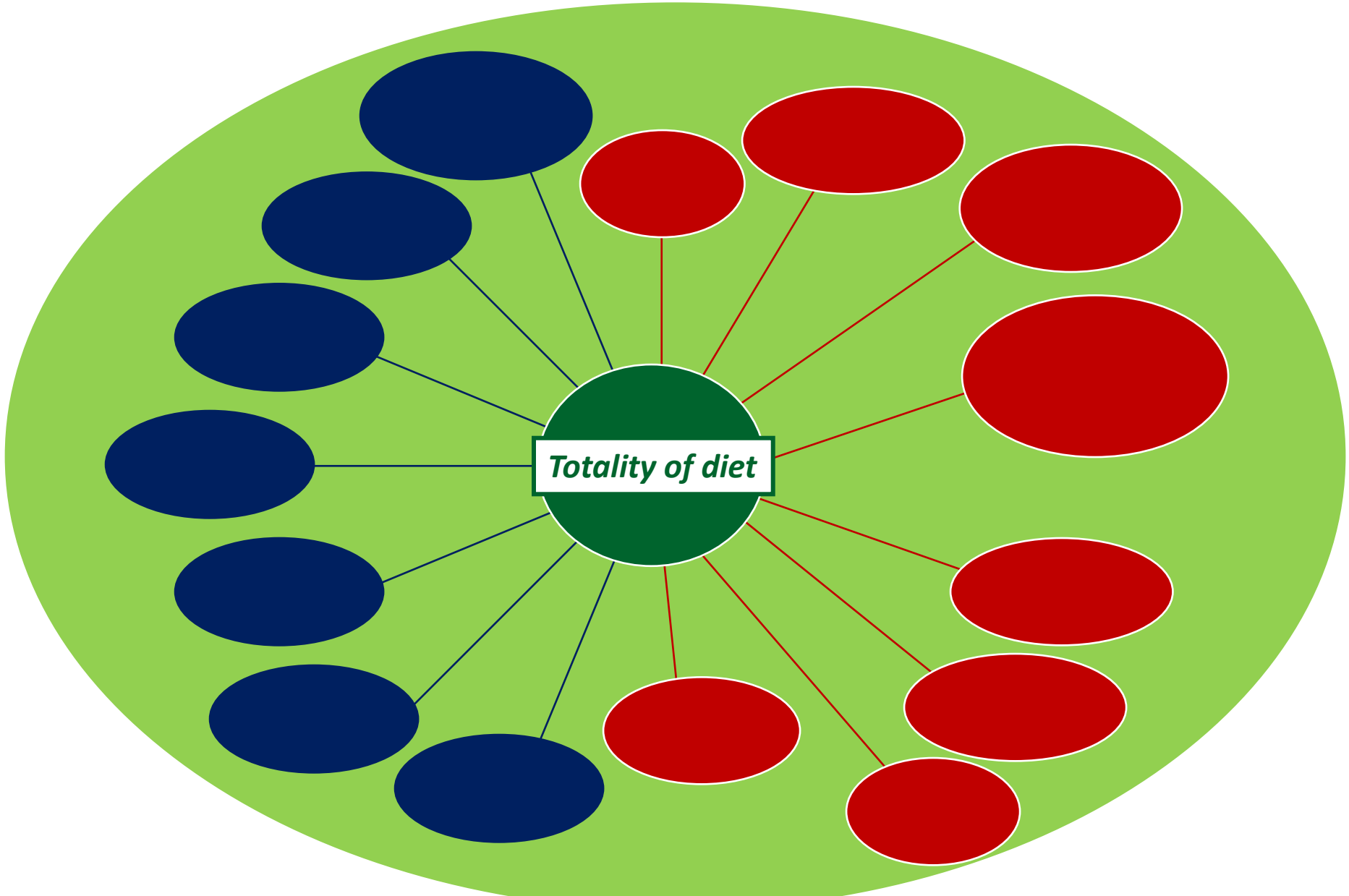
Miller PE. 2012

Diet and cancer prevention



Miller PE. 2012

Dietary patterns and cancer prevention



Miller PE. 2012

Expand “diet” to include the totality of diet, or “dietary patterns”

Outline

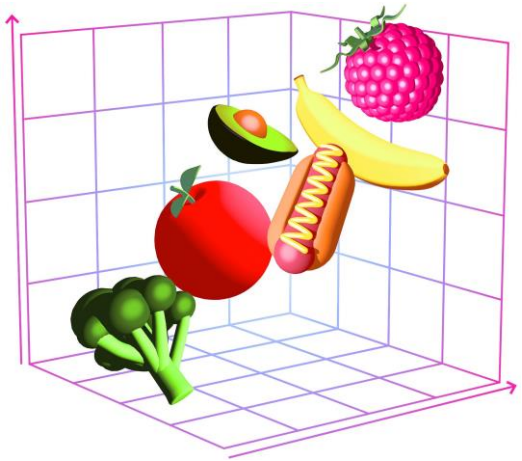
Outline

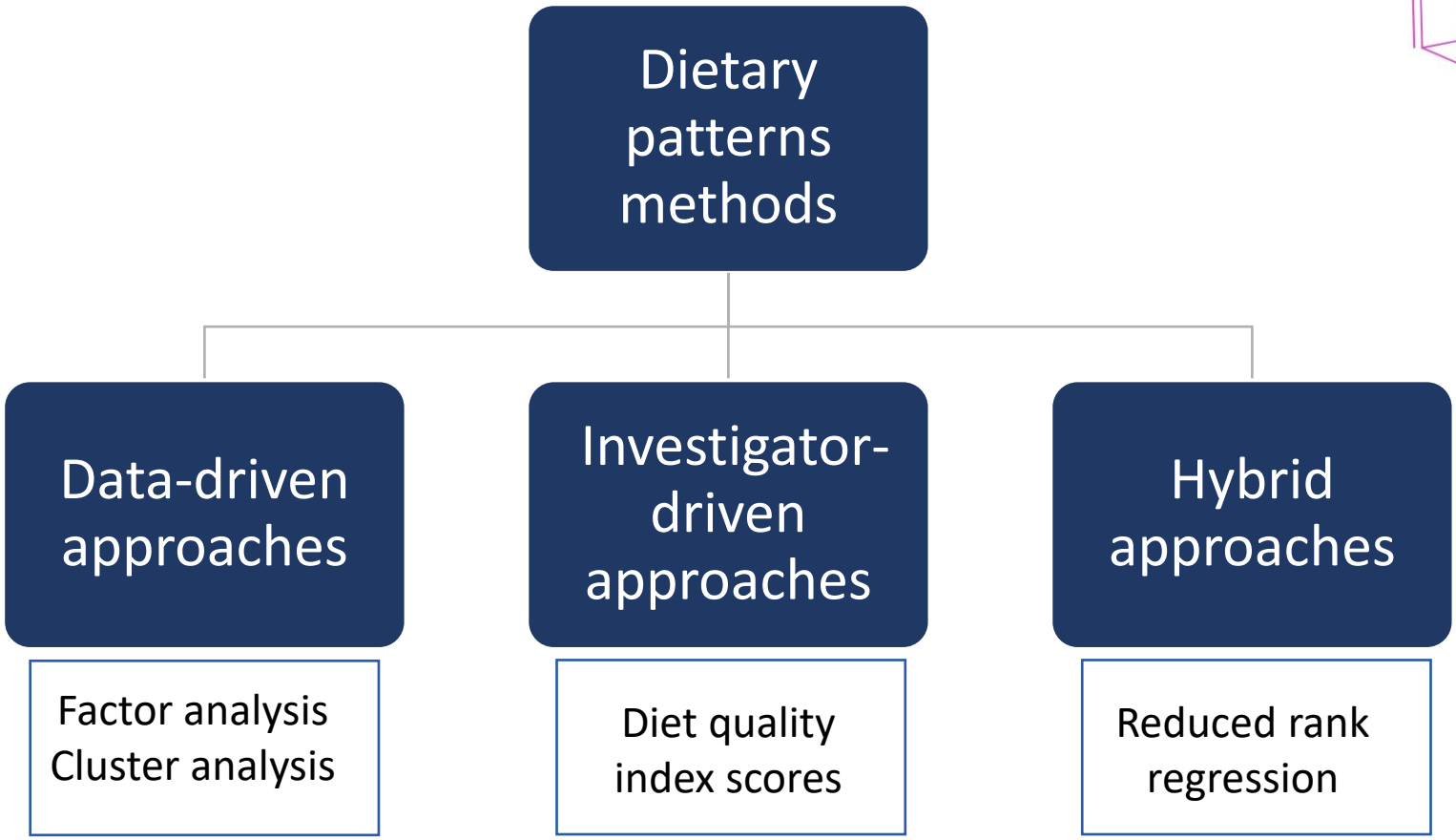
Definition of dietary patterns

“ . . . the quantities, proportions, variety, or combination of different foods, drinks, and nutrients (when available) in diets, and the frequency with which they are habitually consumed”

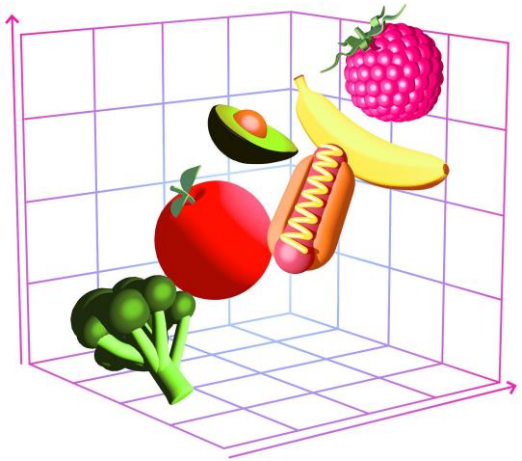
Nutrition Evidence Library. A Series of Systematic Reviews on the Relationship Between Dietary Patterns and Health Outcomes. 2014.

