

# **TRENDY OR TRIED-AND-TRUE?**

**Who sticks to different diets and how  
do they affect produce consumption?**

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Presented by Dr. Kiyah Duffey and Dr. Nicola McKeown

# Our Purpose

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The Produce for Better Health Foundation (PBH), a 501(c)3, is the only national non-profit organization committed to helping people live happier, healthier lives by eating more fruits and vegetables in all their glorious forms every day.

**PRODUCE FOR<sup>®</sup>  
BETTER HEALTH**  
FOUNDATION

# Spread the Fruit and Veggie Love

## #haveaplant

 @fruits\_veggies

 @fruitsandveggies

 @fruitsandveggies



# Our Movement

Research shows, rather than a prescriptive recommendation to eat a certain amount of fruits and vegetables each day, consumers (particularly Gen Z and Millennials) want actionable, realistic and FUN approaches that make eating fruits and vegetables easy, helping them feel confident, happy and healthy.

That's where PBH's **Have A Plant™** movement comes in. It's a way to tap into the emotional connection consumers have to the fruit and vegetable eating experience while inspiring long-term, sustainable behavior change. And it does so with a no-nonsense approach that's simple, understandable, and, importantly for this audience, non-prescriptive.



[RECIPES](#)[VIDEOS](#)[NUTRITION](#)[SUSTAINABILITY](#)[NUTRITION PROFESSIONALS](#)

# PEAK FLAVOR

From the moment they're picked, it's a race against time to deliver you all that goodness

# Kiyah J. Duffey, PhD



Kiyah J. Duffey Consulting, Inc

Writing. Research. Strategic Planning.



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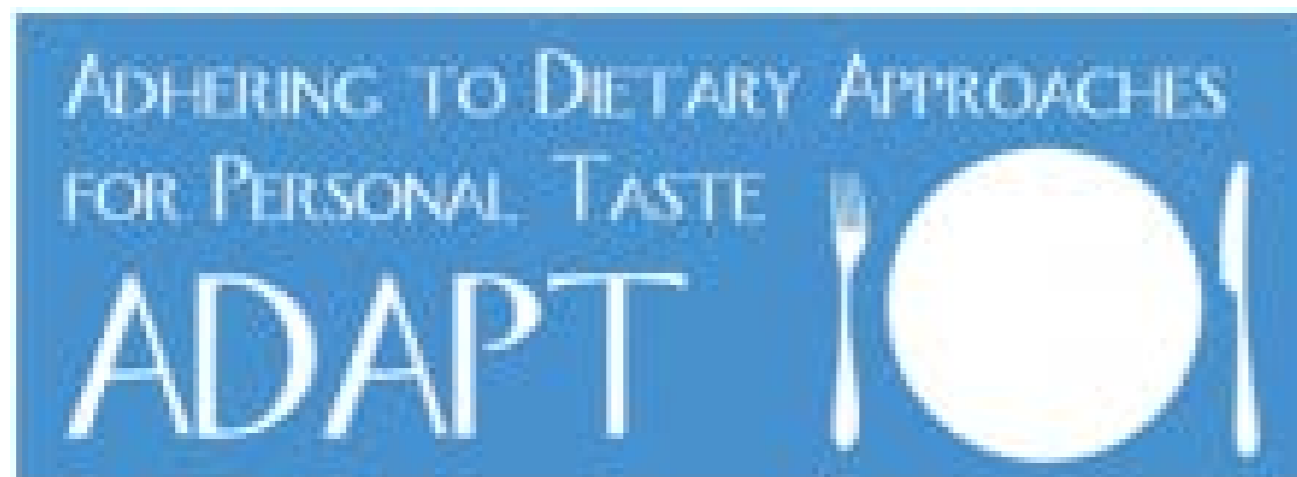
O THE OPRAH  
MAGAZINE



# Nicola McKeown, PhD



JEAN MAYER  
USDA  
HUMAN  
NUTRITION  
RESEARCH  
CENTER ON  
AGING



# What's coming up



Dietary patterns in the U.S.



Fruit and vegetable intake in classic and popular diets



Studying Food Tribes



How adherence to certain dietary patterns affects fruit and vegetable consumption



Characteristics of people who adhere to diets



How all forms of fruits and vegetables help people adhere to diets



Q & A

# Why do dietary patterns matter?

- People eat foods, not nutrients
- Health benefits are more likely to come from the aggregate of dietary (and physical activity) choices, not from single nutrient or food choices
- Food-based recommendations are more easily interpreted

Theuwissen, *Mol Nutr Food Res*, 2009; Marik, *JPEN*, 2012; Hooper, *BMJ*, 2006; Kaiser, *Am J Clin Nutr*, 2014



# Popular & classic dietary patterns in the U.S.

## Popular Diets/Food Tribes

(Self-identified followers)

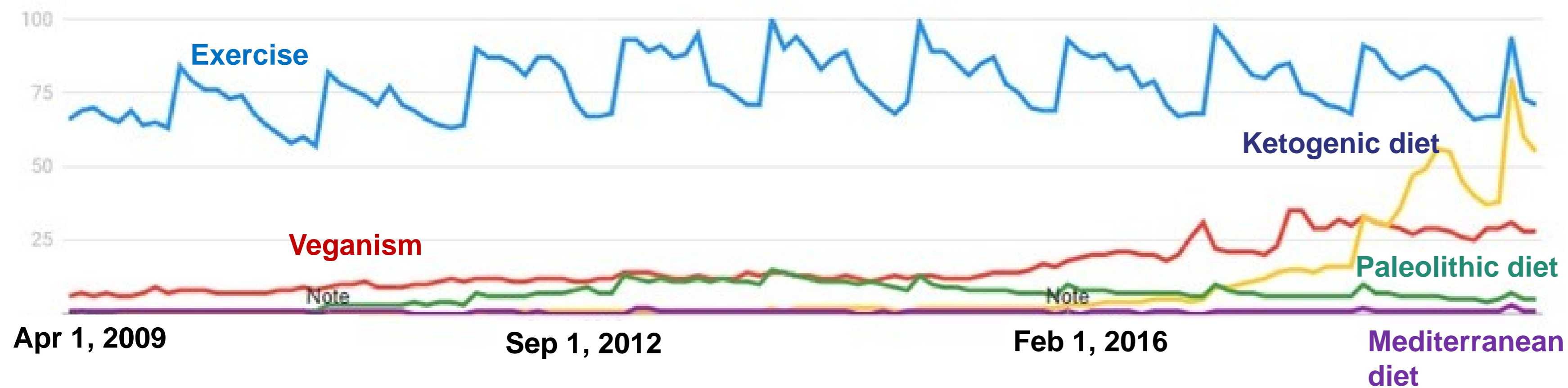
- Whole Food Plant-Based
- Vegan/Raw Vegan
- Vegetarian/Pescatarian
- Paleo
- Ketogenic
- Mediterranean
- Others

## Classic Patterns (Research defined)

- Dietary Approaches to Stop Hypertension (DASH)
- American Heart Recommendation
- Dietary Guidelines for Americans (DGA)
- Mediterranean

# Food Tribes continue to grow in the U.S.

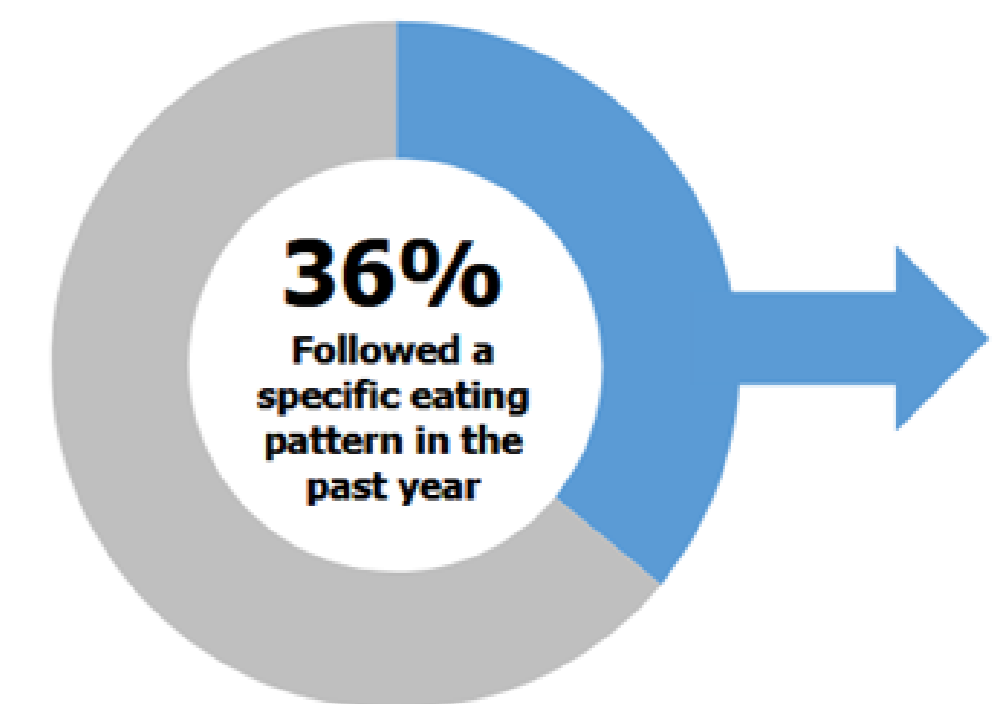
Google Trends Search Term  
Activity: 2009-2019



Paleo, keto, fasting, Whole 30: Why food tribes are on the rise



Following Specific Eating Pattern



The International Food  
Information Council  
(IFIC) Foundation's  
*2018 Food and Health  
Survey*

# Food Tribes: basic principles

## WHOLE FOOD PLANT BASED



No meat, dairy,  
processed food

## VEGETARIAN & PESCATARIAN



No meat; may eat  
dairy/eggs

## VEGAN & RAW VEGAN



No meat, dairy;  
emphasizes raw food;  
*some* eat processed  
food

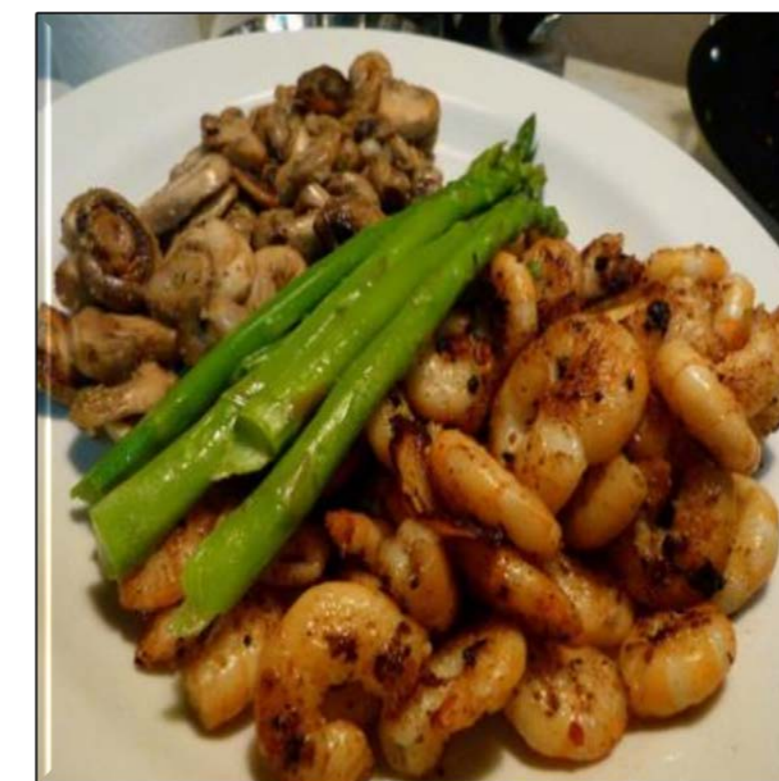
- Due **to limited research and lack of consensus on diet definitions**, few conclusions can be reached about long-term health benefits of these diets.
- Some studies show **benefits of a plant-based diet**; the 2015-2020 DGA includes vegetarian as a healthy dietary pattern.

