Interventions to Improve Food & Nutrition Security: Food is Medicine

March 4, 2026

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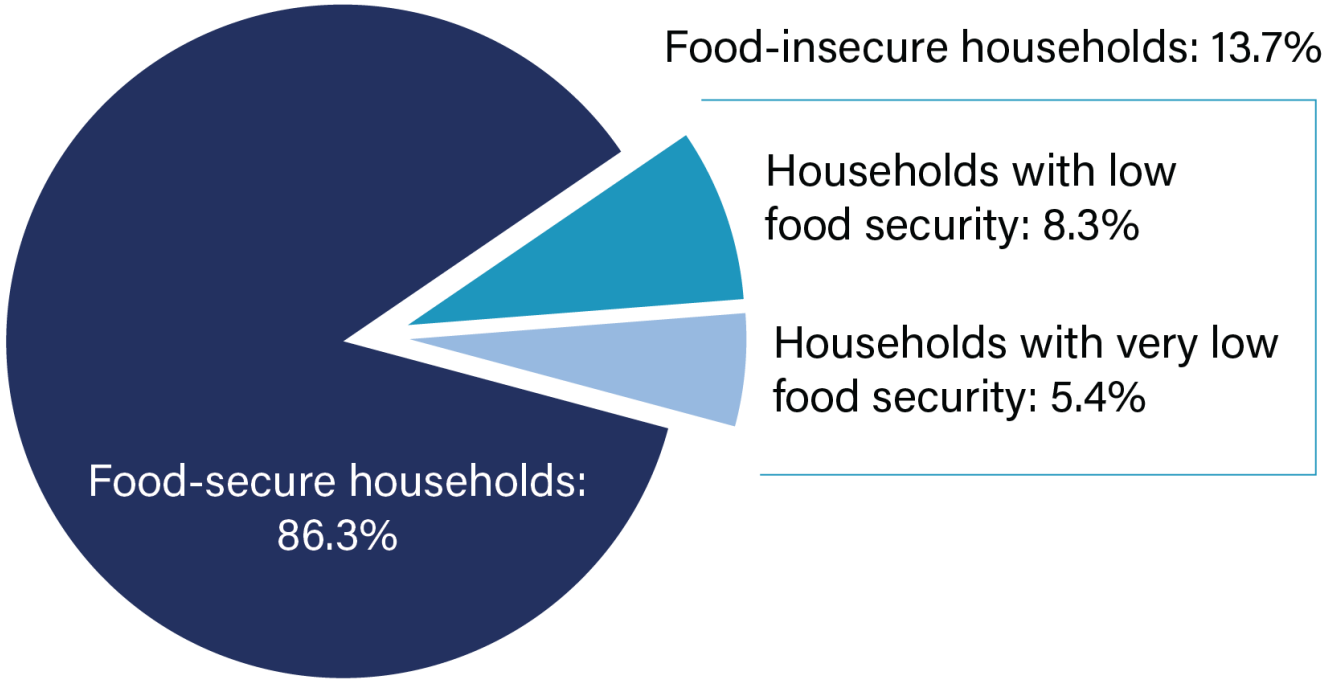
The produce prescription program I run receives funding from the City and County of San Francisco, USDA, Hellman Foundation, and Crankstart Foundation.

Dietary intake and chronic disease in the US

- US ranks last on key health measures compared with other high-income nations
  - 42% of US adults are obese
- People in the US have really poor diets
  - 1 in 10 meet recommended F&V intake
  - 9 of 10 exceed recommended sodium intake
  - Only 2% of Americans meet whole grain targets
- Poor diets are a key driver of obesity and diabetes
- Almost half (45%) of deaths related to heart disease are due to poor diet
- 77% of Americans would like to eat a healthier diet
- #1 barrier to eating a healthy diet reported is the cost of food (60%)