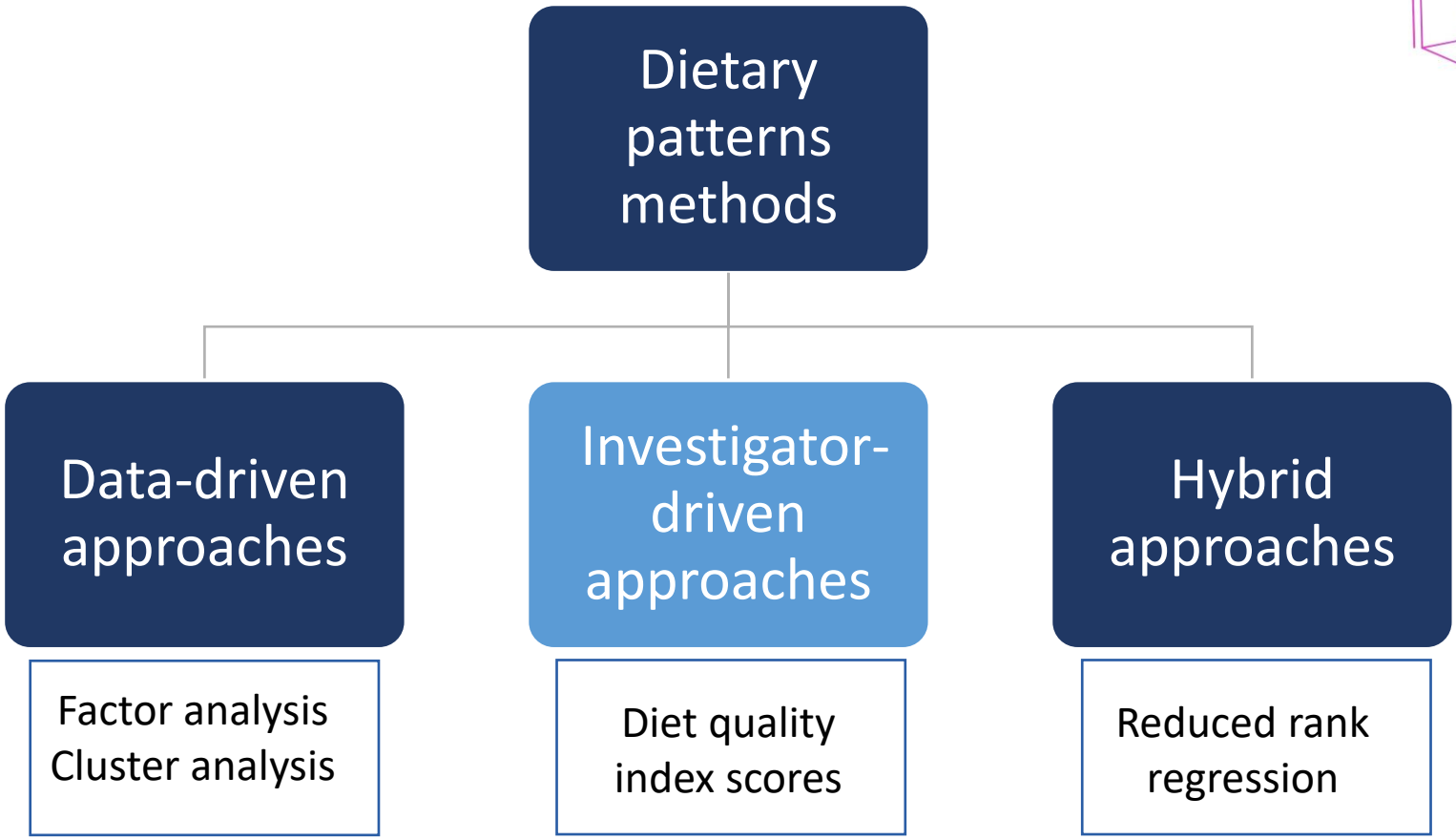
Methods to derive dietary patterns





Methods to derive dietary patterns





Outline

Framework for characterizing dietary patterns

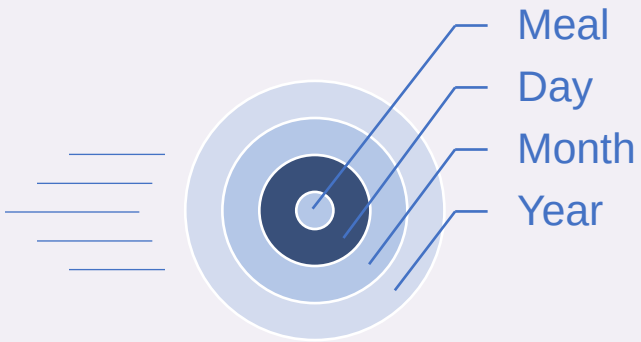
Food supply

Market/Community

Individual

Levels

Layers



In utero	Childhood	Adolescence	Adulthood	Old Age

Lifestages across the lifecourse


McDonald's
RESTAURANT
Greens

Multiple levels

Varying layers

Food supply

Market/Community

Individual

How

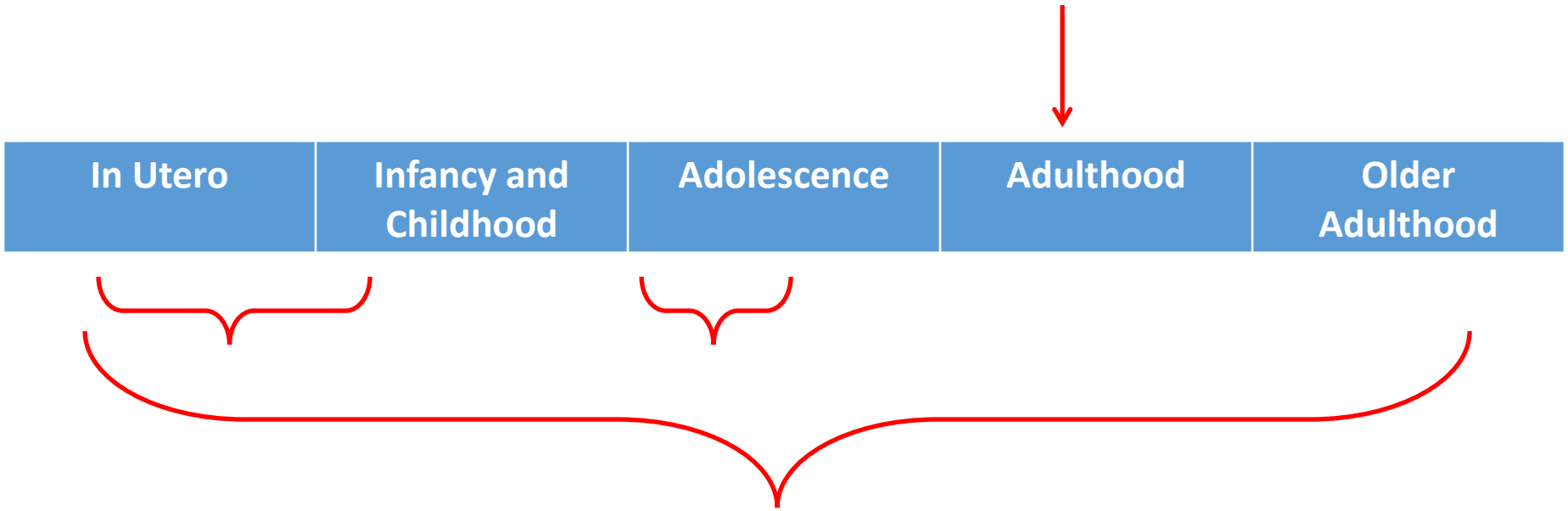
Why

Where

When

What

Total life course of exposure



Outline

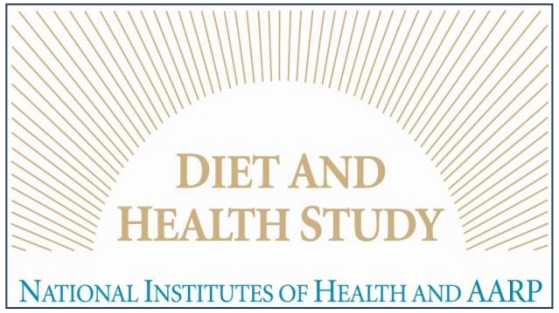
Dietary Patterns Methods Project

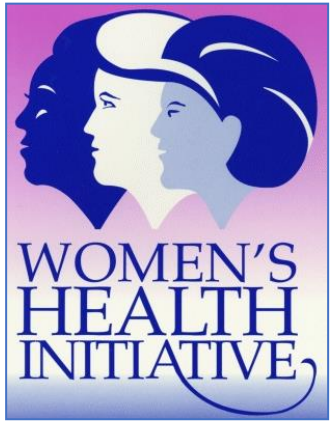
a systematic comparison of diet quality indices with mortality

Dietary Patterns Methods Project: 3 cohorts

a systematic comparison of diet quality indices with mortality

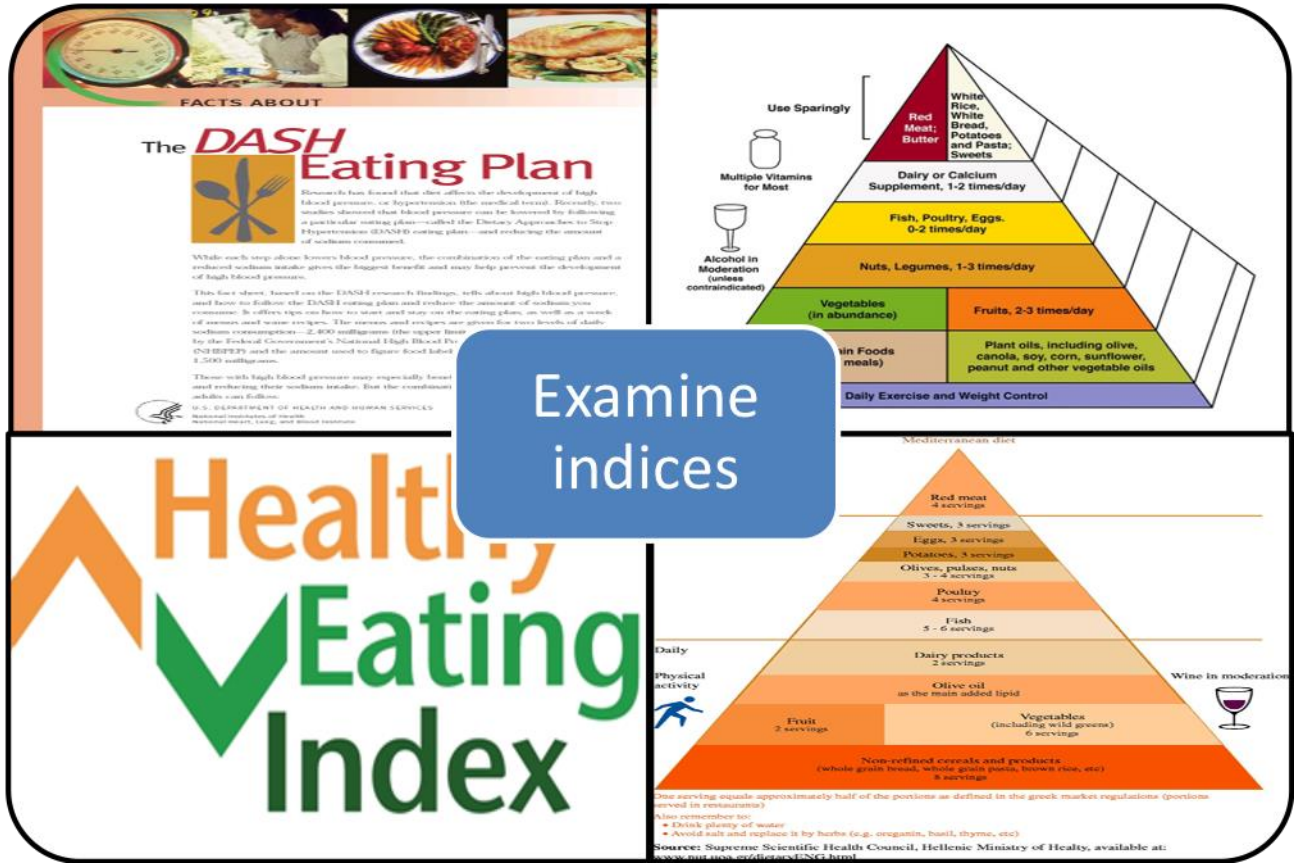
- NIH-AARP Diet and Health Study (AARP)
  - Older Americans, 50-71 y (n = 567,169)
- Multiethnic Cohort (MEC)
  - Multiethnic population, 45-75 y (n = 215,782)
- Women's Health Initiative (WHI)
  - Postmenopausal women, 50-79 y (n = 93,676)





Dietary Patterns Methods Project: 4 indices

a systematic comparison of diet quality indices with mortality



Similarities and differences across indices

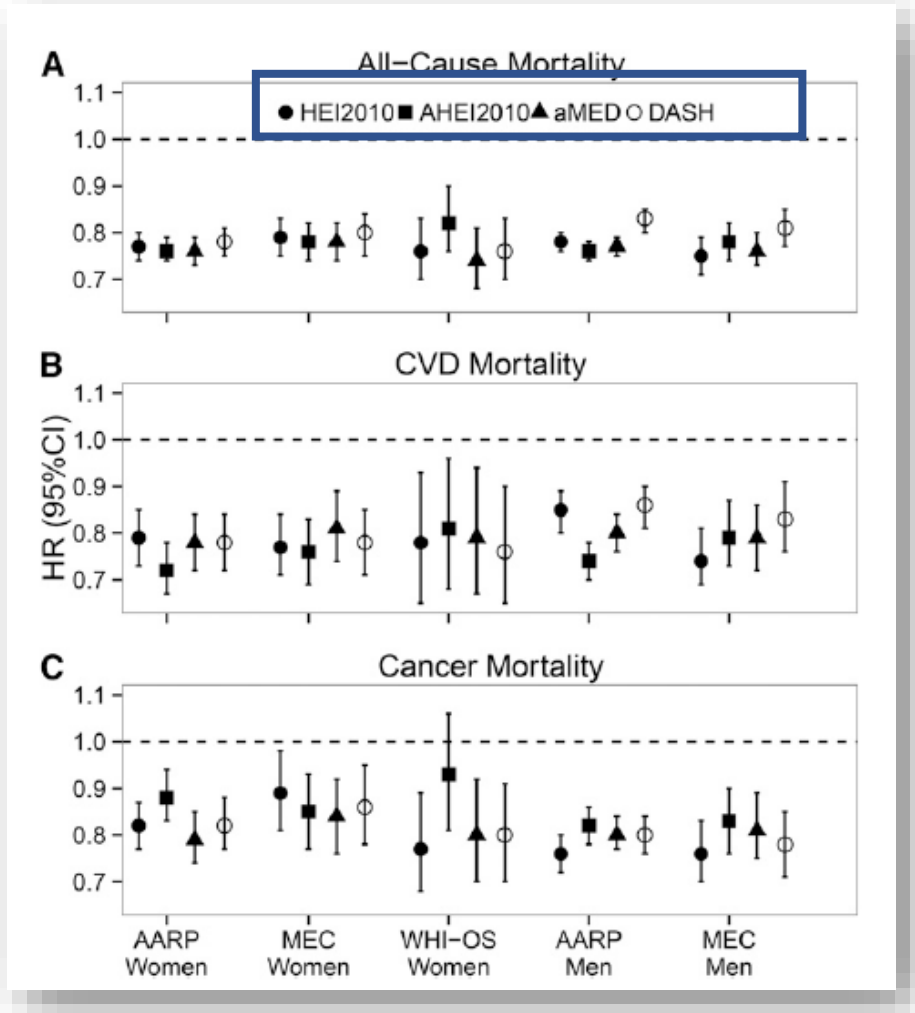
- Common underlying constructs
  - Whole grains
  - Vegetables
  - Fruit
  - Plant proteins
- Different components
  - Dairy (HEI, DASH)
  - Alcohol (AHEI, aMED)
- Different scoring approaches
  - Density basis or per 1000 kcal (HEI)
  - Absolute intake (AHEI)
  - Population-specific cutpoints, medians/quintiles (aMED/DASH)