## PALEO



No grains, legumes,  
dairy; emphasizes  
fruit, vegetables, meat

## KETOGENIC



Low or no grains;  
full fat dairy; nuts,

# Classic diets

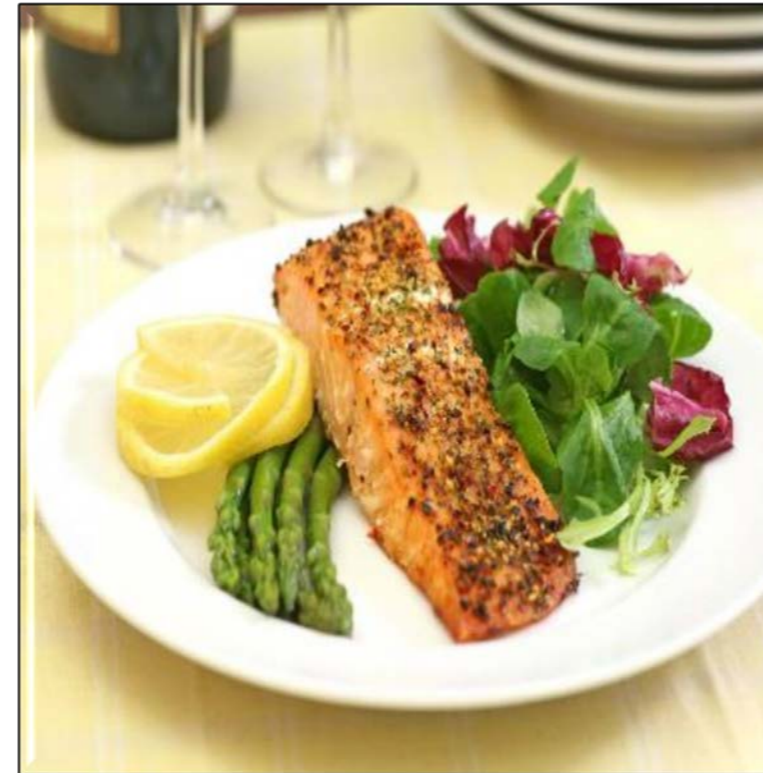
## Dietary Guidelines for Americans



Scored with the Healthy Eating Index

\*Associated with maintaining a healthy body weight and reducing chronic disease risk

## DASH



Low in sodium, high in fruits and vegetables

\*Associated with lower blood pressure and LDL cholesterol

## AMERICAN HEART



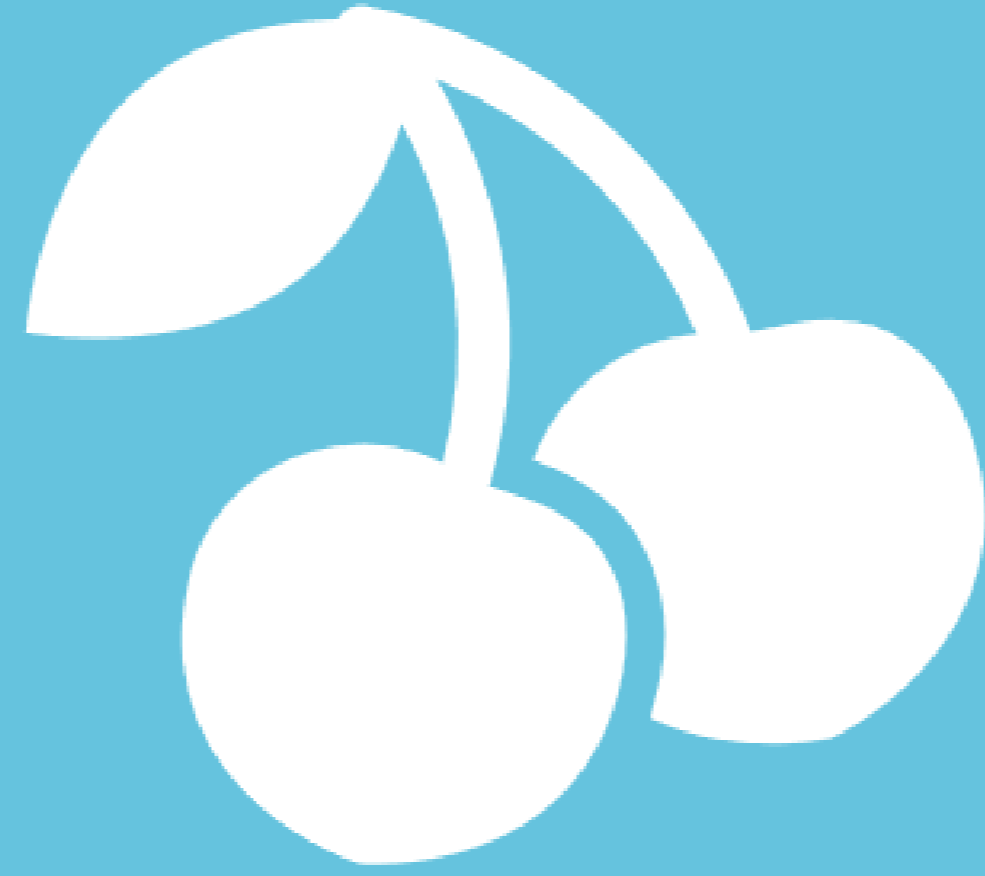
High in fruits and vegetables, fish, whole grains, low in sugar and salt

## MEDITERRANEAN



Emphasizes whole grains, produce, fish, olive oil, local food, red wine

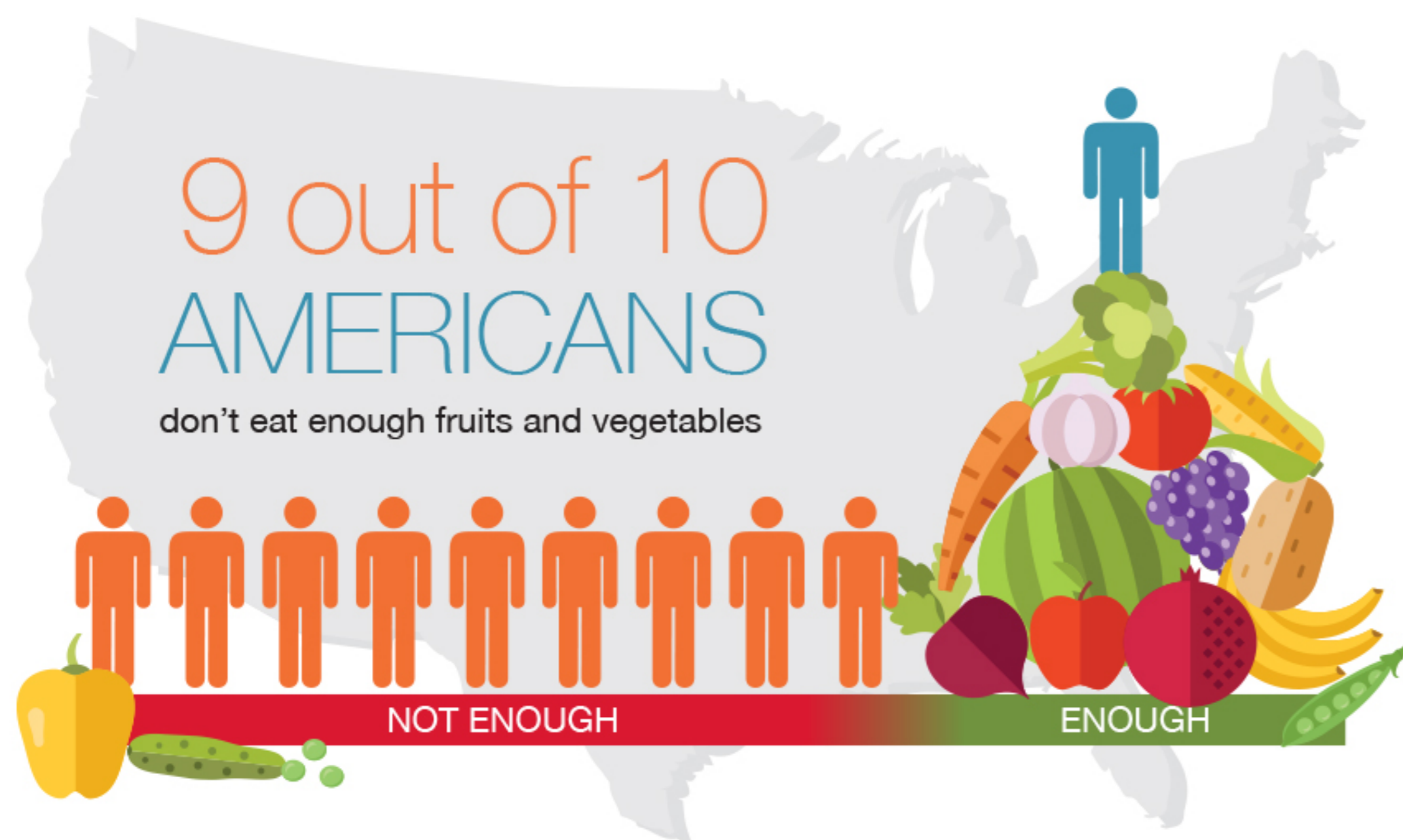
\*Associated with lower LDL cholesterol and reduced CVD risk