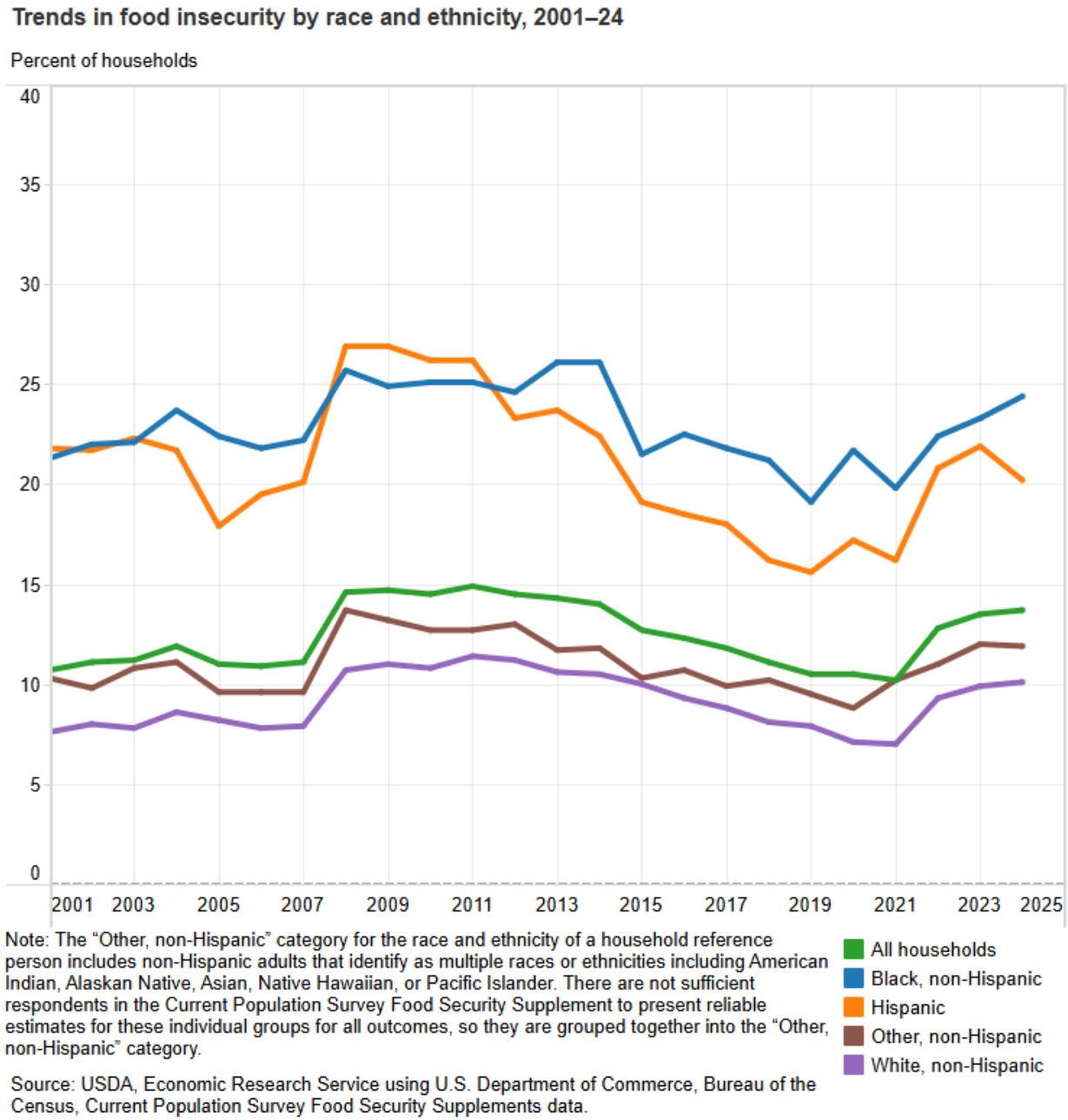
1 in 7 US Households Food Insecure in 2024