Scoring standards for each index component

	HEI		AHEI		aMED		DASH	
Component	Criteria for minimum score	Criteria for maximum score	Criteria for minimum score	Criteria for maximum score	Criteria for minimum score	Criteria for maximum score	Criteria for minimum score	Criteria for maximum score
Whole Grains	0 oz eq/1000 kcal	≥1.5 oz eq/1000 kcal	0 oz eq/d	≥5 & ≥6 oz eq/d	< median	≥ median	Lowest quintile	Highest quintile
Total Vegetables	0 c eq/1000 kcal	≥1.1 c eq/1000 kcal	—	—	—	—	—	—
Vegetables No Potatoes	—	—	0 c eq/d	≥2.5 c eq/d	< median	≥ median	Lowest quintile	Highest quintile
Greens & Beans	0 c eq/1000 kcal	≥0.2 c eq/1000 kcal	—	—	—	—	—	—
Total Fruit	0 c eq/1000 kcal	≥0.8 c eq/1000 kcal	0 c eq/d	≥2 c eq/d	< median	≥ median	Lowest quintile	Highest quintile
Whole Fruit	0 c eq/1000 kcal	≥0.4 c eq/1000 kcal	—	—	—	—	—	—
Nuts & Legumes	—	—	0 oz eq/d	≥1 oz eq/d	—	—	Lowest quintile	Highest quintile
Nuts	—	—	—	—	< median	≥ median	—	—
Legumes	—	—	—	—	< median	≥ median	—	—
Seafood & Plant Proteins	0 oz eq/1000 kcal	≥0.8 oz eq/1000 kcal	—	—	—	—	—	—
Fish	—	—	—	—	< median	≥ median	—	—
Total Protein Foods	0 oz eq/1000 kcal	≥2.5 oz eq/1000 kcal	—	—	—	—	—	—
Low-Fat Dairy	0 c eq/1000 kcal	≥1.3 c eq/1000 kcal	—	—	—	—	Lowest quintile	Highest quintile
Ratio of Fatty Acids	PUFA + MUFA/SFA: <1.2	PUFA + MUFA/SFA: ≥2.5	—	—	MUFA/SF: < median	MUFA/SF: ≥ median	—	—
Trans Fat	—	—	≥4%	≤0.5%	—	—	—	—
EPA + DHA	—	—	0 mg/d	250 mg/d	—	—	—	—
PUFA	—	—	≤2%	≥10%				
Alcohol	—	—	≥3.5 & ≥2.5 drinks/d	0.5-2 & 0.5-1.5 drinks/d	<5 or >15 g/d & <10 or >25 g/d	5-15 g/d & 10-25 g/d	—	—
Red & Processed Meat	—	—	≥1.5 oz eq/d	0 oz eq/d	≥median	<median	Highest quintile	Lowest quintile
Refined Grains	≥4.3 oz eq/1000 kcal	≤1.8 oz eq/1000 kcal	—	—	—	—	—	—
Empty Calories	≥50% kcal	≤19% kcal						
SSB & Juices	—	—	≥1 c eq/d	0 c eq/d	—	—	—	—
SSB	—	—	—	—	—	—	Highest quintile	Lowest quintile
Sodium	≥2.0 g/1000 kcal	≤1.1 g/1000 kcal	Highest decile	Lowest decile	—	—	Highest quintile	Lowest quintile

Scoring standards are based on standardized cup &ounce equivalents from the MyPyramid Equivalents Database.
HEI-2010 (Healthy Eating Index-2010): 100 points; AHEI (Alternative Healthy Eating Index-2010): 110 points; aMED (alternate Mediterranean Diet Score): 9 points; DASH (Dietary Approaches to Stop Hypertension Score): 40 points.

Higher diet quality associated with lower mortality



NIH-AARP (AARP)

DIET AND HEALTH STUDY
NATIONAL INSTITUTES OF HEALTH AND AARP

Multiethnic Cohort (MEC)

The Multiethnic Cohort Study
UNIVERSITY OF HAWAI'I CANCER CENTER
USC UNIVERSITY OF SOUTHERN CALIFORNIA

Women's Health Initiative (WHI)

WOMEN'S HEALTH INITIATIVE

Liese AD et al, The Dietary Patterns Methods Project: Synthesis of Findings across Cohorts and Relevance to Dietary Guidance. J Nutr 2015

Outline

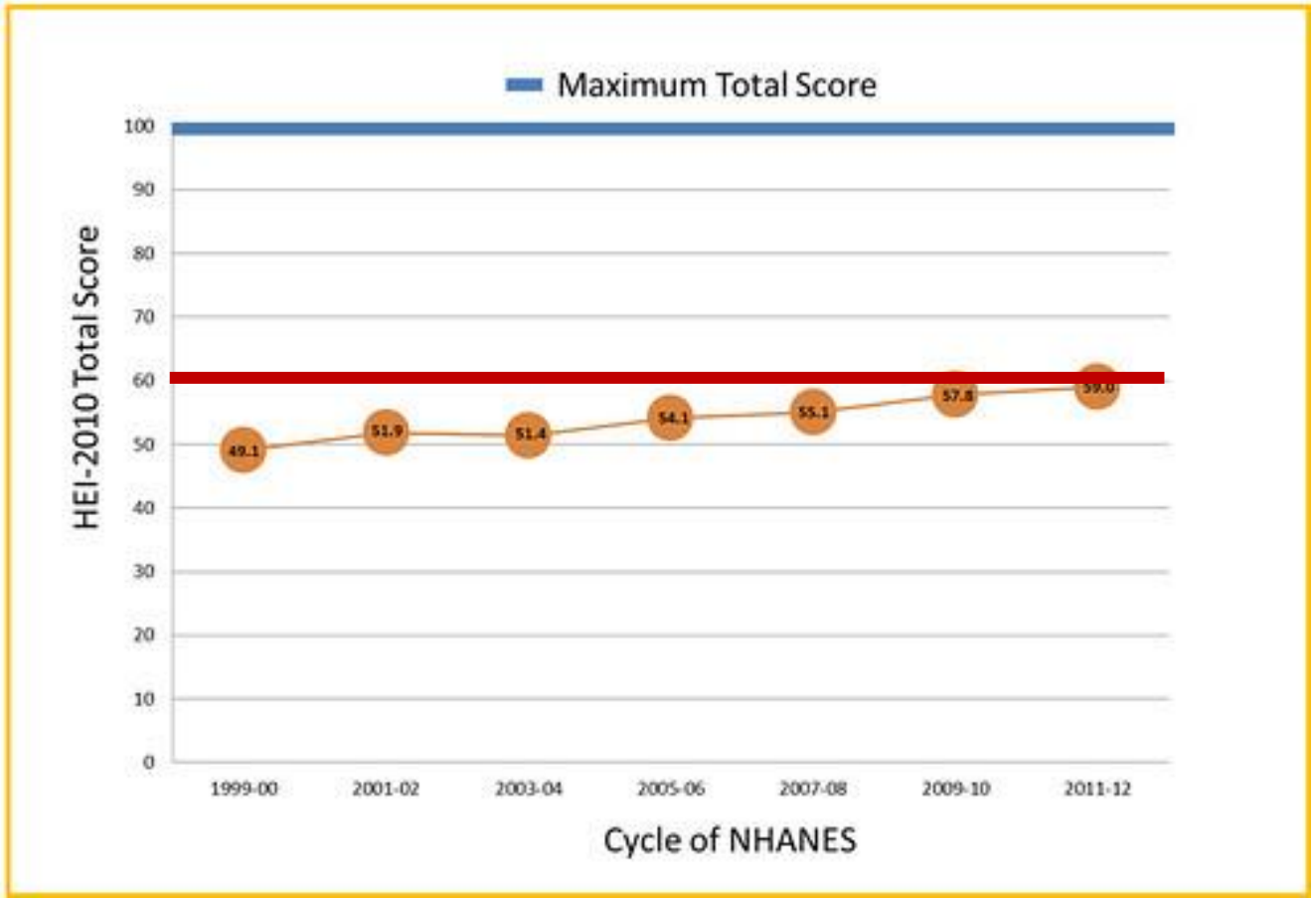
Healthy Eating Index (HEI)

- Standardized diet quality metric
- 13 components, total score = 0-100 points
- High score reflects optimal alignment with federal dietary guidelines
- Developed and evaluated for children and adults 2 years and older

How healthy is the American Diet?

Healthy Eating Index scores are suboptimal (<60 points), 1999-2012

Adherence of the U.S. Population Ages 2 Years and Older to the 2010 Dietary Guidelines, as Measured by Average Total Healthy Eating Index-2010 (HEI-2010) Scores.



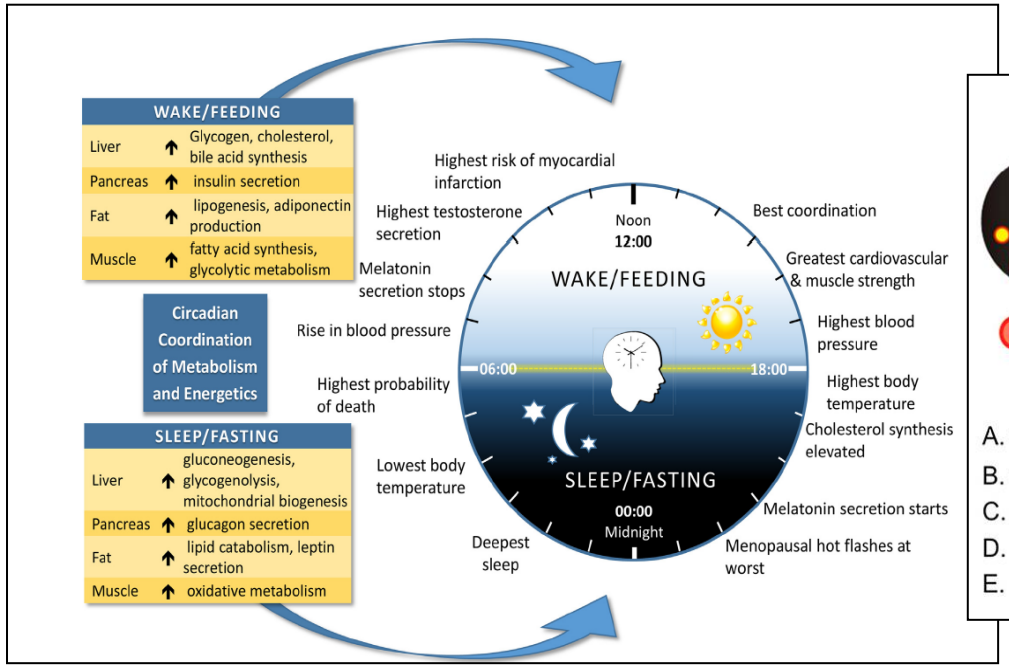
Outline

Further extend definition of “dietary patterns” to include multidimensionality and dynamism

.