**Fruit and vegetables are  
emphasized across all dietary  
patterns**

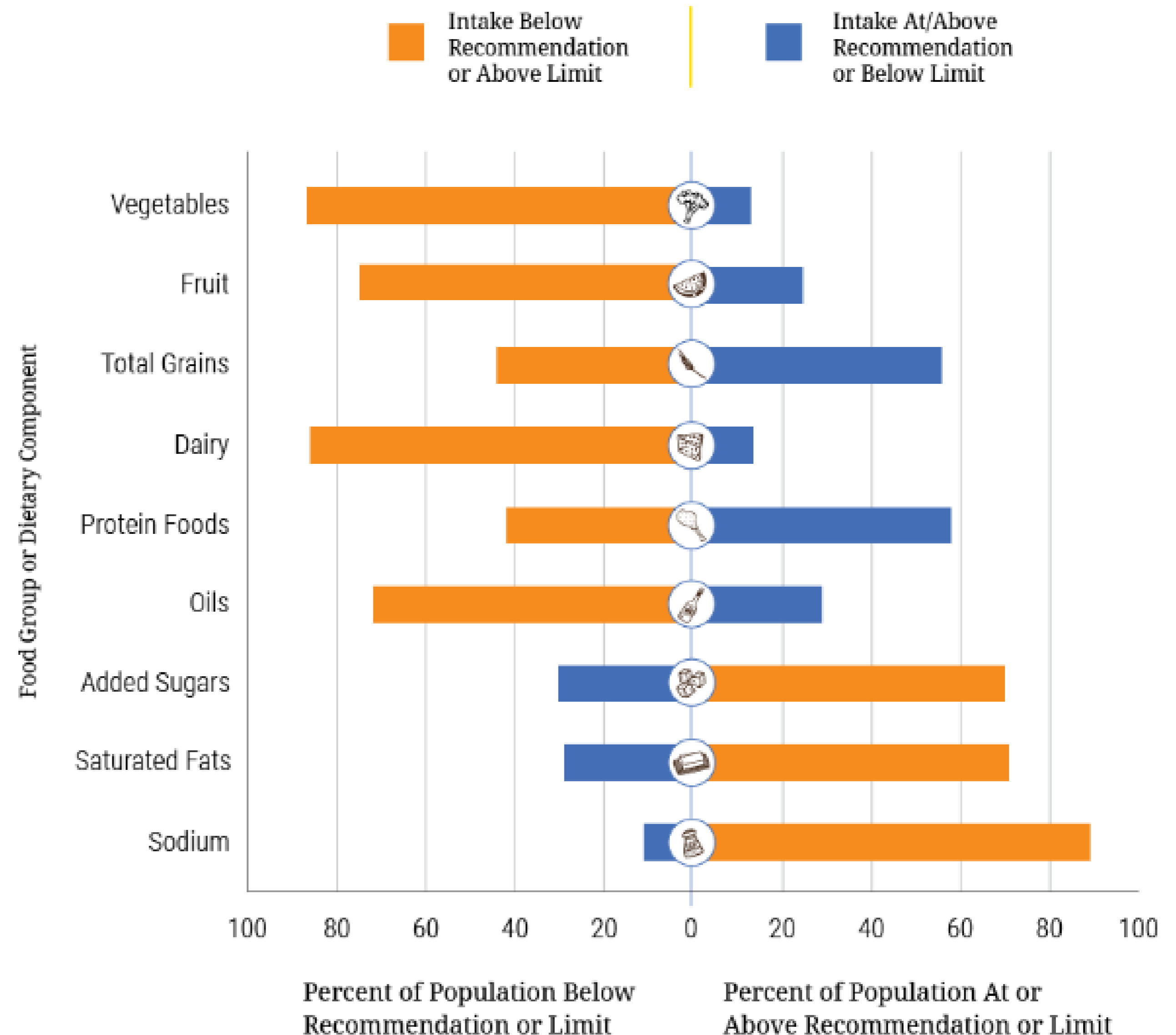
# Recommendation vs. Reality

No age or gender group meets recommendations

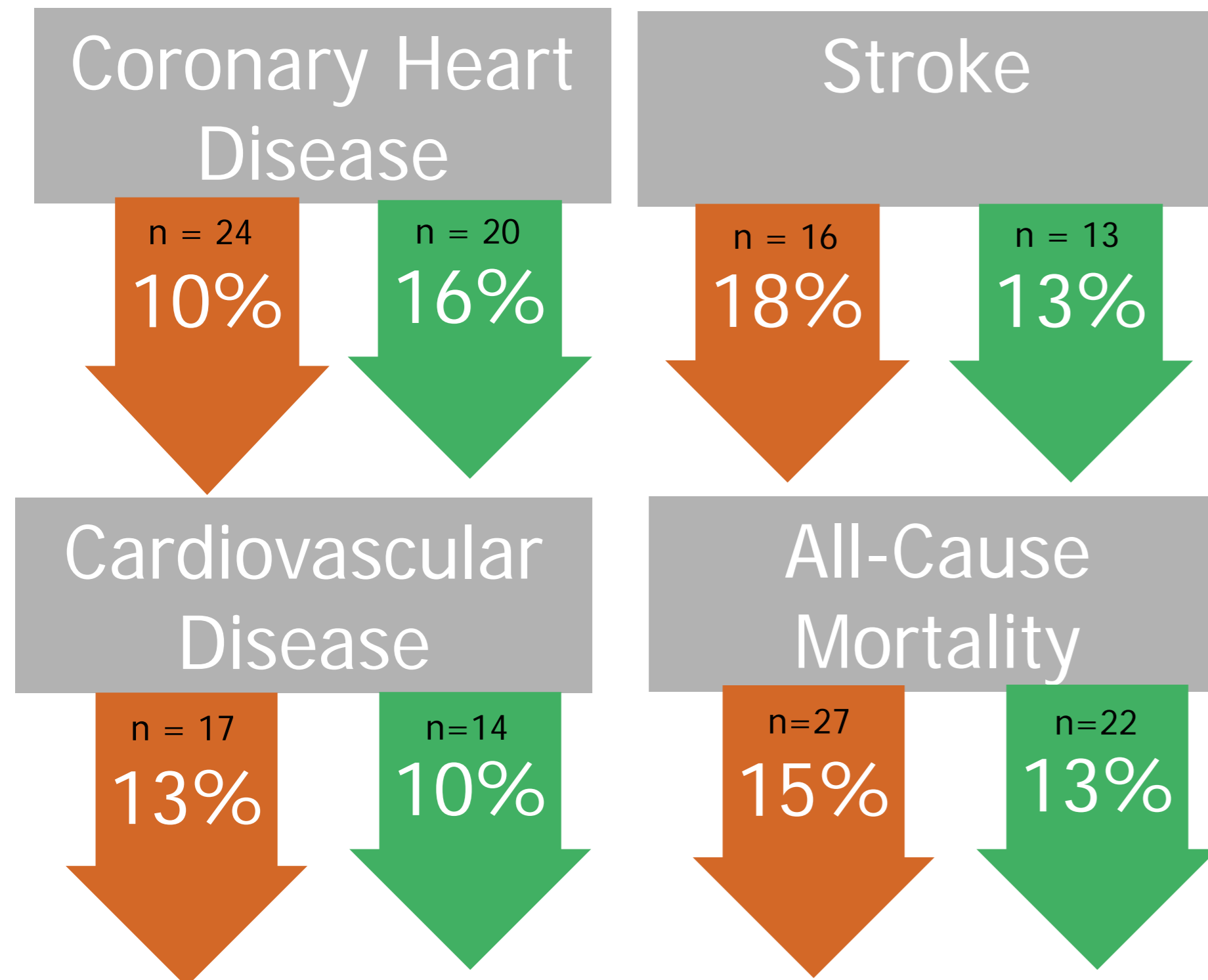


# Typical American Dietary Pattern

The **Healthy Eating Index (HEI)** is a measure of diet quality used to assess how well a set of foods aligns with key recommendations of the Dietary Guidelines for Americans.



# Health benefits of fruits and vegetables



**Fruit and vegetables are thought to affect multiple to **other biological mechanisms** that lead to positive health outcomes:**

- Lipid oxidation
- Increased antioxidant capacity of the blood
- Reduced oxidative stress
- Anti-inflammatory effects
- Improved vascular function
- Decreased blood pressure
- Improved immune function
- Supporting the gut microbiome
- Displacement of other less nutritious food groups

■ Per 200 g increment in fruit intake  
■ Per 200 g increment in vegetable intake

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Characteristics of people who adhere to diets

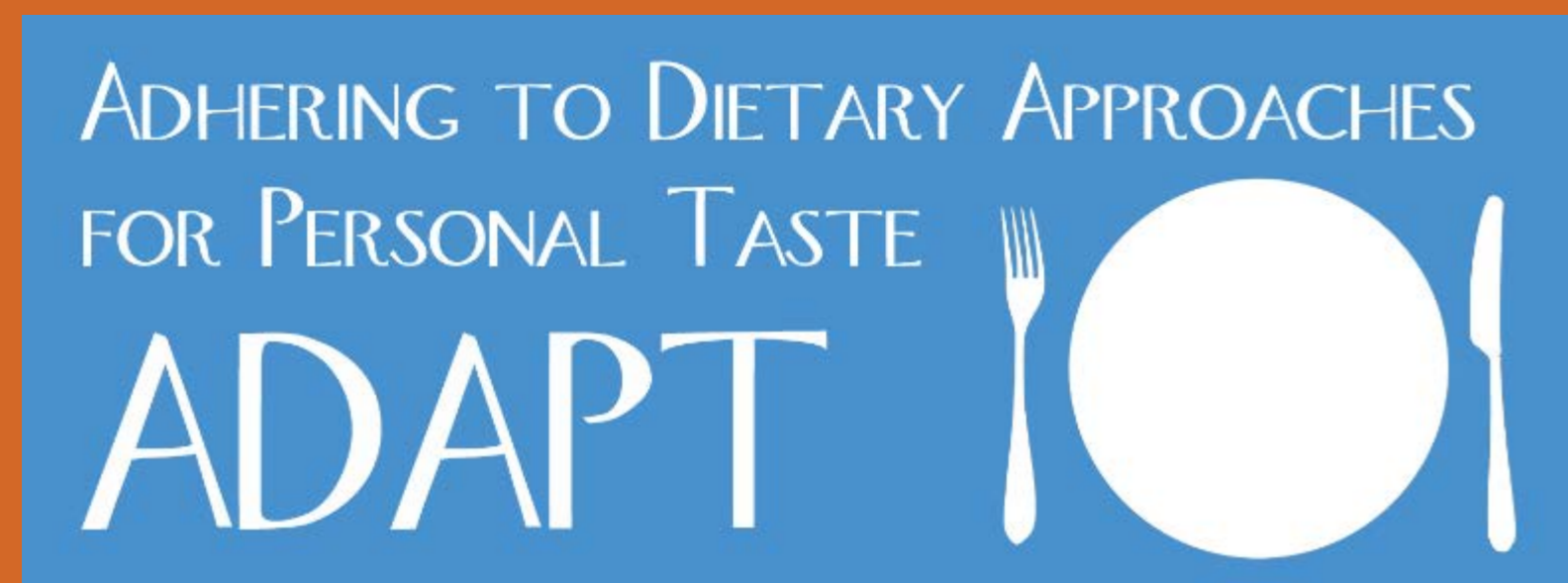


How all forms of fruits and vegetables help people adhere to diets



Q & A

# Studying Food Tribes



A Cohort to Capture Behavior Change  
In Relation to Personalized Dietary  
Patterns