U.S. households by food security status, 2024

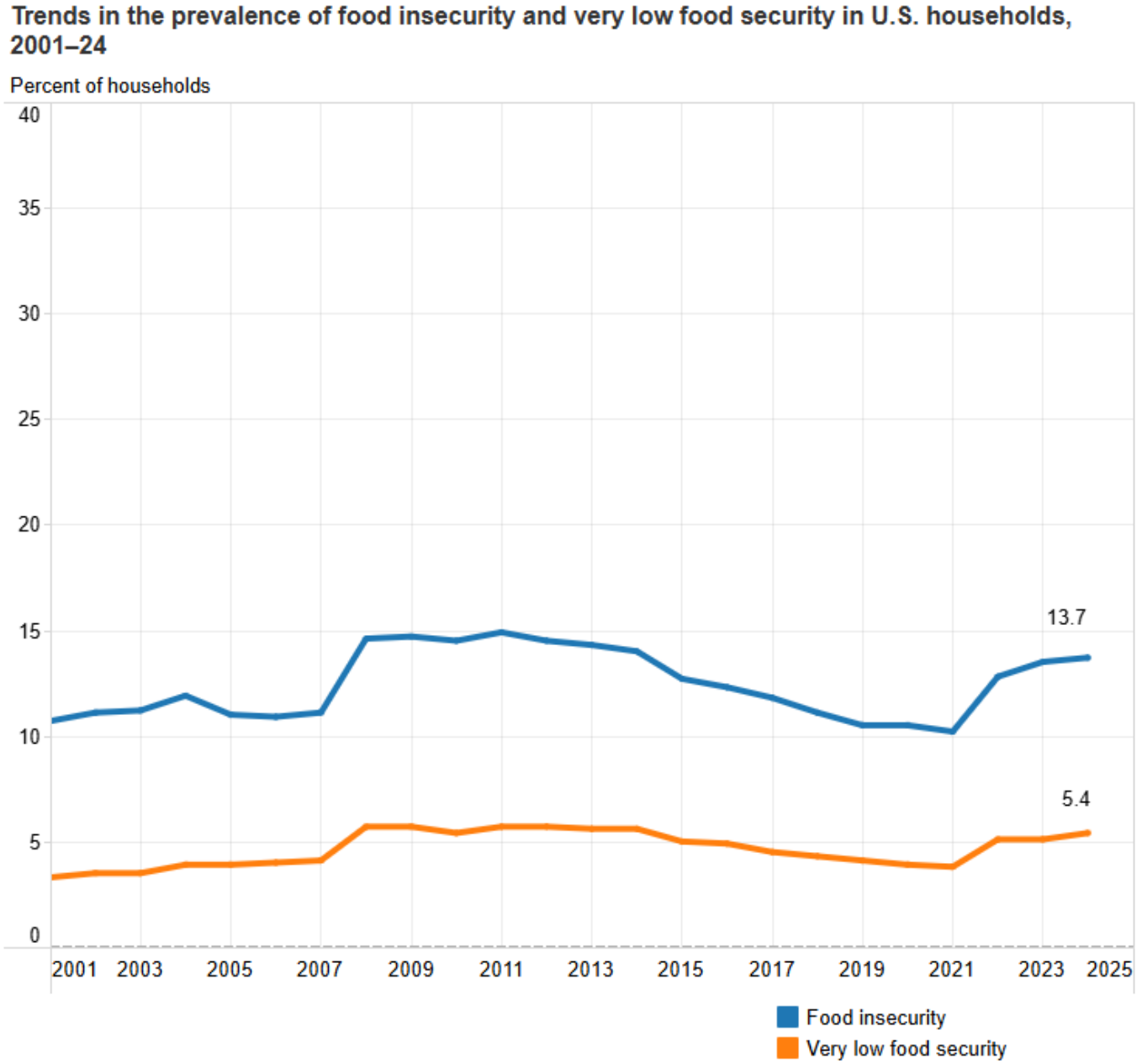


Source: USDA, Economic Research Service using U.S. Department of Commerce, Bureau of the Census, 2024 Current Population Survey Food Security Supplement data.

Food insecurity rates by race/ethnicity, 2001-2024



Pandemic era programs and policies were likely highly effective

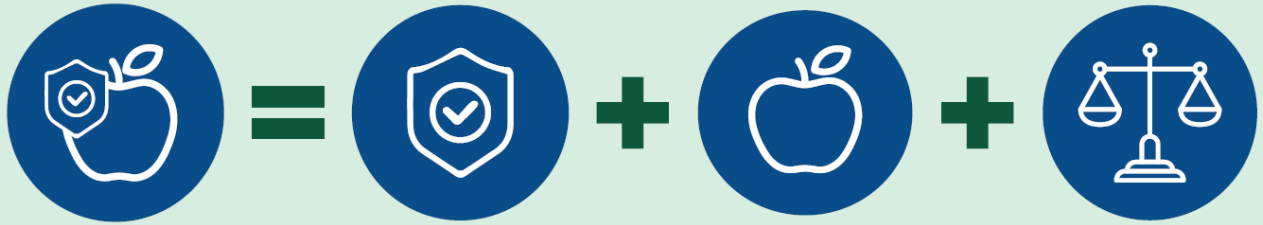


Source: USDA, Economic Research Service using U.S. Department of Commerce, Bureau of the Census, Current Population Survey Food Security Supplements data.

Nutrition Security vs Food Security (simplified)

WHAT IS NUTRITION SECURITY?