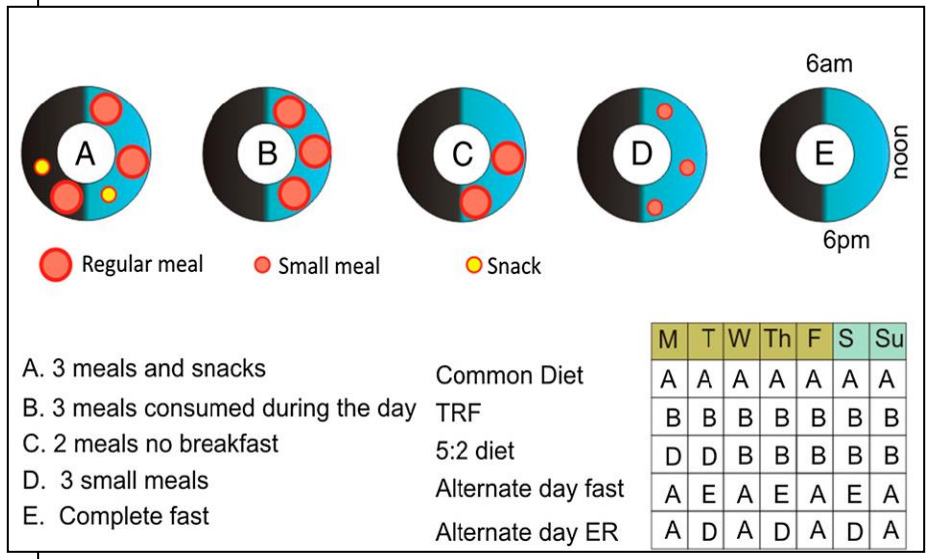
Biological effects of eating, metabolism, and the circadian clock

If we alter eating frequency, does it modify the biology?



Source: Patterson et al, *JAND,* 2015

Examples of eating frequency patterns

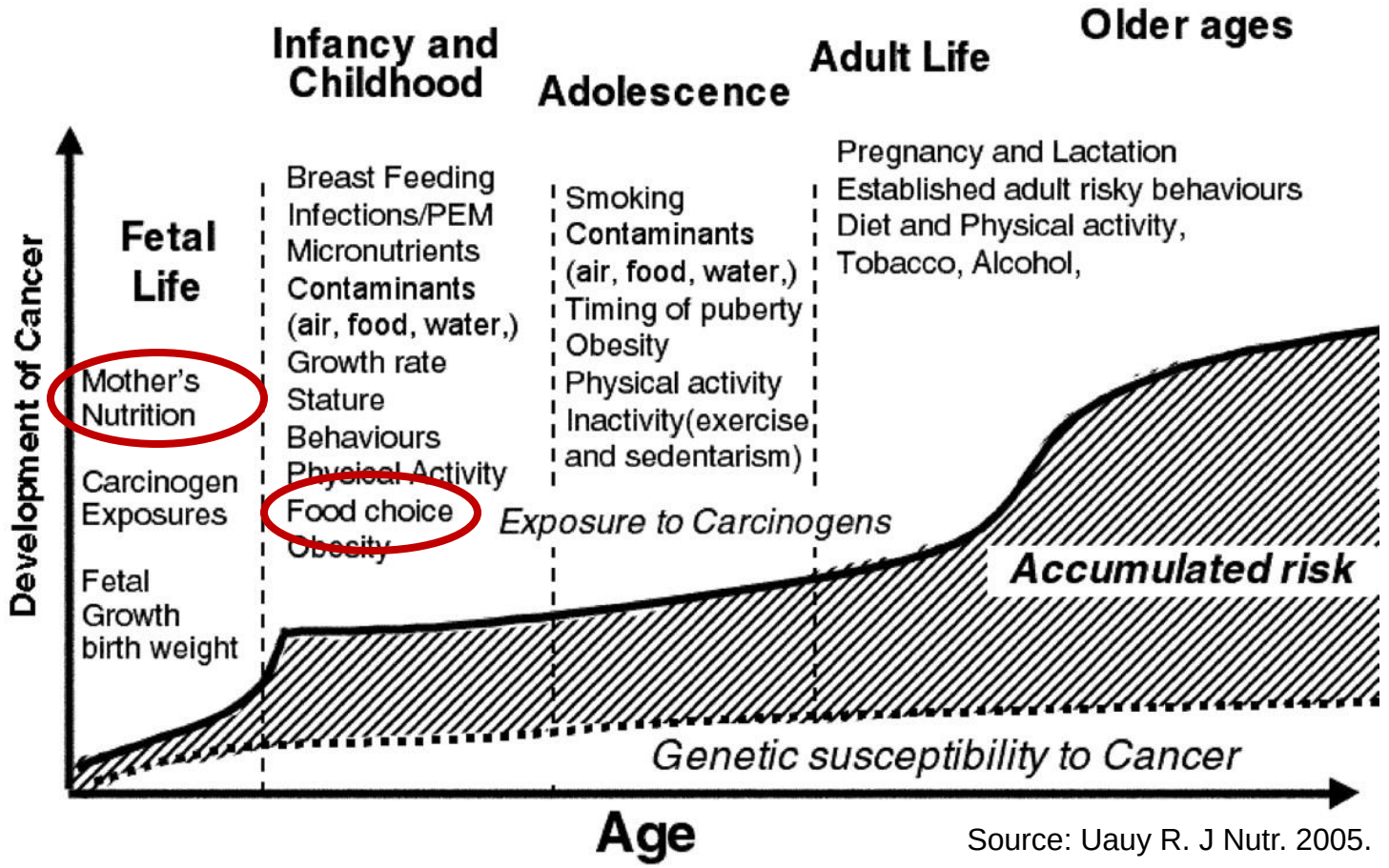


M	T	W	Th	F	S	Su
A	A	A	A	A	A	A
B	B	B	B	B	B	B
D	D	B	B	B	B	B
A	E	A	E	A	E	A
A	D	A	D	A	D	A

Source: Mattson, *PNAS,* 2014

Diet over the life-course:

exposures may be acute, cumulative, and/or at critical windows



Source: Uauy R. J Nutr. 2005.

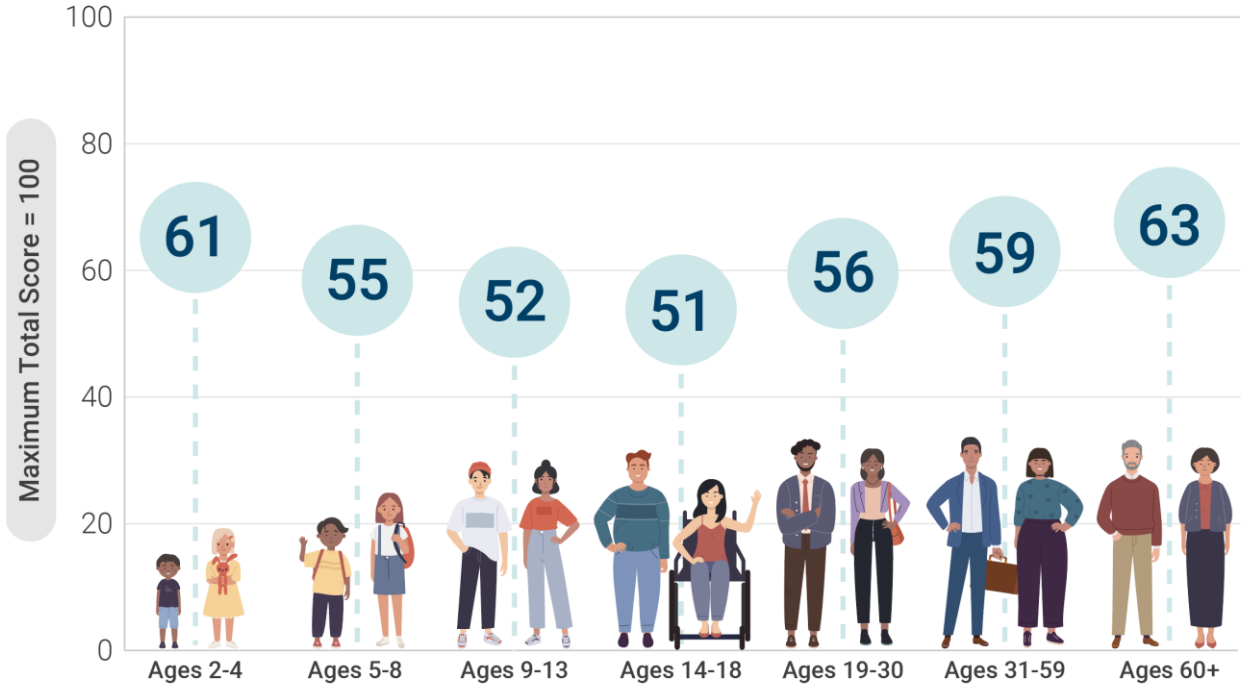
Outline

How healthy is the American diet?

Healthy Eating Index scores at different life stages

Figure 1-4

Adherence of the U.S. Population to the *Dietary Guidelines* Across Life Stages, as Measured by Average Total Healthy Eating Index-2015 Scores

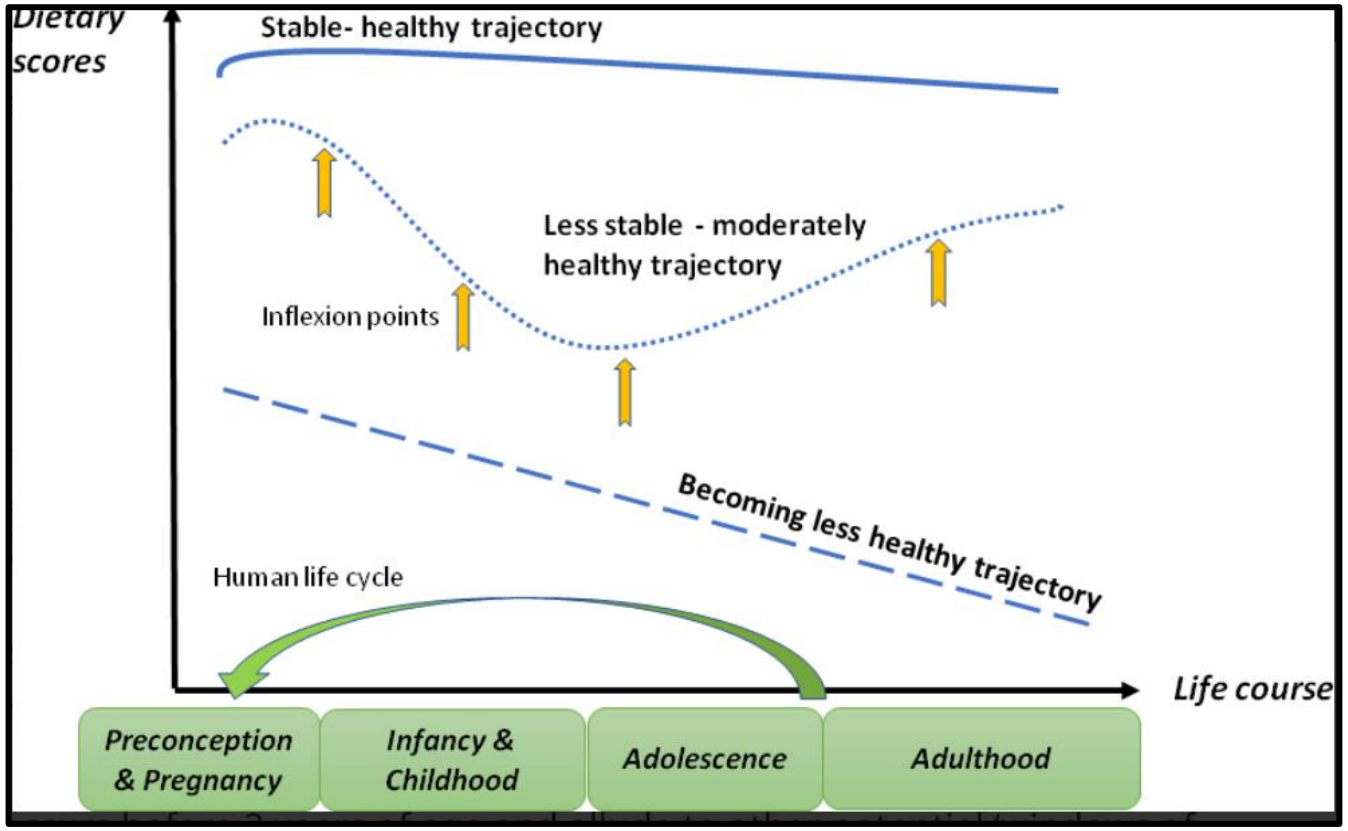


NOTE: HEI-2015 total scores are out of 100 possible points. A score of 100 indicates that recommendations on average were met or exceeded. A higher total score indicates a higher quality diet.