# ADAPT: Feasibility and recruitment

## ADAPT Feasibility Survey (FS)

- Summer 2015
- Web-based research methods to gather data and to maximize response rates
- Social Media/Recruitment Partners
- 13,000+ responded to 15 minute survey
- Convenience sample, no incentives

## ADAPT Pilot Study (Preliminary data)

- Fall 2017
- Respondents to ADAPT FS (approx. 3000)
- Participants accessed an online web portal
- Completed 17 online questionnaires over 6 to 8 week period

### Types of questionnaires:

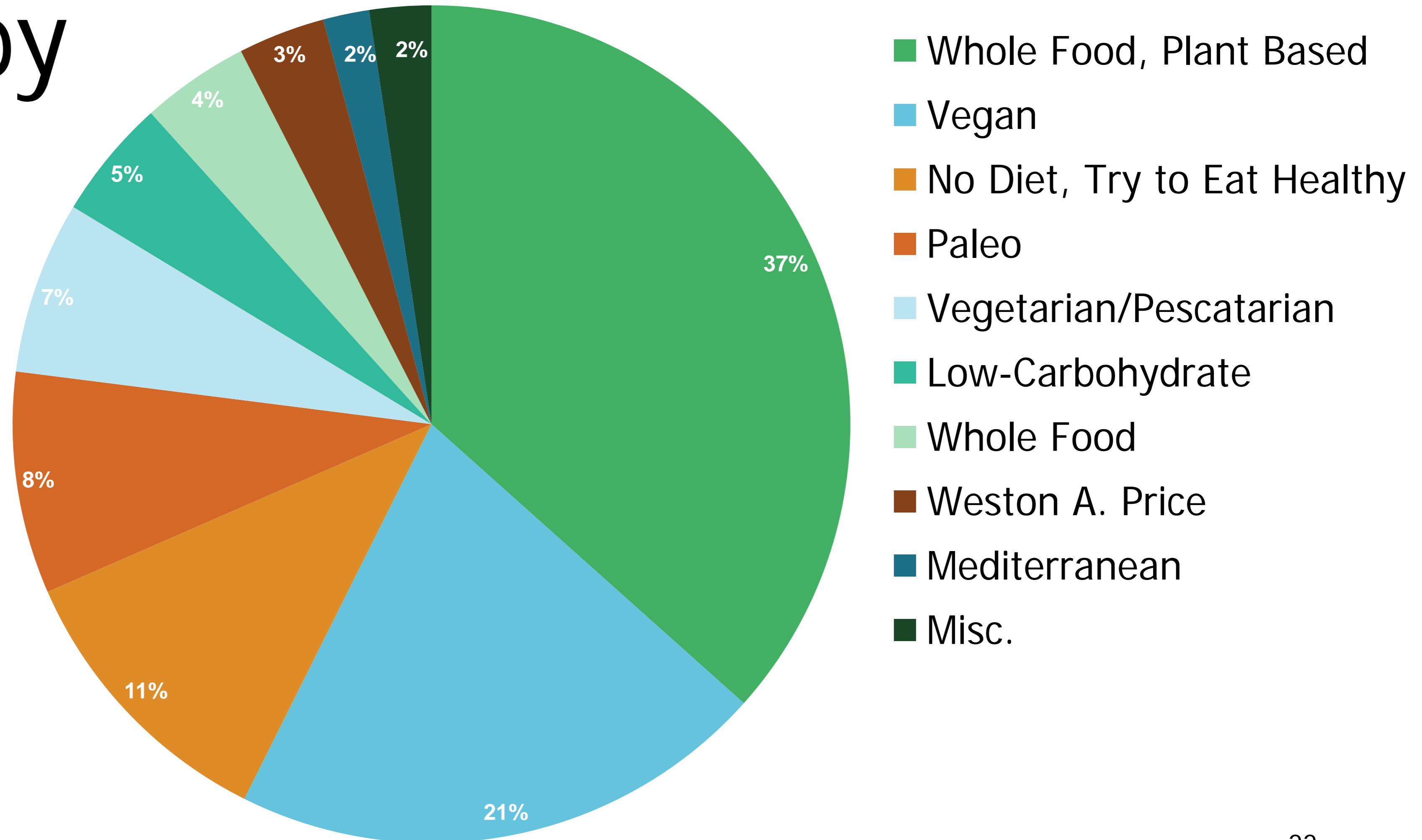
- Demographic, medical and lifestyle
- Physical activity and diet
- Behavioral

# ADAPT: Surveying participants

**Q:** Imagine that you were chatting casually about your diet with someone you met in an elevator. Would you use any of the following terms to describe what you typically eat?

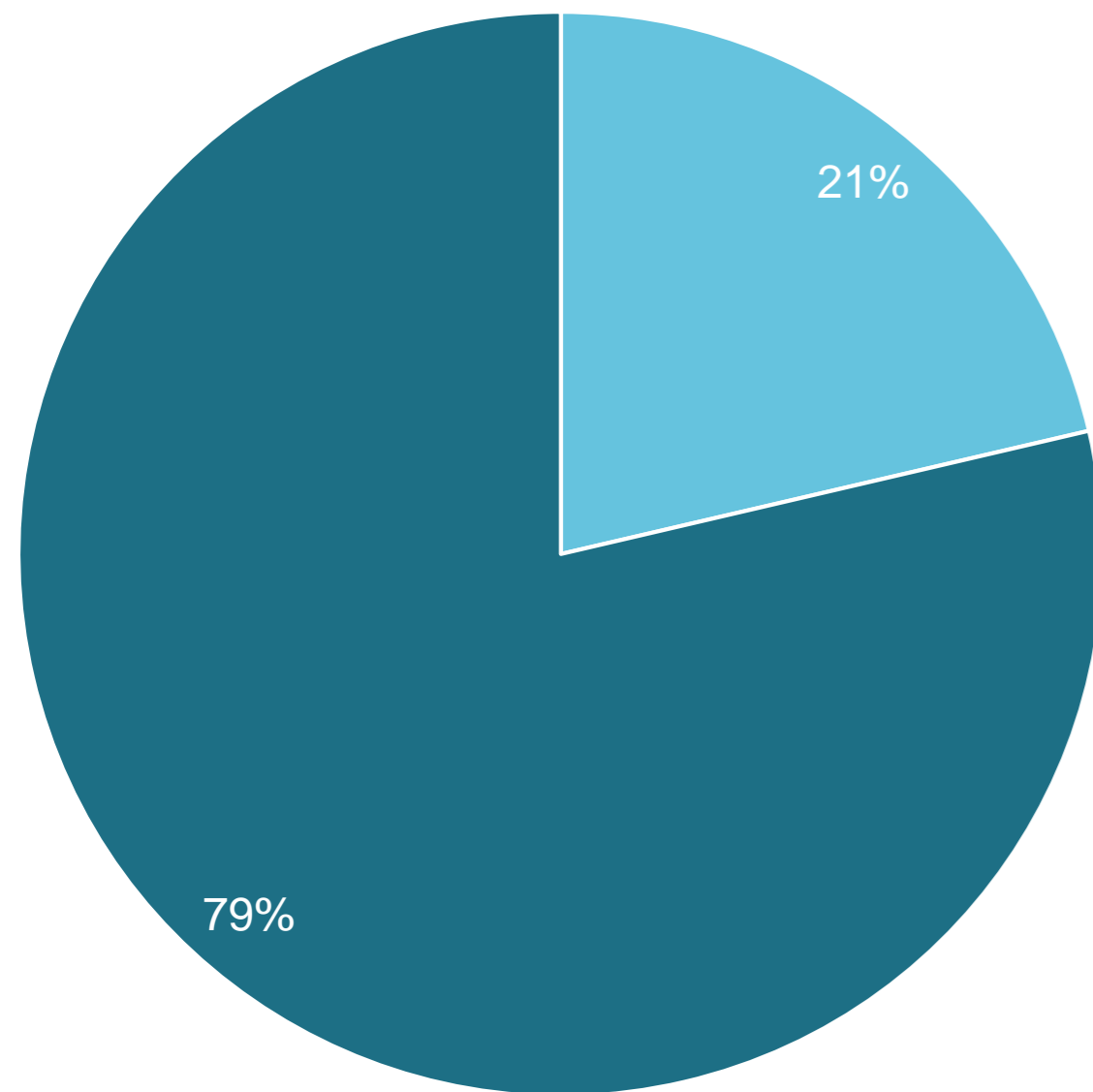
- No particular diet / I haven't followed any diet
- No particular diet, but I have tried to eat healthy
- Mediterranean-type diet
- Paleolithic-type diet
- Vegan diet
- Raw vegan diet
- Vegetarian diet
- Pescatarian diet
- Gluten-free diet
- Whole food diet
- Whole food, plant-based diet
- Locavore / local food diet
- Weston A. Price diet
- High-protein diet
- Low-carb diet
- Low-fat diet
- Dairy-free
- Doctor/practitioner recommended (diabetic sugar-free diet, DASH, NCEP, low-calorie, or other) \_\_\_\_\_
- Other diet (the diet I have followed is not listed here) \_\_\_\_\_

# Percentage of participants by diet group



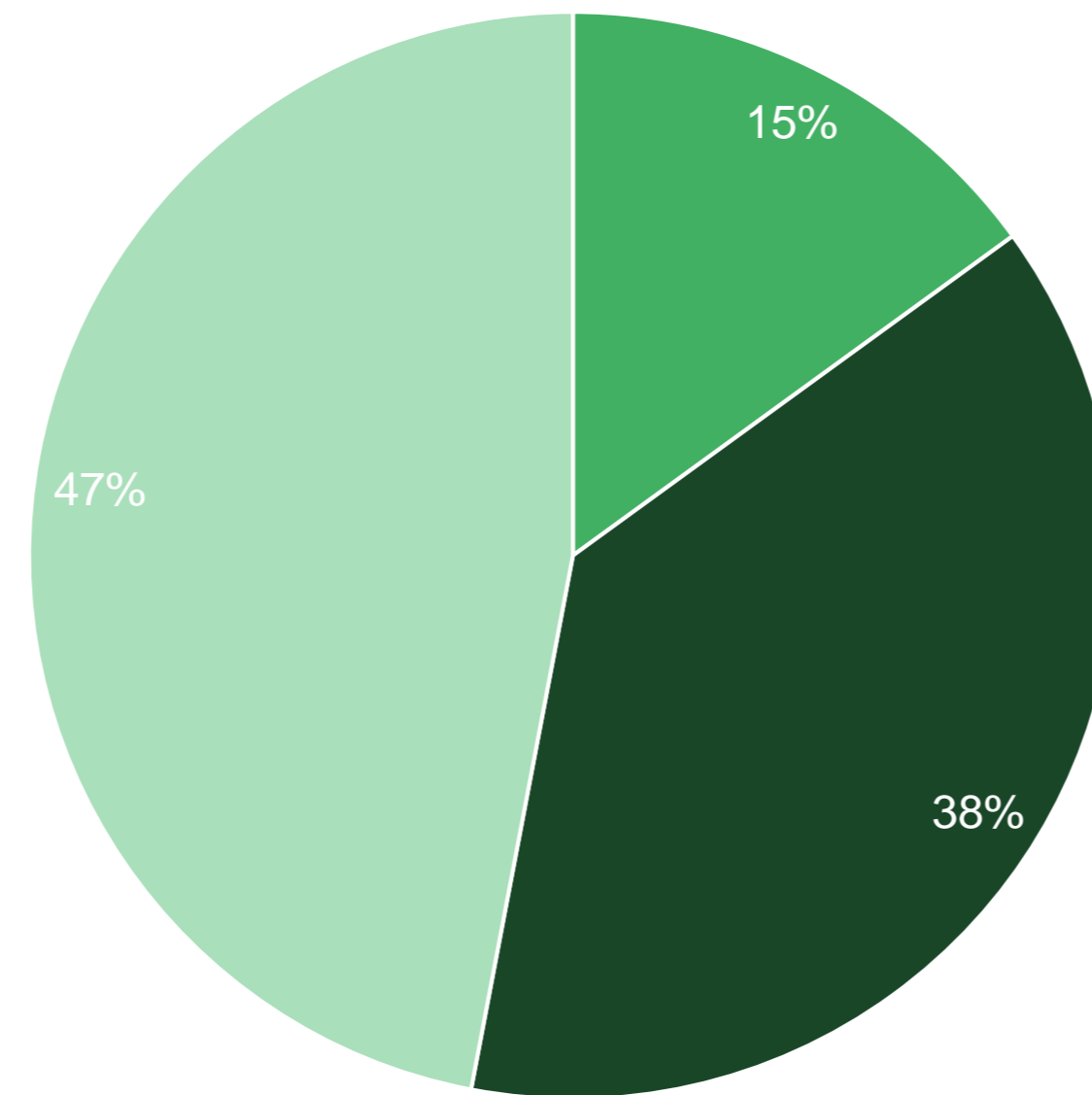
# Demographics

## Gender



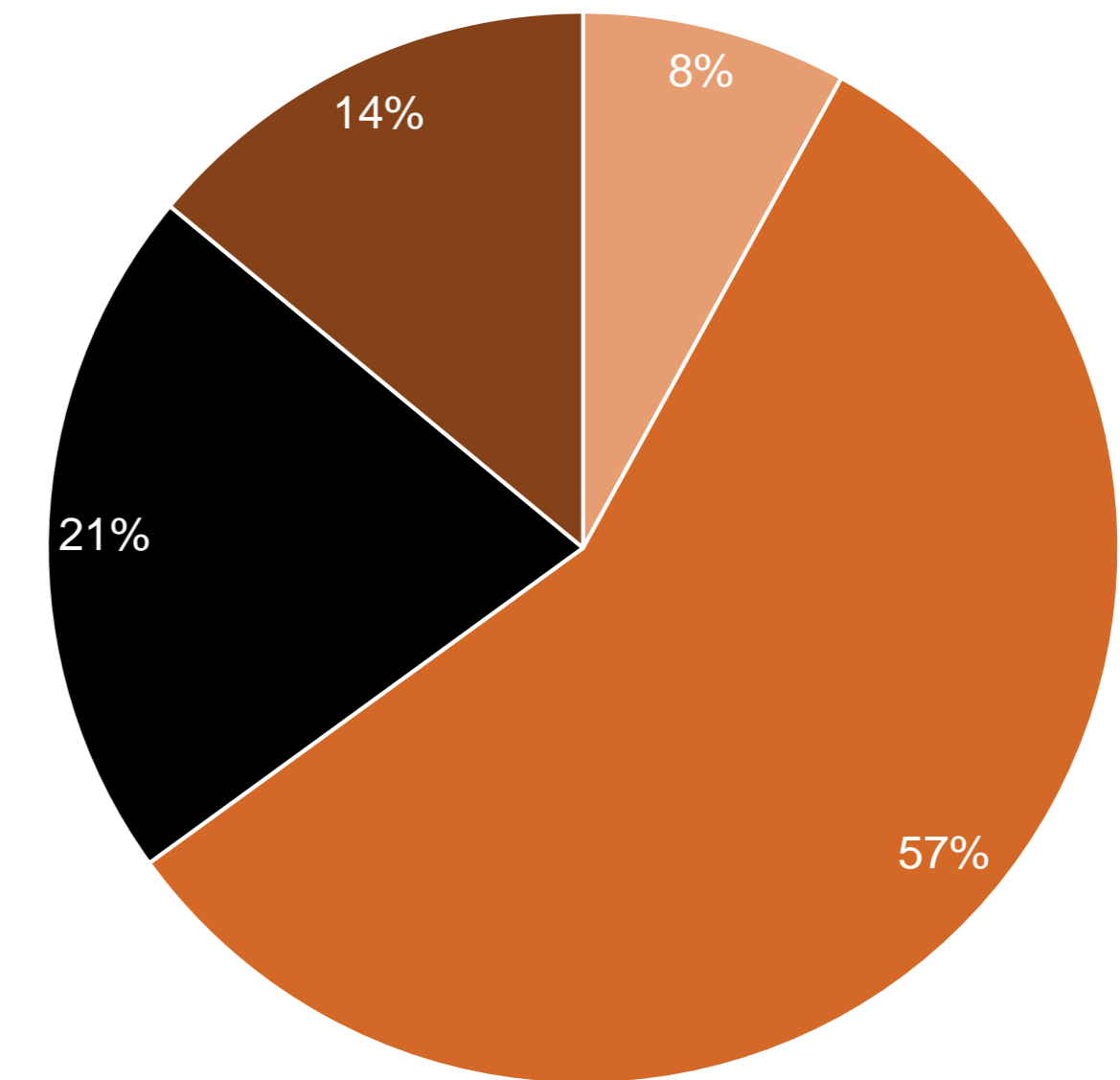
■ Male ■ Female

## Age



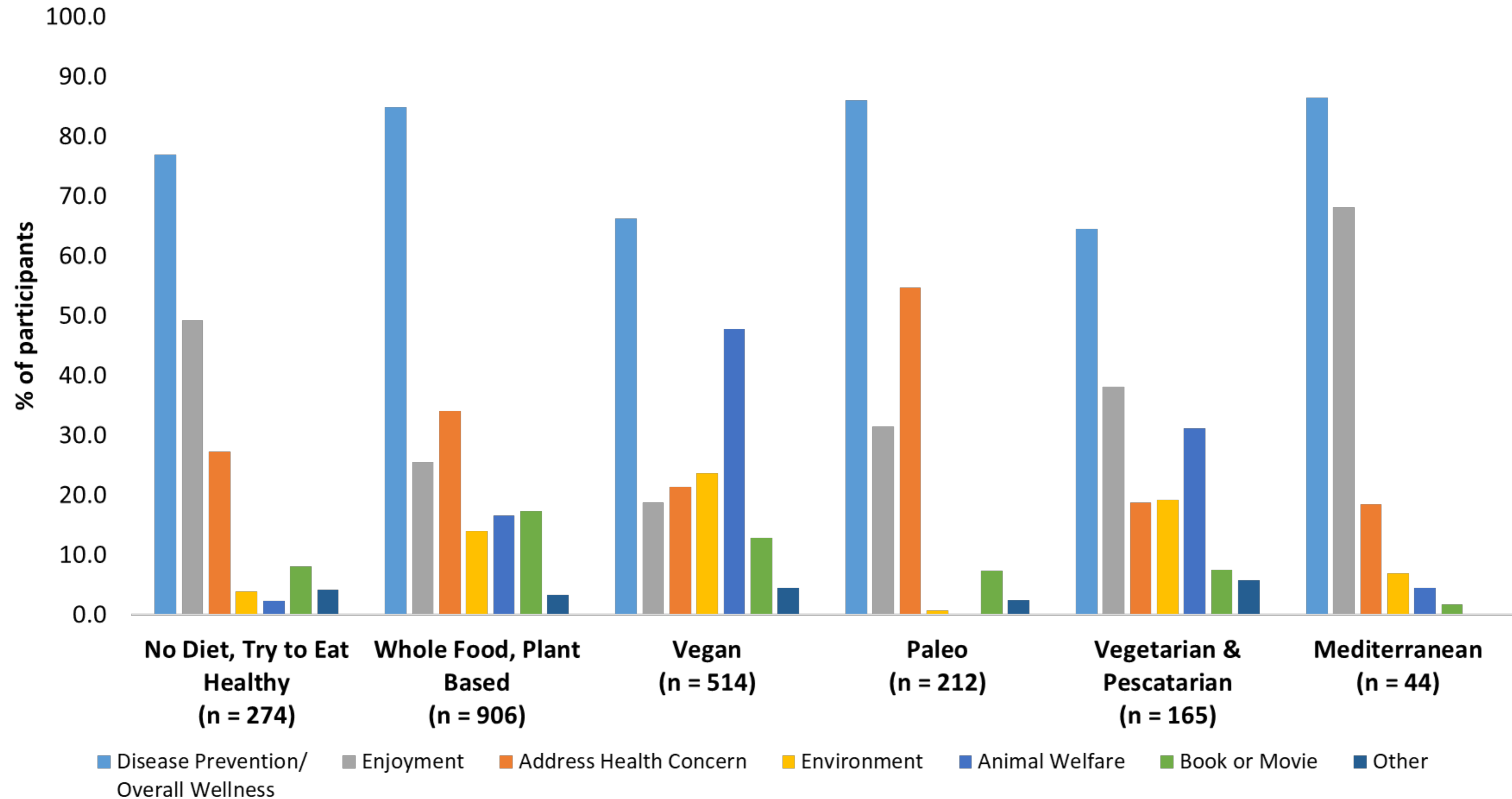
■ 18-34 ■ 35-54 ■ 55+

## BMI



■ <18.5 ■ 18.5-24.9 ■ 25-29.9 ■ 30.0+

# Motivations to follow these diets



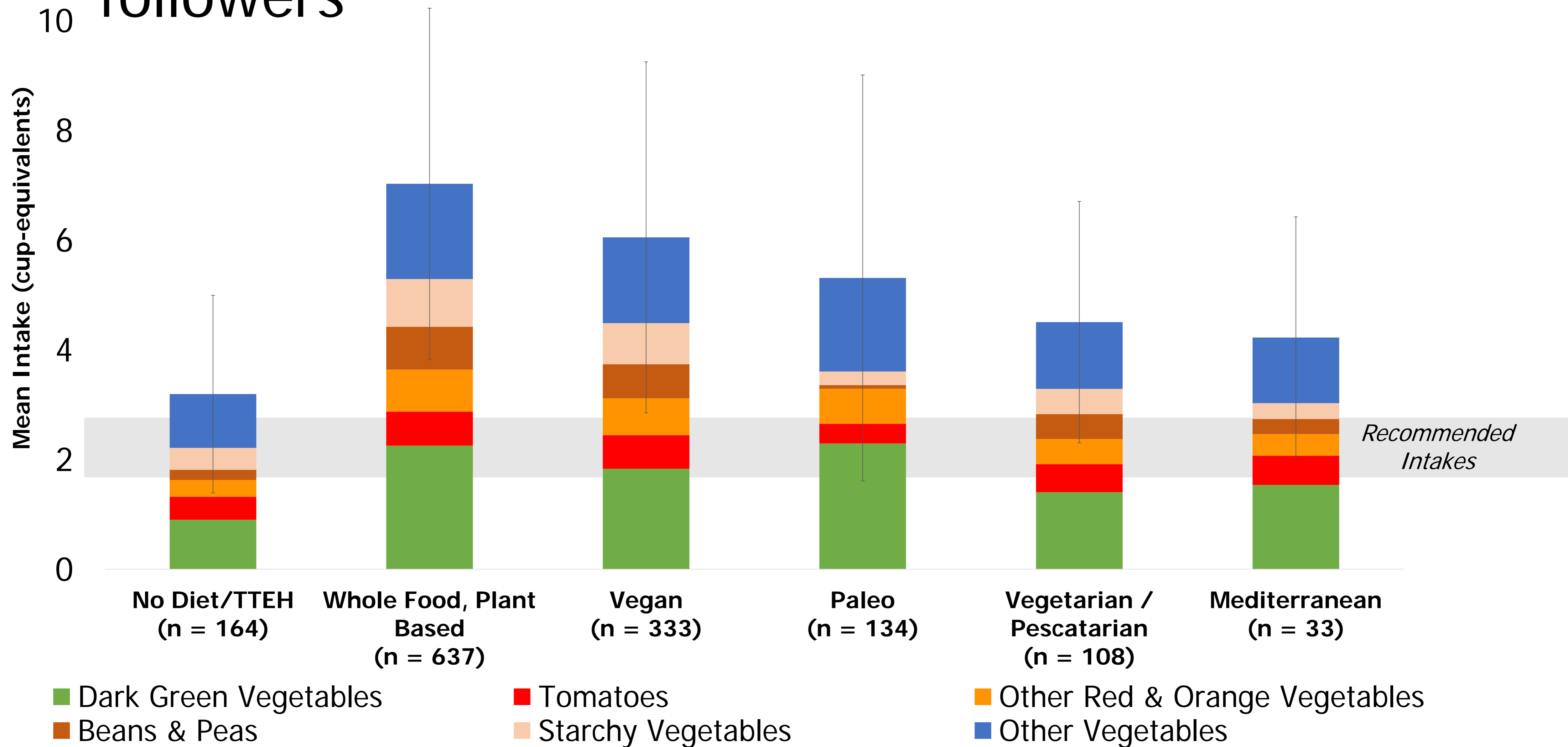
How adherence  
to dietary  
patterns affects  
fruit and  
vegetable  
intake



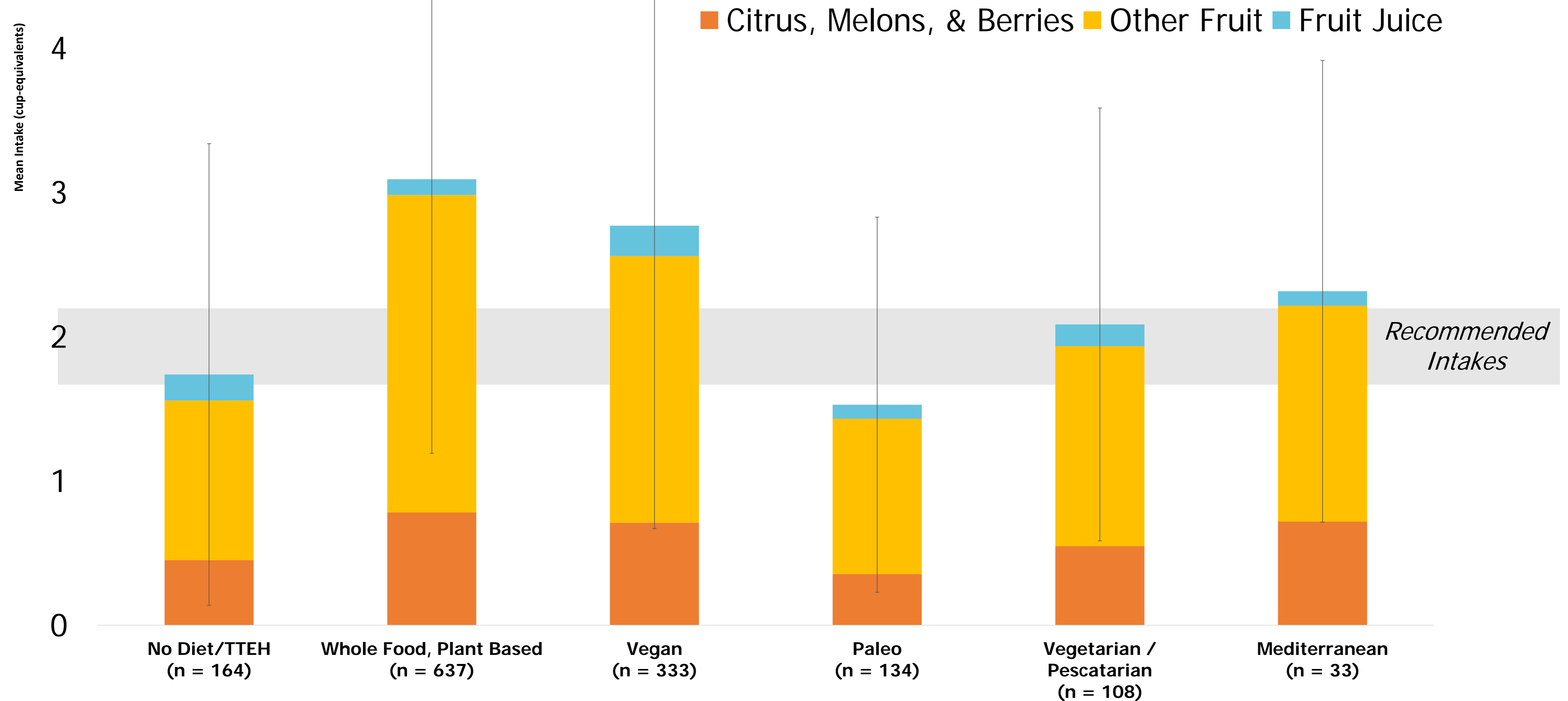
# Diet History Questionnaire II

- Automated, electronic questionnaire administered by National Cancer Institute (NCI)
  - skip patterns for efficiency
  - queries to complete questions before proceeding
  - can log in and out to finish questionnaires
  - respondents cannot complete with missing or inconsistent responses
- Food frequency questionnaire (FFQ), capturing 134 food items consumed within the past month, plus portion size and dietary supplement questions
- Foods and portion sizes included in the DHQ are based on national dietary intake data

# Mean vegetable intake higher among plant-based followers



# Mean fruit intake lower among Paleo followers



# How popular diets measure up to national recommendations

HEI-2015 Dietary Component (max score)	No Diet	TTEH	WFPB	Vegan	Paleo	Vegetarian / Pescatarian	Mediterranean Diet
Total Vegetables (5)	3.9	4.5	5.0	5.0	4.9	4.8	4.9
Greens and Beans (5)	3.6	4.5	5.0	5.0	4.7	4.8	4.9