Data Source: Analysis of What We Eat in America, NHANES 2015-2016, ages 2 and older, day 1 dietary intake data, weighted.

DGA
DietaryGuidelines.gov

Healthy eating trajectory across the life course



Foong-Fong Chong M, 2022

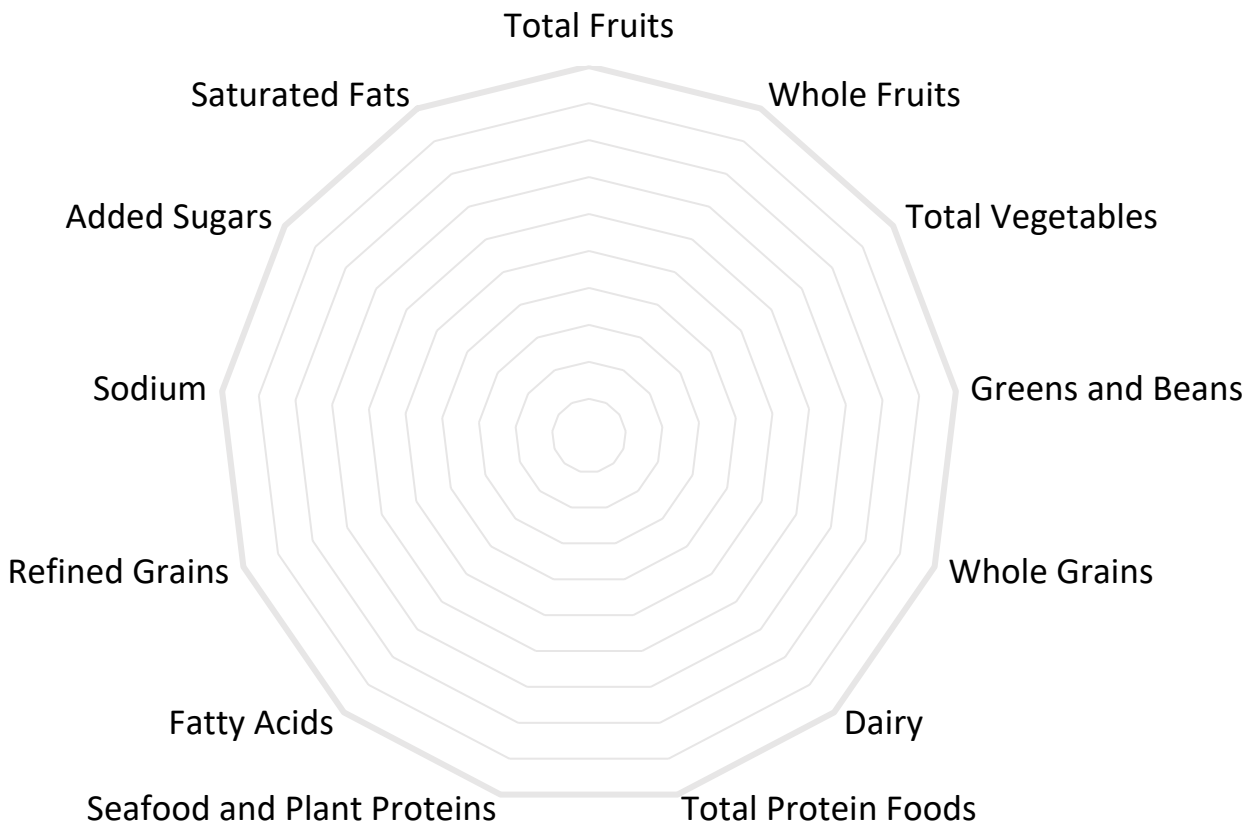
Healthy Eating Index-2020

- for children and adults 2 years+

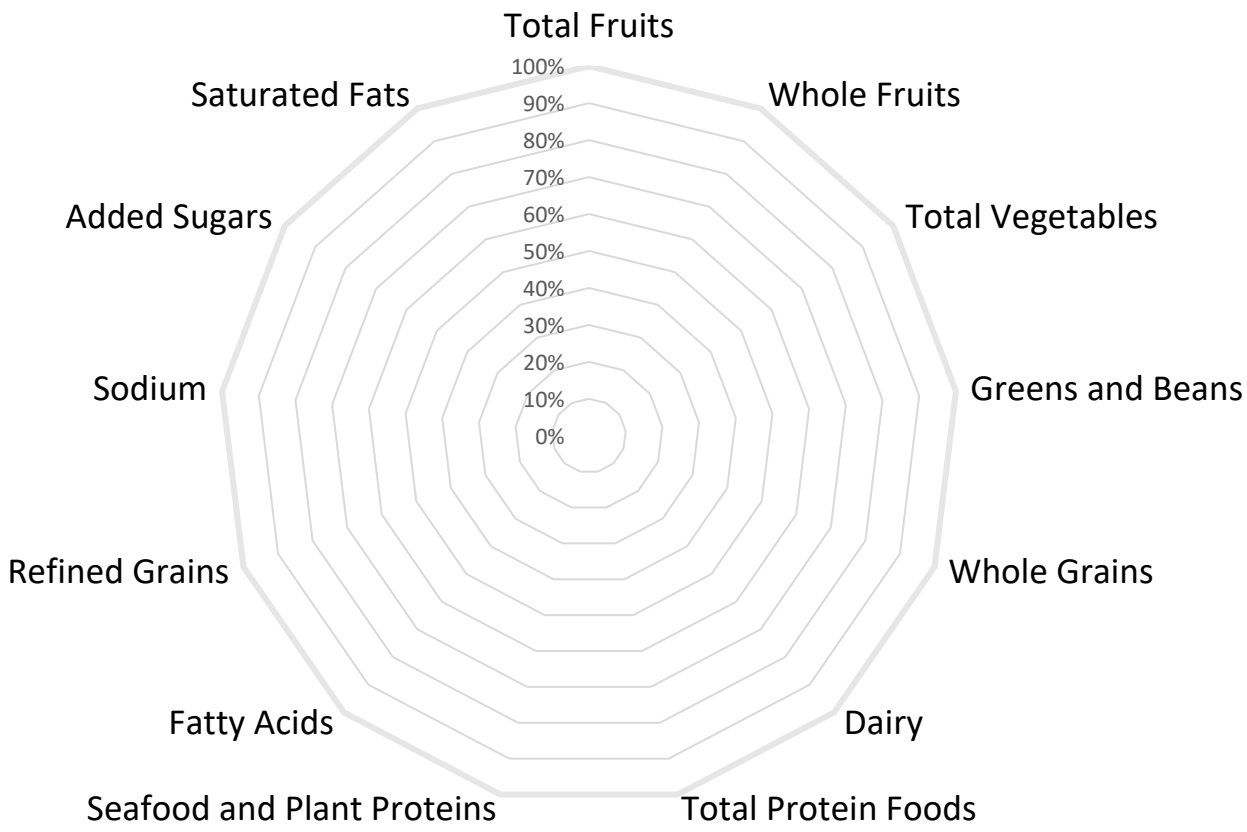
Healthy Eating Index-Toddlers-2020

- for toddlers 12 through 23 months

Dietary patterns at different life stages