Total Fruit (5)	2.4	3.8	4.7	4.3	3.2	3.9	4.1
Whole Fruit (5)	3.4	4.4	4.9	4.6	3.9	4.3	4.6
<i>Total (100)</i>	<i>60.0</i>	<i>67.8</i>	<i>76.7</i>	<i>75.7</i>	<i>62.4</i>	<i>72.1</i>	<i>74.3</i>
			*	*	*	*	

\*Total HEI score is made up of 13 components that reflect the different food groups and key recommendations in the 2015-2020 Dietary Guidelines for Americans. Components include total fruits, whole fruits, total vegetables, greens and beans, whole grains, dairy, total protein foods, seafood and plant proteins, fatty acids, refined grains, sodium, added sugars and saturated fats.

# Meeting recommendations for fruit and vegetables improves diet quality

Diet	% meeting recommendations	Mean HEI score of those <u>MEETING</u> recommendations	Mean HEI score of those <u>NOT</u> meeting recommendations
No diet / TTEH	30%	70.5	65.7
WFPB	77%	77.7	73.2
Vegan	63%	77.7	72.1
Paleo	35%	67.7	59.4
Vegetarian/ Pescatarian	53%	77.1	66.5
Mediterranean	55%	78.4	69.4



The secret to getting enough fruits and vegetables is **choosing and sticking to a diet that emphasizes plants.**

# Promoters of adherence

What makes some people able to “stick” to certain diets?



# Factors of adherence – what's important in terms of meeting fruit and vegetable requirements?

Where do you shop most frequently?

## **Dietary Pattern**

Self efficacy

## **Age**

Household income

Food acceptability

## **Monthly grocery expense**

Transportation

How easy is it to find food?