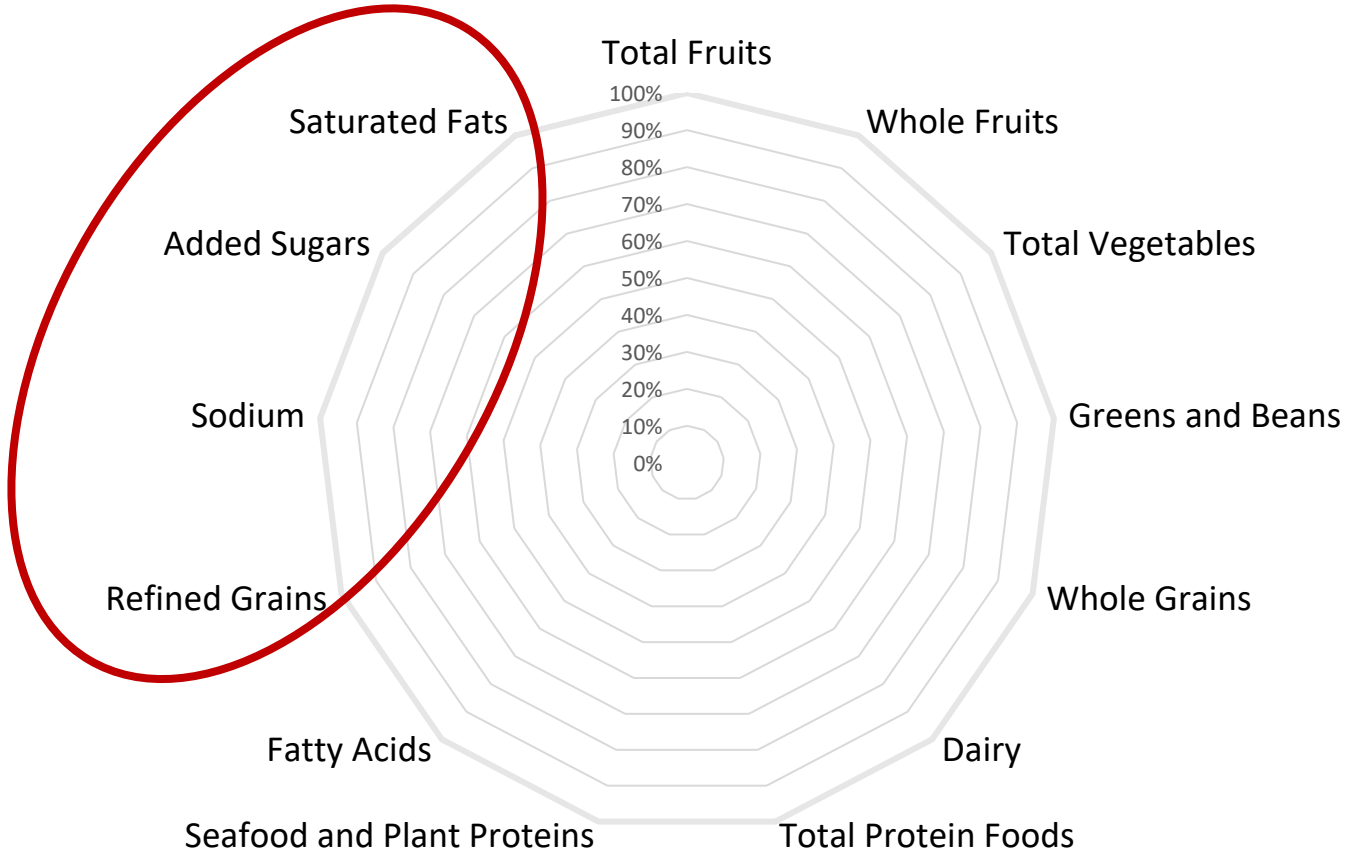


Dietary patterns at different life stages

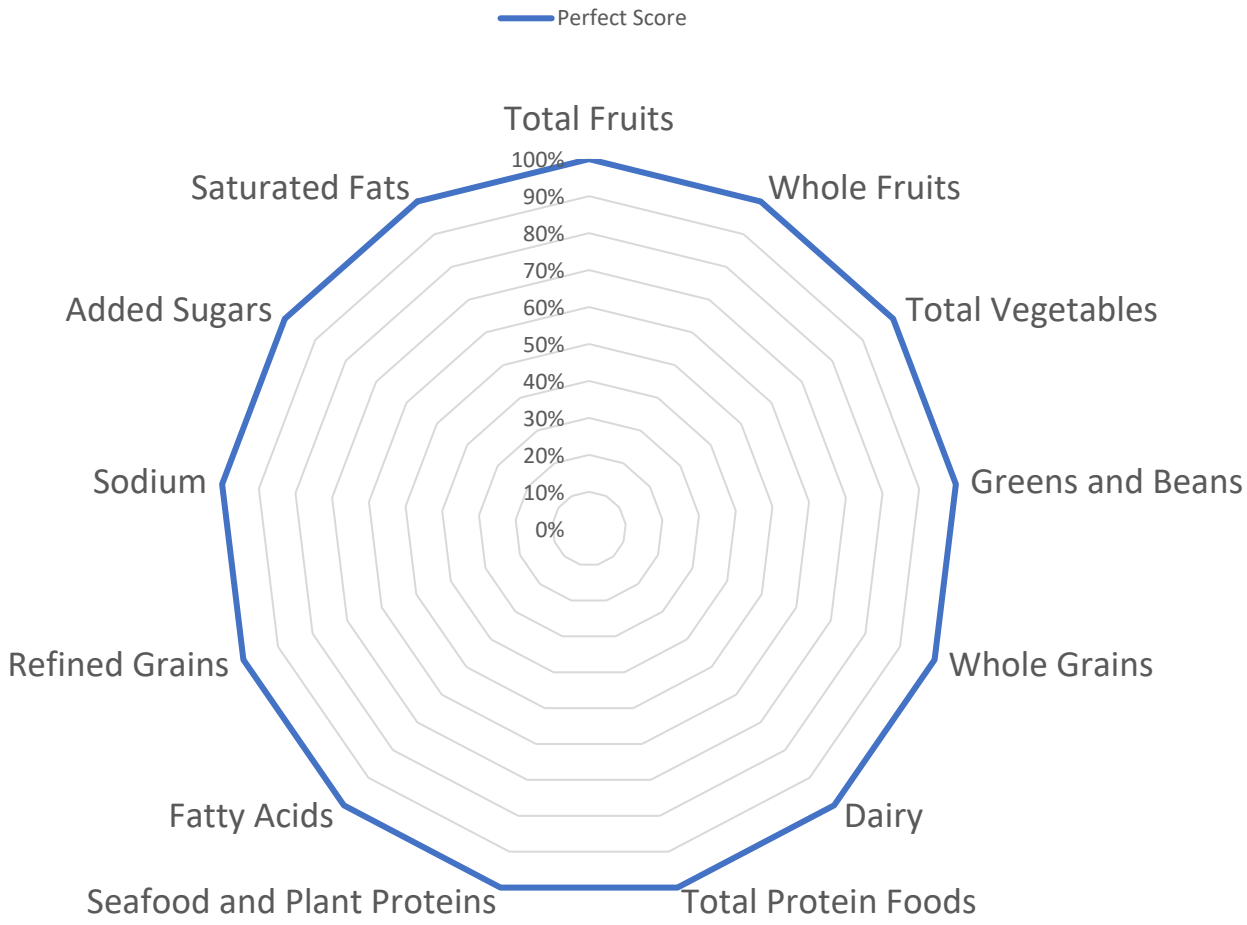


Dietary patterns at different life stages

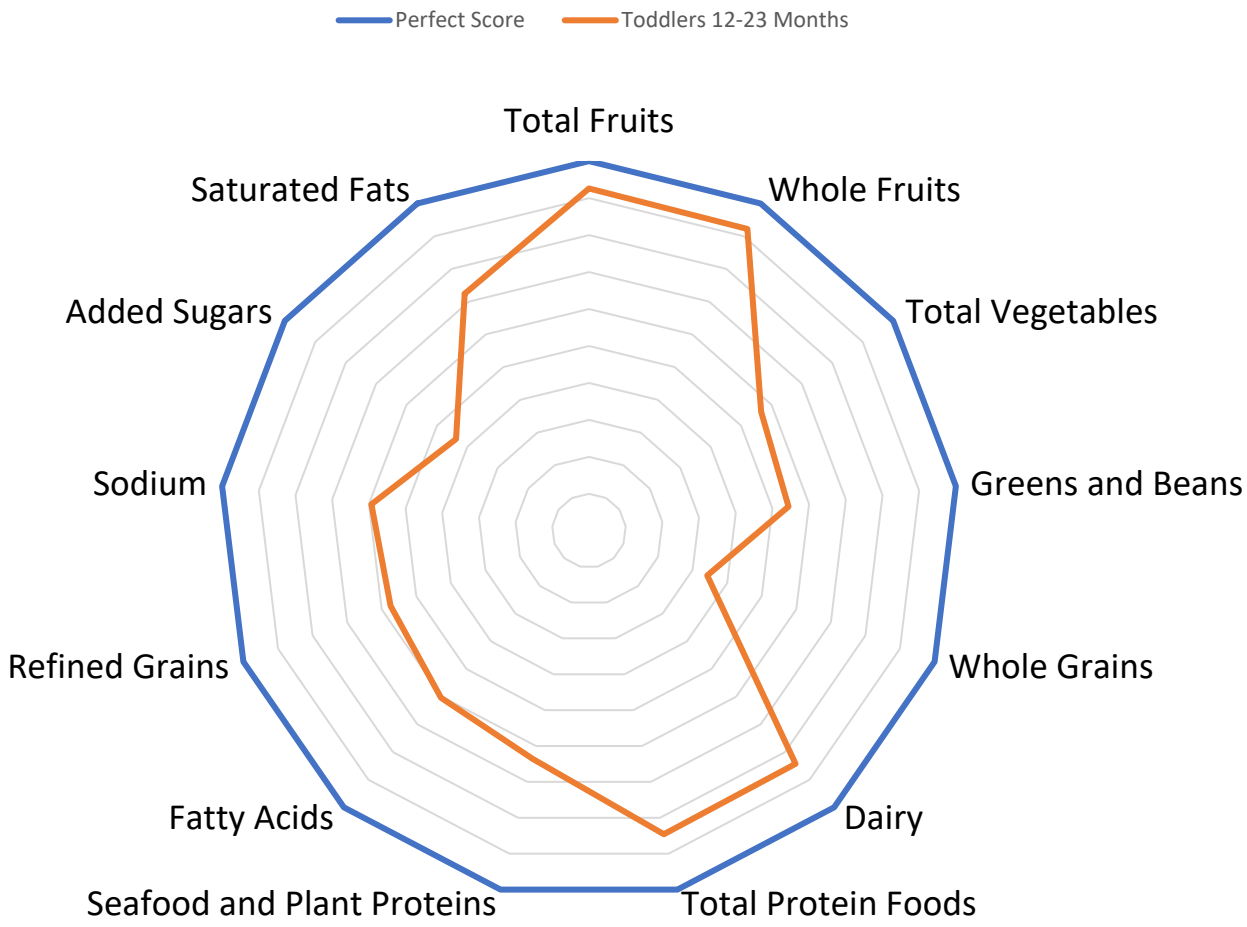
Healthy Eating Index



Dietary patterns at different life stages

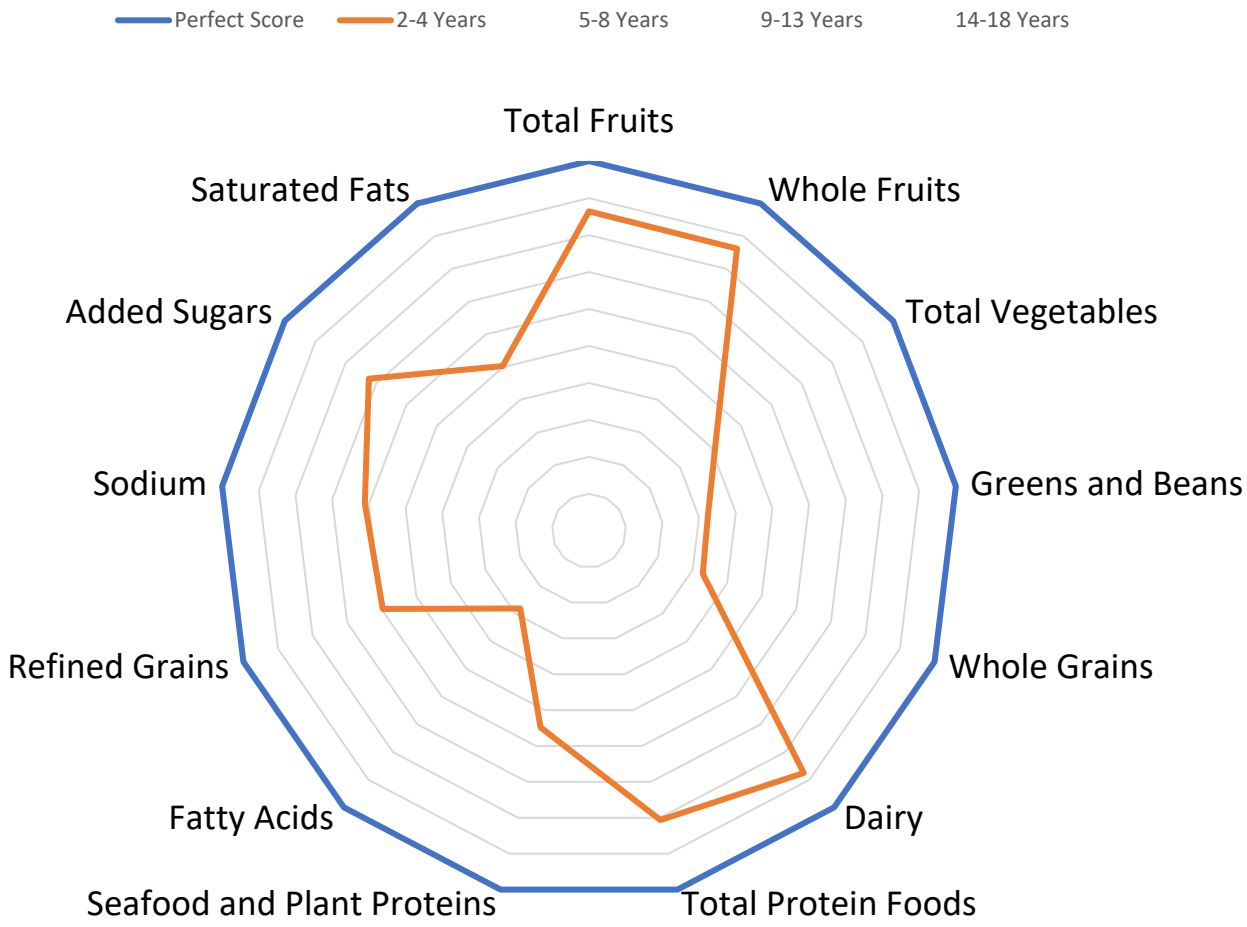


Dietary patterns: HEI-Toddlers-2020



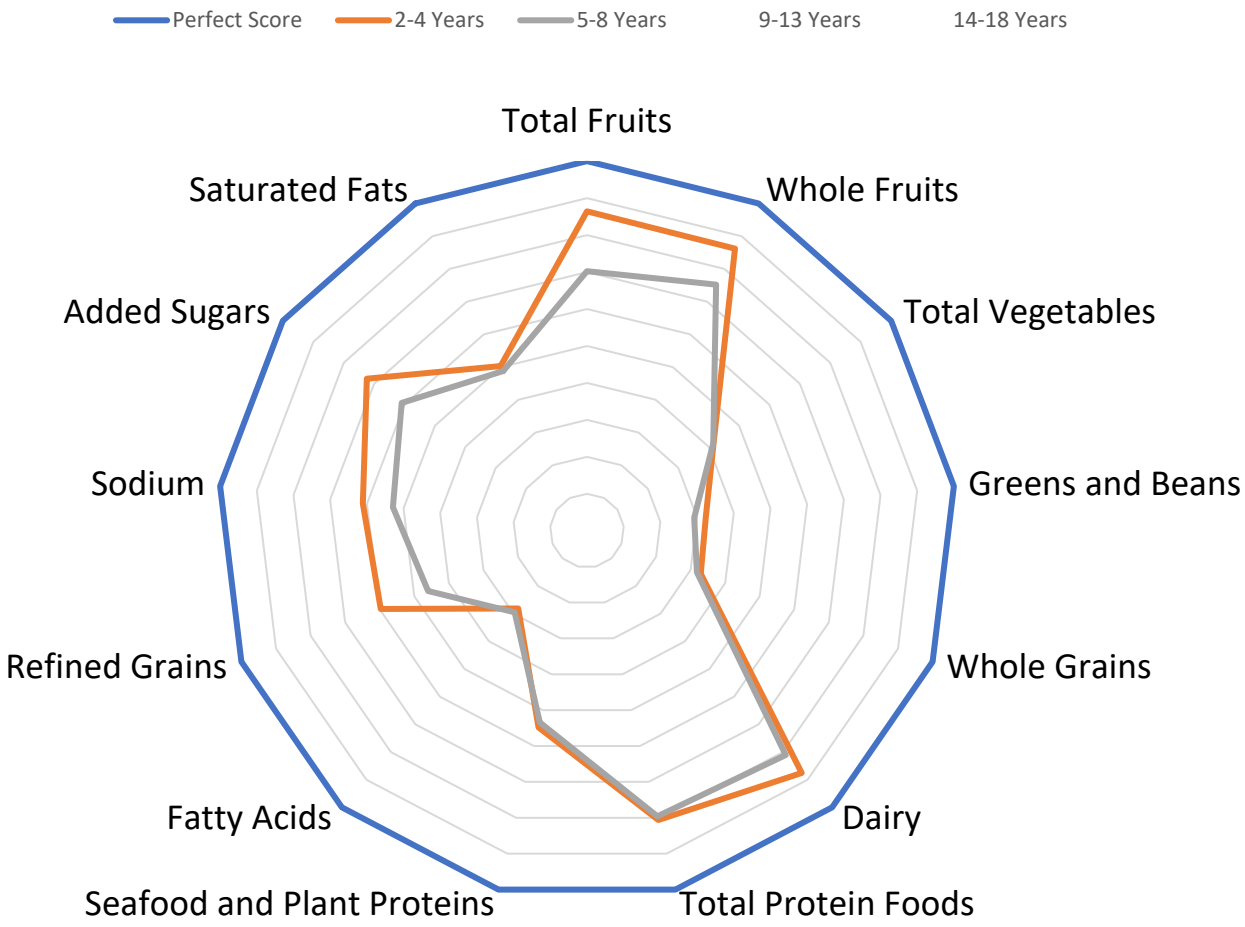
Lerman JL et al, 2023
Pannucci TS et al, 2023
Herrick KA et al, 2023