Education

## **Affordability**



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Q & A

# Frozen, canned, dried and juiced fruits and vegetables may promote dietary pattern adherence

- **Value-add forms help consumers overcome barriers:**

- Cost
- Accessibility
- Difficulty preparing
- Waste



# The can's unique role in promoting adherence to dietary patterns

Canned fruits and vegetables have been shown to provide nearly as many – or more – nutrients per calorie compared to fresh but **cost 50% less**.

RDs recognize the nutrition and value of canned foods.

**89%**

say canned foods are important for helping their clients reach food goals.





1 Produce is harvested at peak ripeness, nutrition and flavor.



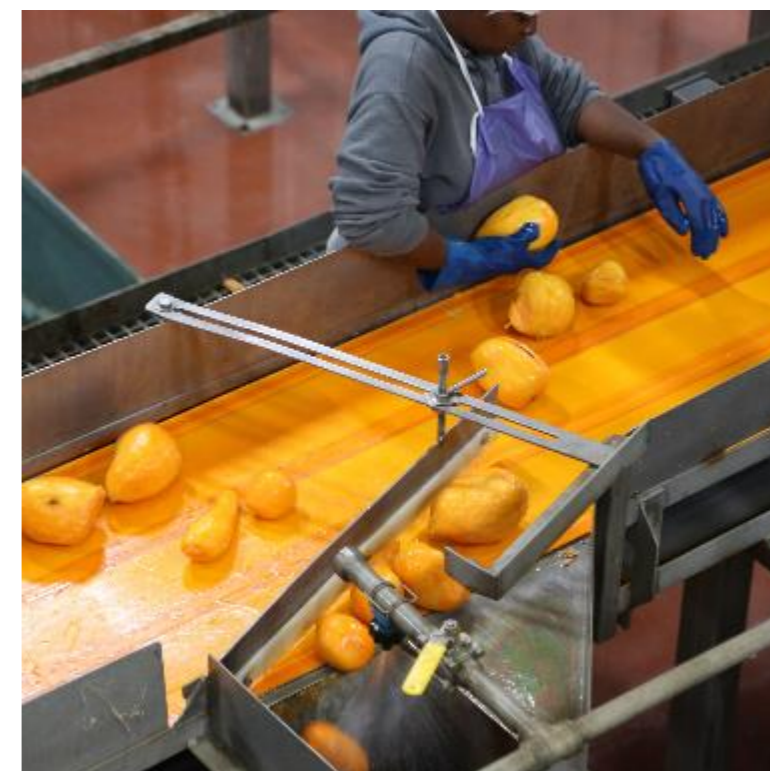
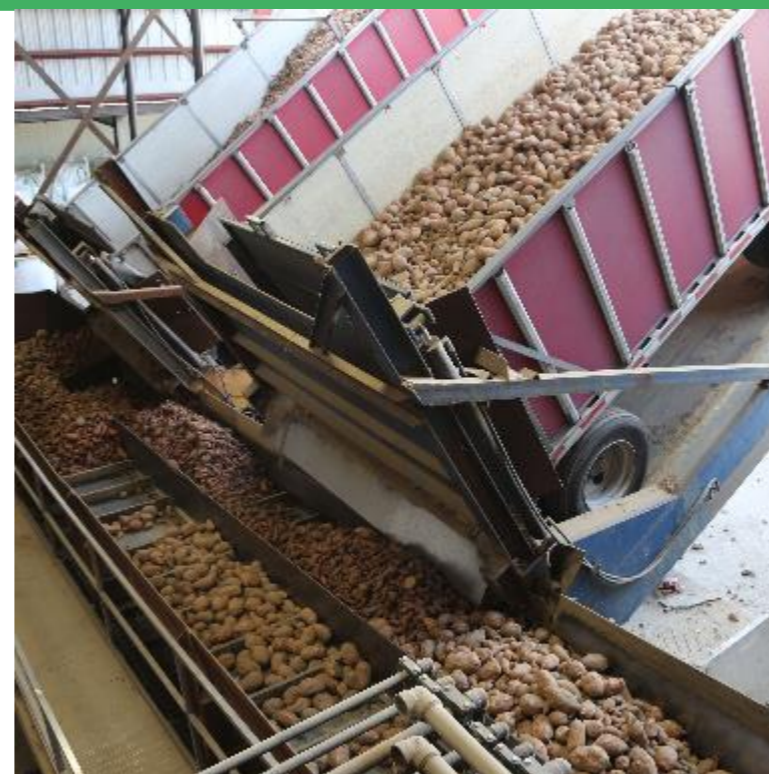
2 Produce is transported to canning facility.



FIELD

SEALED

Field to sealed  
in 4 hours

A green stopwatch icon with a white face and a blue border, indicating the time taken for the process.

3 Produce is washed, sorted, cut and sealed in cans.

What is role that canned foods play in helping US adults meet various healthy eating patterns?

Diet	Source
Dash Diet	Mellen et al., 2008
American Heart	AHA, 2014
Mediterranean Diet	Trichopoulou et al., 2003
HEI score (DGAs)	National Cancer Institute, 2015



# Analyzing dietary patterns of can users



**n = 5176**

Canned food user or non-user

Score for all 4 classic diet patterns

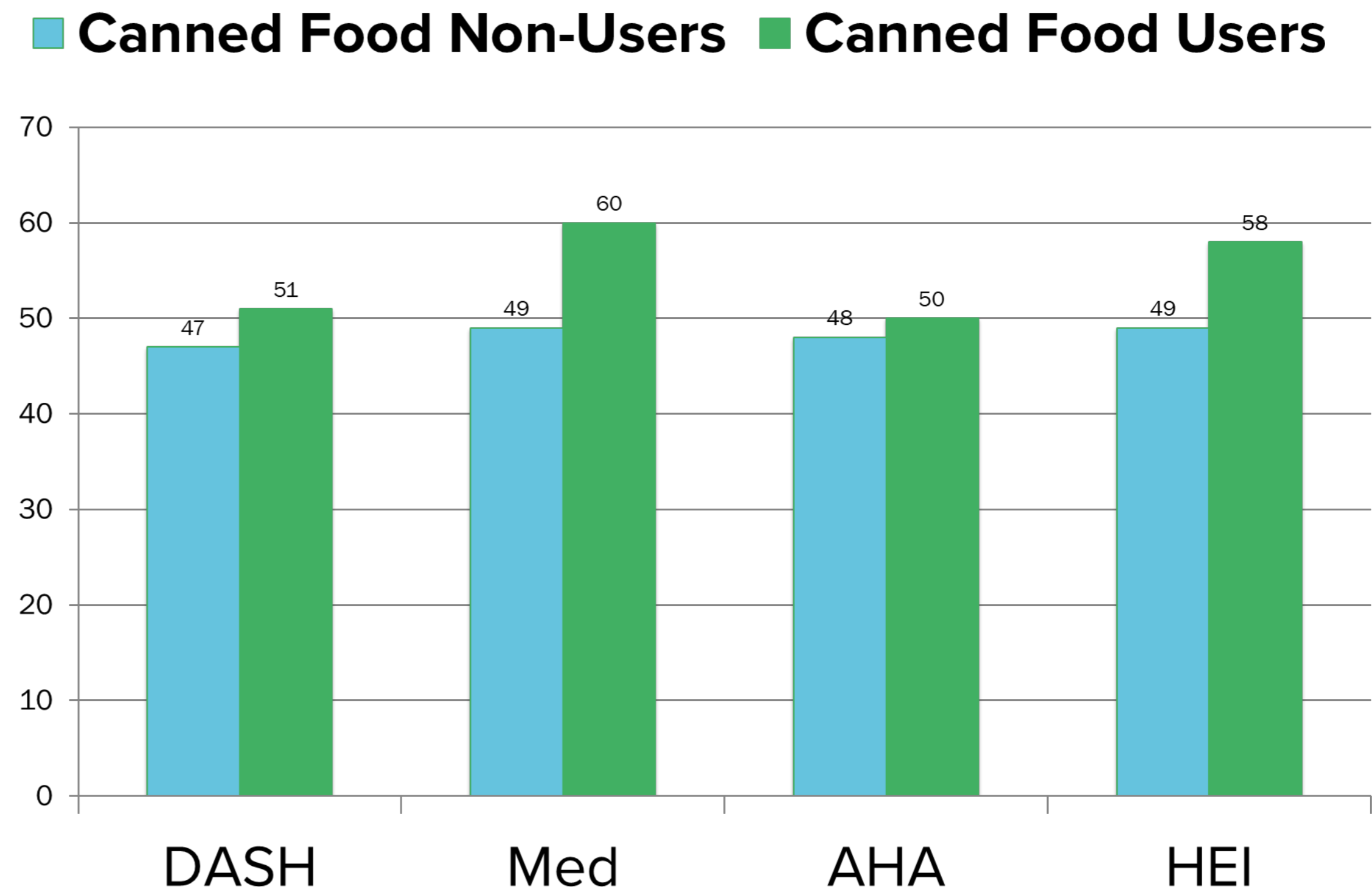
Classified as more or less adherent

# Scoring diets for their adherence to classic dietary patterns



Example scores for non-canned food user			
Diet	Range	Score	High or Low Adherence
DASH	0-9	3.1	High
American Heart	0-50	24.9	Low
Mediterranean	0-50	2.9	Low
HEI score (DGAs)	0-100	60	High

A higher proportion  
of **canned food**  
consumers have  
above average  
adherence scores  
across all diets  
examined



Canned food consumers' diets **are more nutrient dense**

▲

Higher

▼

Lower

■

Positive

■

Negative

Nutrient	Canned Food Consumer Mean (SE)		Canned Food Non-Consumer Mean (SE)
Total Energy (kcal)	2169 (29)		2133 (23)
Sodium (mg)	3749.0 (62.5)	▲	3474.1 (33.1)
Fiber (g)	20 (0.5)	▲	16 (0.3)
Protein (% energy)	87.0 (1.7)	▲	82.7 (0.9)
Vitamin A (mcg)	675.1 (20.3)	▲	627.0 (12.2)
Vitamin C (mg)	86.5 (2)	▲	76.8 (2)
Vitamin D (mcg)	5.4 (0.5)	▲	4.5 (0.1)
Iron (mg)	15.5 (0.2)	▲	14.3 (0.2)
Potassium (mg)	2860.3 (50.2)	▲	2597.8 (33.6)
Added Sugar (% energy)	17.1 (0.9)	▼	19.8 (0.4)
Total fat (% energy)	81.9 (1.1)	▼	83.1 (1.1)
Saturated fat (% energy)	26.1 (0.5)	▼	26.9 (0.3)
Calcium (mg)	943.6 (21.0)	▼	971.0 (12.7)

# Bringing this research to life



- Developed 5-days of canned-focused meal plans that meet a Mediterranean dietary pattern
- Challenged nutrition influencers and consumers to follow meal plan
- Intended outcomes:
  - Easier meal prep
  - Higher nutritional quality of meals
  - Better moods

Find them here

[www.cansgetyoucooking.com/happinesschallenge](http://www.cansgetyoucooking.com/happinesschallenge)

**Cans Get You COOKING**  
**Day 1**

For Day 1 of the challenge, we're featuring a quick and easy veggie-packed breakfast, White Chicken Chili, veggies and paprika hummus for a snack, and easy salmon burgers for dinner. You'll easily get over 3 cups of veggies today!