Dietary patterns: children and adolescents



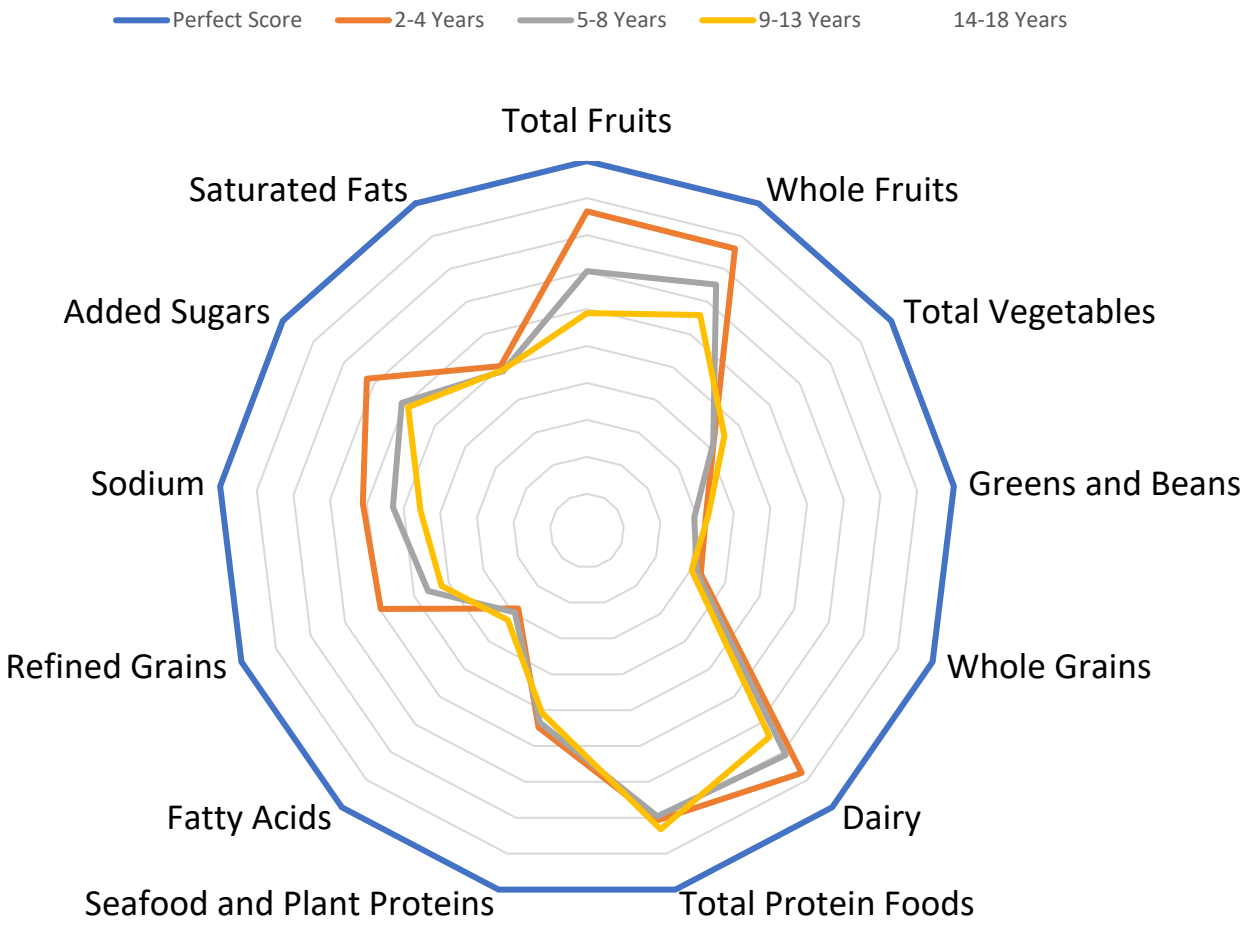
Shams-White MM et al, 2023

Dietary patterns: children and adolescents



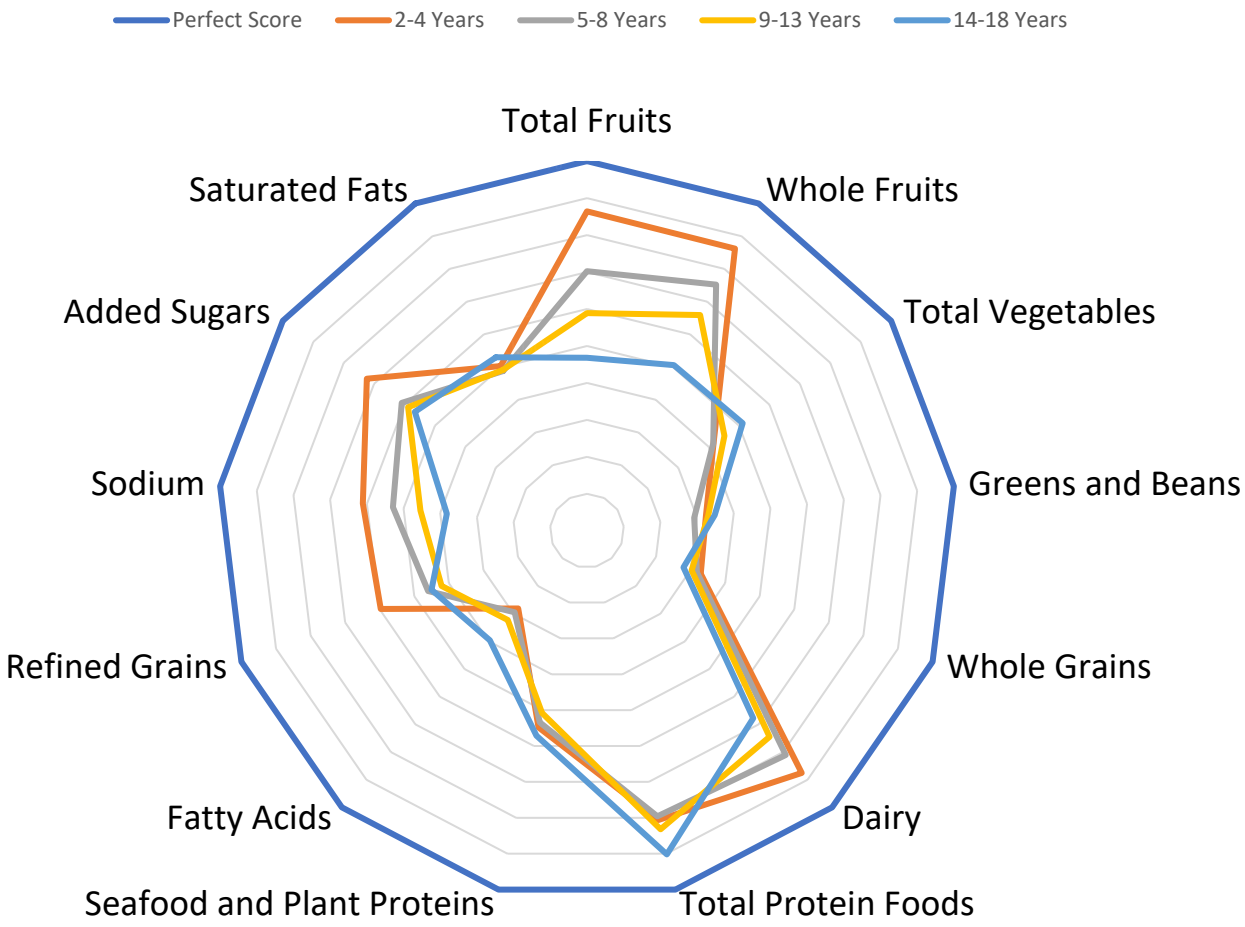
Shams-White MM et al, 2023

Dietary patterns: children and adolescents



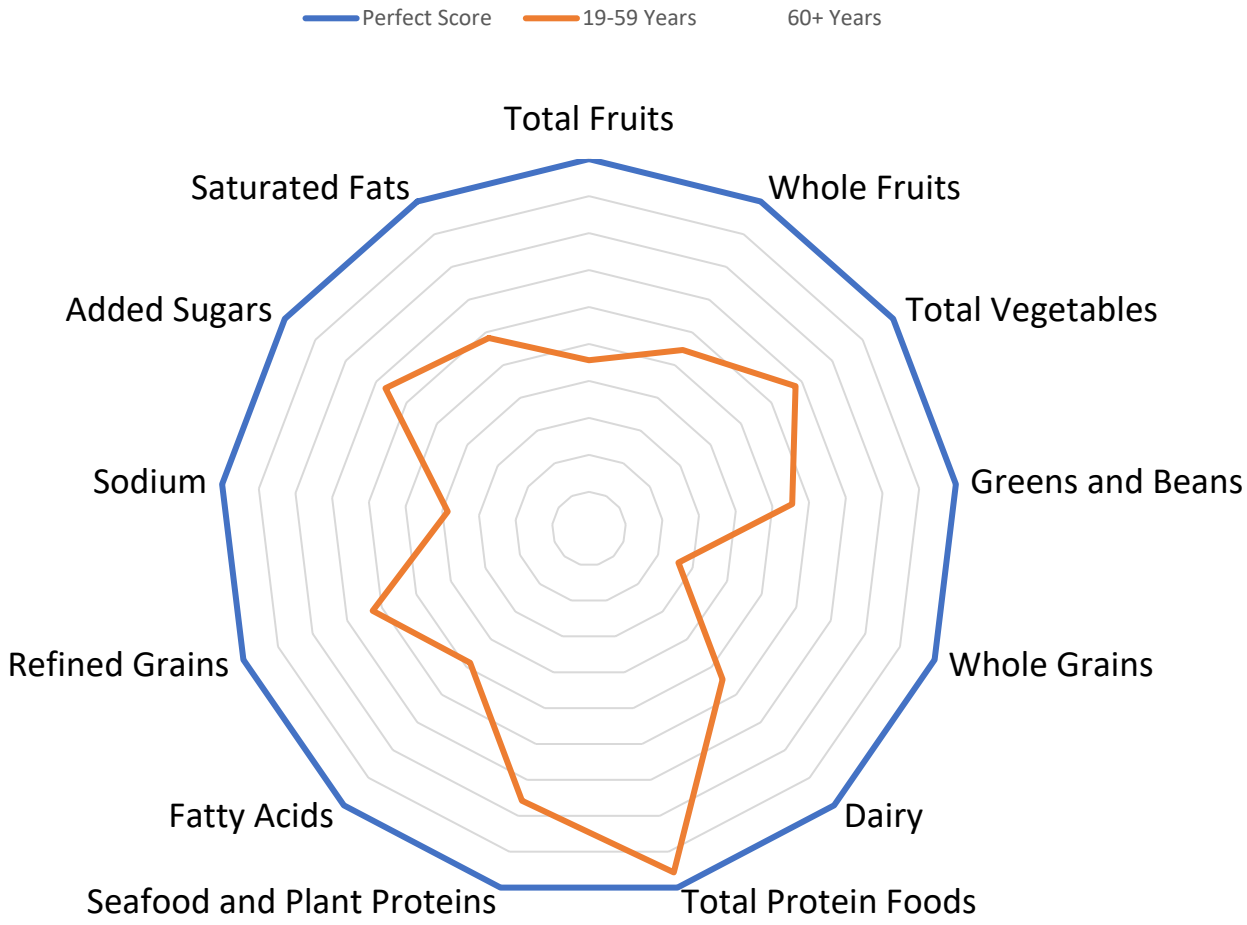
Shams-White MM et al, 2023

Dietary patterns: children and adolescents



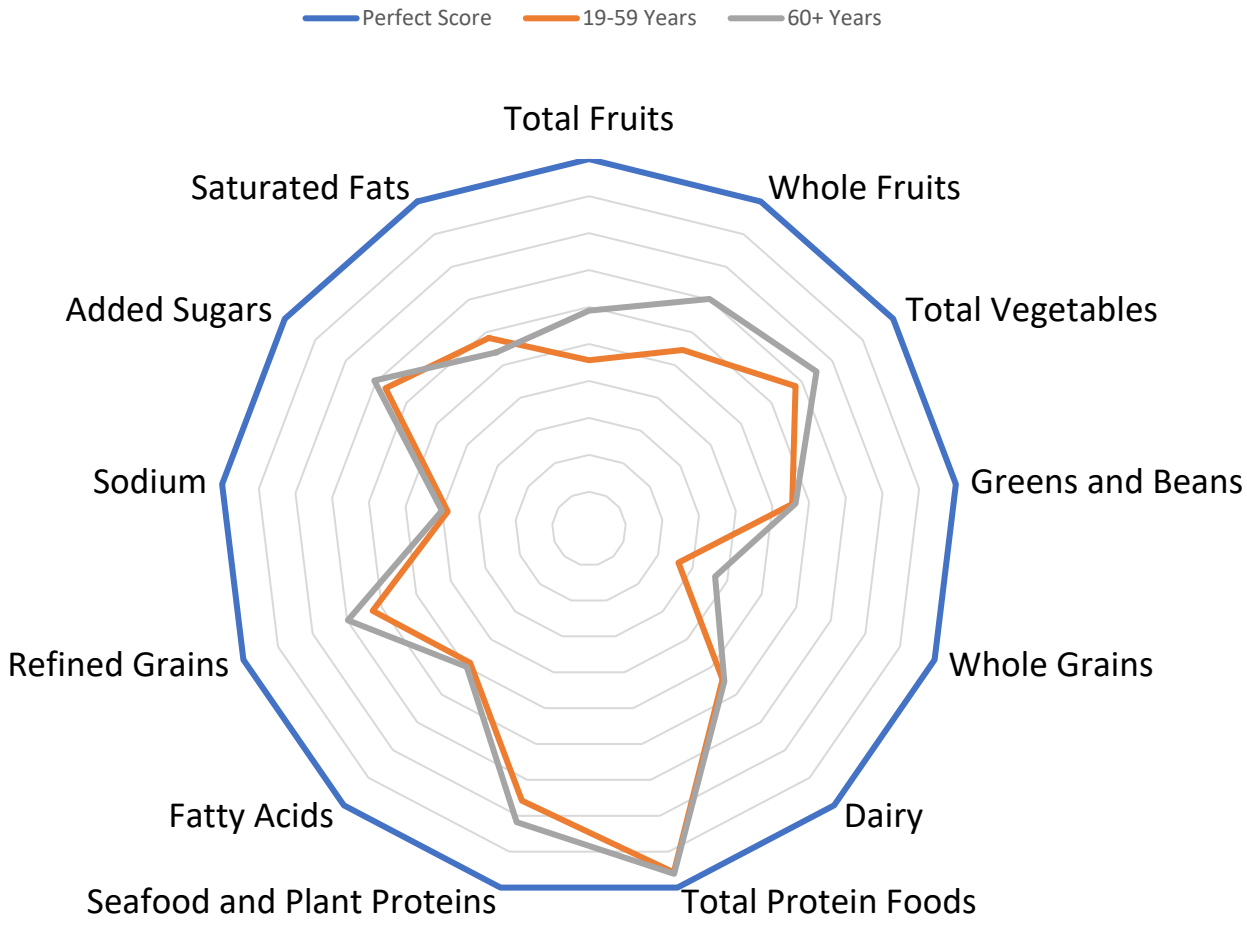
Shams-White MM et al, 2023

Dietary patterns: adulthood



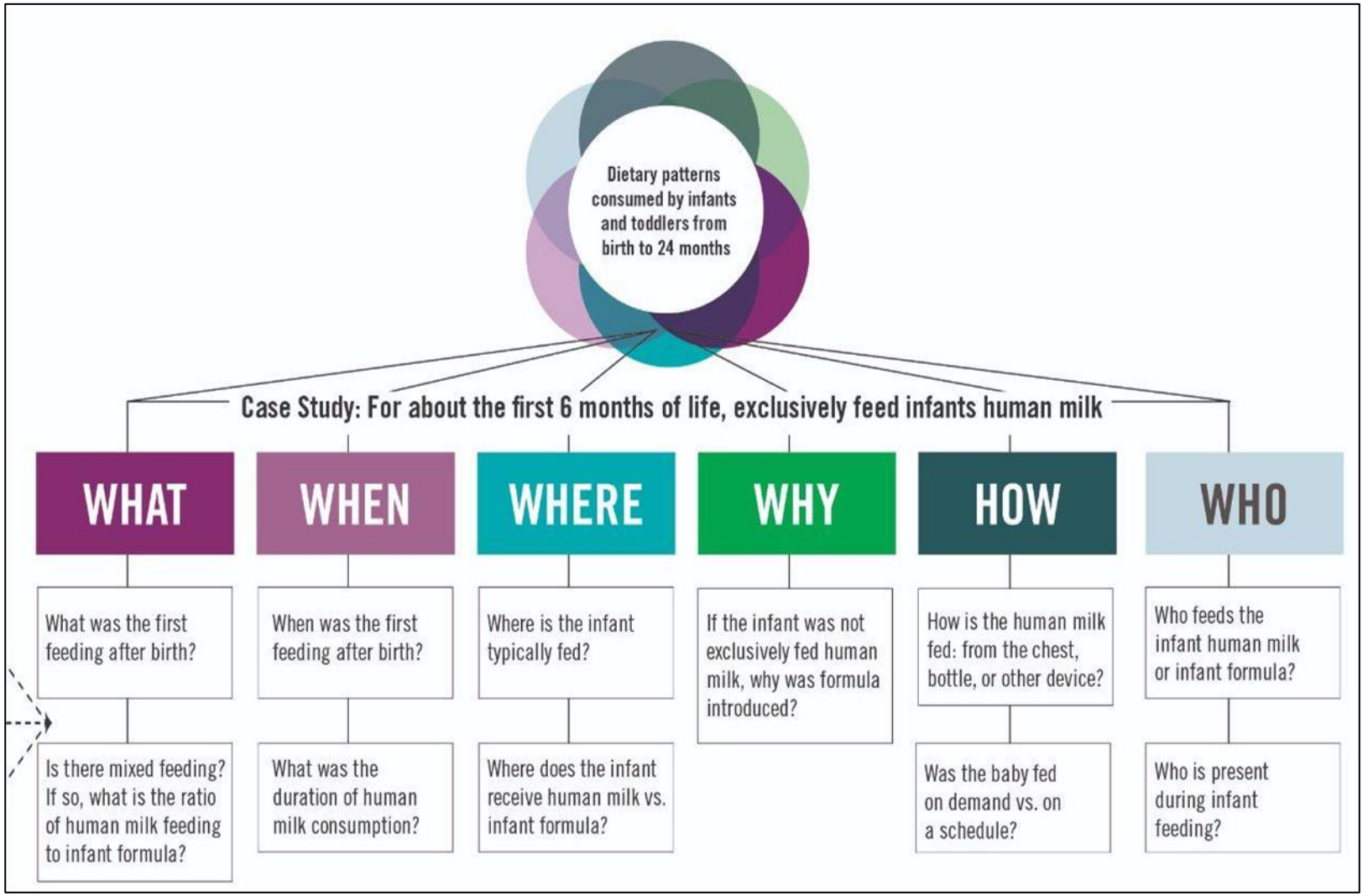
Shams-White MM et al, 2023

Dietary patterns: adulthood

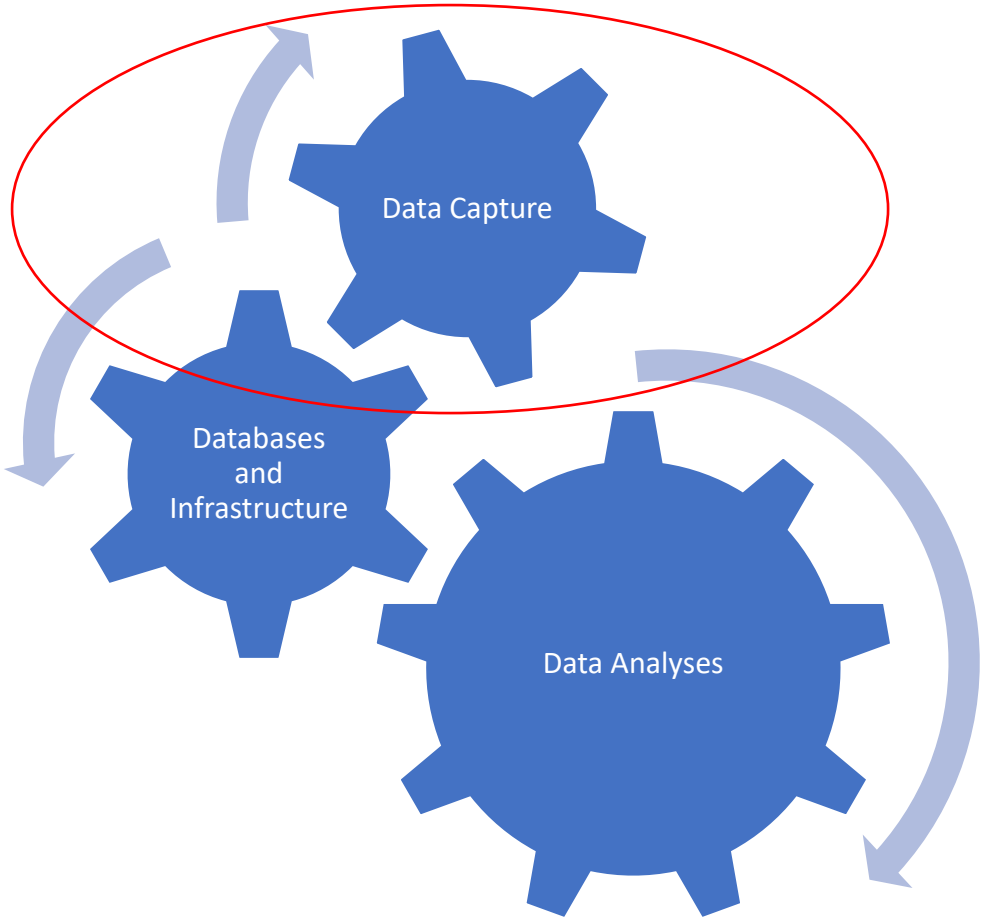


Shams-White MM et al, 2023

Case study: B-24



Zimmer M et al, 2023


Data Capture
Databases
and
Infrastructure
Data Analyses

Opportunities and challenges

- Use a shared conceptual framework across research questions
- Match appropriate diet assessment methods to include contextual and dynamic attributes of dietary patterns in different populations
- Develop methods and models that fully capture the richness within the total dietary pattern at different life stages
- Consider relevant periods of timing, apply time-varying models for dietary patterns across the life course
- Consider timing and frequency of dietary patterns over the short term such as by meal, by day
- Apply systems-oriented approaches, that consider measures of other related exposures and their interactions within the context of dietary patterns

Outline