**BREAKFAST**

These delicious Veggie Frittatas only take 10 minutes to prep, and 10 minutes to cook and they make a whopping 36 servings. After you enjoy them hot for breakfast, stick them in the freezer so you can simply microwave for breakfast throughout the week.

Serve two hot with:

- 1 whole grain English muffin with 1/3 cup mashed avocado on top
- 1 cup canned fruit

**LUNCH**

If you can, prepare this White Chicken Chili the night before and customize it with your favorite toppings. At a minimum, we recommend:

- 1/2 cup plain yogurt (instead of sour cream, we swear it will be just as delicious!)
- 1 serving (8) tortilla chips

**SNACK**

2 tbsp Paprika Smoked Hummus with:

- 1 cup of veggies (like carrots or celery)
- 1 serving (12) whole grain crackers

**DINNER**

These Salmon Burgers require just five ingredients and two of the main ingredients are pantry staples—canned salmon and oats. Canned salmon (just like fresh salmon) is a great source of lean protein and healthy fats. Plus, it's affordable and portable. Leftovers are great for lunch tomorrow!

Enjoy one burger with:

- Whole wheat hamburger bun
- 1 cup canned veggies of your choice—roast, sauté or add to a salad.

**DAY 1 SHOPPING LIST**

**Bakery Items**

- 1 pkg English Muffin, whole grain
- 1 pkg Hamburger bun
- 1 pkg Whole Grain Crackers

**Canned Items**

- 8 cans (10oz) Chicken Breast
- 1 cans (15oz) Chicken Broth, can
- 2 cans (15oz) Fruit—Your Choice!
- 1 cans (15oz) Garbanzo beans (Chickpeas)
- 1 cans (4.5oz) Green chiles, canned
- 1 can (15.5 oz) Hominy
- 1 can (15oz) Mixed Vegetables
- 2 cans (6oz) Salmon
- 2 cans (15oz) Veggie—Your Choice!
- 1 can (15 oz) White Beans

**Dairy**

- 1 dozen Eggs
- 1 gallon Milk
- 1 pkg Parmesan Cheese, grated
- 1 pkg Shredded cheese, optional
- 1 container (16oz) Yogurt, plain

**Dry Ingredients**

- 1 pkg Oats, rolled
- 1 bag Tortilla chips

**Fresh Produce**

- 2 each Avocado
- 1 bunch Celery
- 1 head Garlic
- 3 each Onion, yellow
- 1 bunch Parsley, fresh

**Pantry Items**

- Cayenne Pepper
- Chipotle Powder
- Cumin
- Dried Basil
- Lemon juice
- Olive Oil
- Pepper
- Salt
- Smoked Paprika
- Vegetable Oil

# Feedback from participants



“Canned foods make for faster meal prep and easy meal planning with canned ingredients on hand in the pantry. They also help me expand my cooking repertoire.”

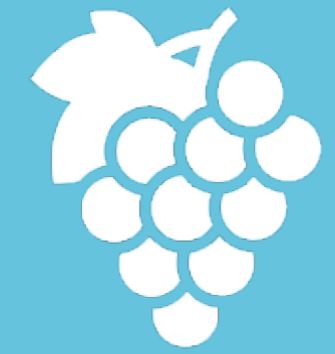
I felt so happy seeing how much children enjoyed these healthy meals, they even have new favorites.



...This was an eye opening challenge. I found meal prep. to be quick/easy and smooth. It was very affordable and my family loved all of the meals...

What does it all mean?





In their pursuit of **overall wellness and enjoyment**, consumers choose to follow special diets



Following and adhering to any **particular diet that emphasizes plants** results in eating more **fruits and vegetables**



**Affordability and age are important factors** when it comes to adherence



**Canned food may promote adherence to healthy dietary patterns & boost nutrient intake**



At a time when even the most motivated have difficulty meeting fruit and vegetable recommendations, encouraging **all forms of fruits and veggies** and other **strategies to overcome barriers** is key.

Questions?



# THANK YOU

## Nicola McKeown, PhD

- ADAPT Research Team Members
- JM USDA HNRCA Nutritional Epidemiology Program
- ADAPT Recruitment Partners
- ADAPT Participants
- ADAPT Advisory Board
- Lisa Wendel Memorial Foundation (Financial Support)
- Tufts Collaborates! (Financial Support)
- USDA/ARS Agreement No. 8050-51530-013-01S (Financial Support)

## Kiyah Duffey, PhD

- Can Manufacturers Institute (Financial Support)
- FoodMinds
- Kevin Mathias
- Karen Ritter

# Join the Movement



**SEPTEMBER IS NATIONAL  
FRUITS & VEGGIES  
MONTH™**  
#HAVEAPLANT  
#HAVEAPLANTPLEDGE

Show your support by taking and sharing the [Have A Plant™ pledge](#) at [fruitsandveggies.org](https://fruitsandveggies.org). While you're there, check out the useful resources to equip you with the tools you need to enhance your nutrition knowledge and empower consumers to enjoy more fruits and vegetables every day.

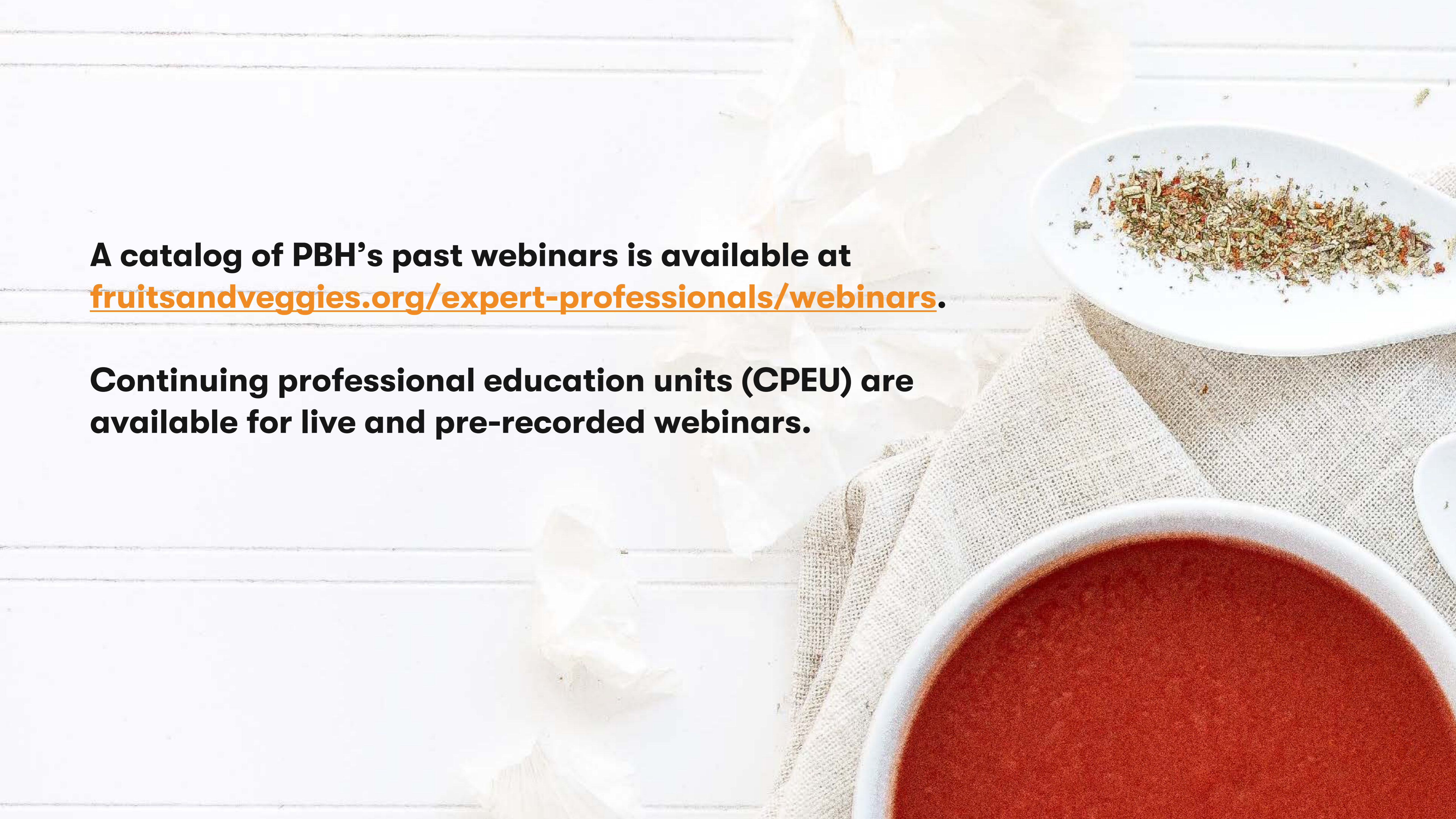
September is National Fruits & Veggies Month™. Take a moment to promote and enjoy all forms of the fruits and veggies that you know and love – fresh, frozen, canned, dried and 100% juice – that taste great and also support your health and happiness!

Follow PBH's social channels to keep up to date on all the insights and inspiration. #haveaplant



**A catalog of PBH's past webinars is available at [fruitsandveggies.org/expert-professionals/webinars](https://fruitsandveggies.org/expert-professionals/webinars).**

**Continuing professional education units (CPEU) are available for live and pre-recorded webinars.**





# THANK YOU

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BETTER HEALTH**  
FOUNDATION

# Appendix

# Ketogenic diets – fruit and vegetable intake

A ketogenic diet typically reduce CHO content to 20-50g per day which **significantly reduces intake of fiber-rich starchy vegetables**, as well as most fruits and legumes.

Ketogenic diets may produce therapeutic and beneficial health effects but **can lead to micronutrient deficiencies**.

In one study, of the **24 micronutrients evaluated, 19 were below the DRI**. Of the 19 nutrients below the DRI, 11 nutrients were provided at less than 50% of the DRI.