Consistent access to nutritious foods that promote optimal health and well-being for all Americans, throughout all stages of life.



HOW DOES NUTRITION SECURITY BUILD ON FOOD SECURITY?

Food security is having ***enough*** calories.
Nutrition security is having the ***right*** calories.

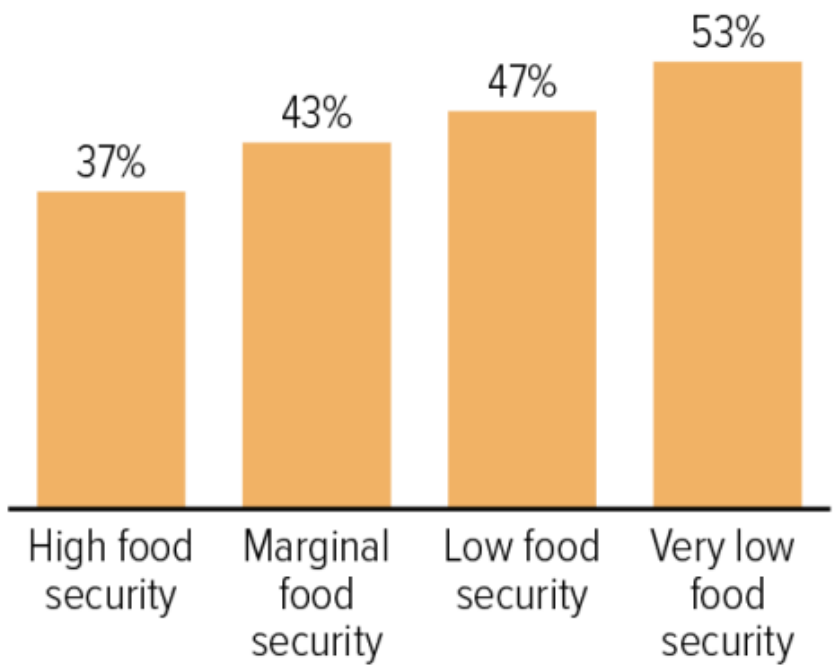
https://www.fns.usda.gov/resource/usda-actions-nutrition-security

Note that this citation is provided for historical reference and is no longer active. This graphic does not represent the official position of USDA.

FIGURE 1

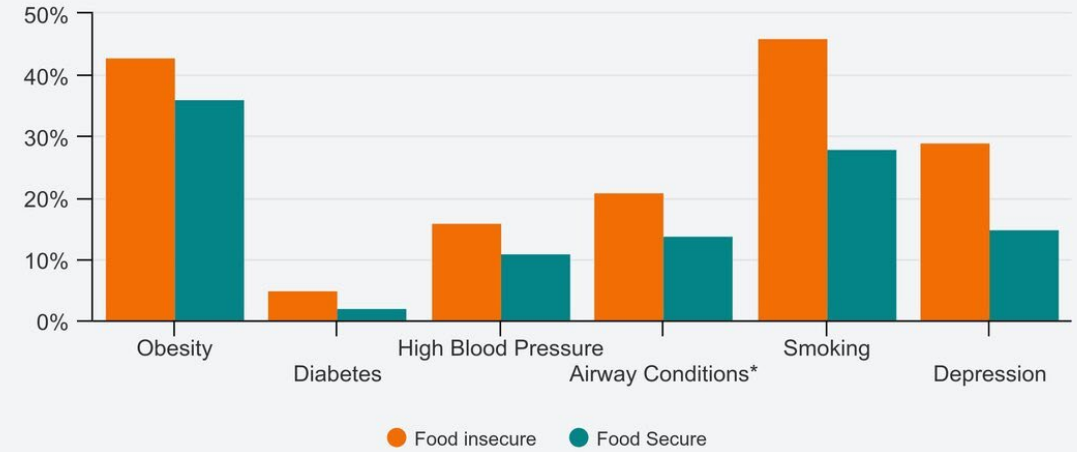
Adults in Households with Less Food Security Are Likelier to Have a Chronic Illness

Probability of any chronic illness



Source: Christian A. Gregory and Alisha Coleman-Jensen, "Food Insecurity, Chronic Disease, and Health Among Working-Age Adults," U.S. Department of Agriculture, July 2017. Adjusted for differences in demographic, socioeconomic and other characteristics. Sample includes working-age adults in households at or below 200% of the federal poverty level.

Chronic Conditions of Food-Secure Vs. Food-Insecure Young Adults

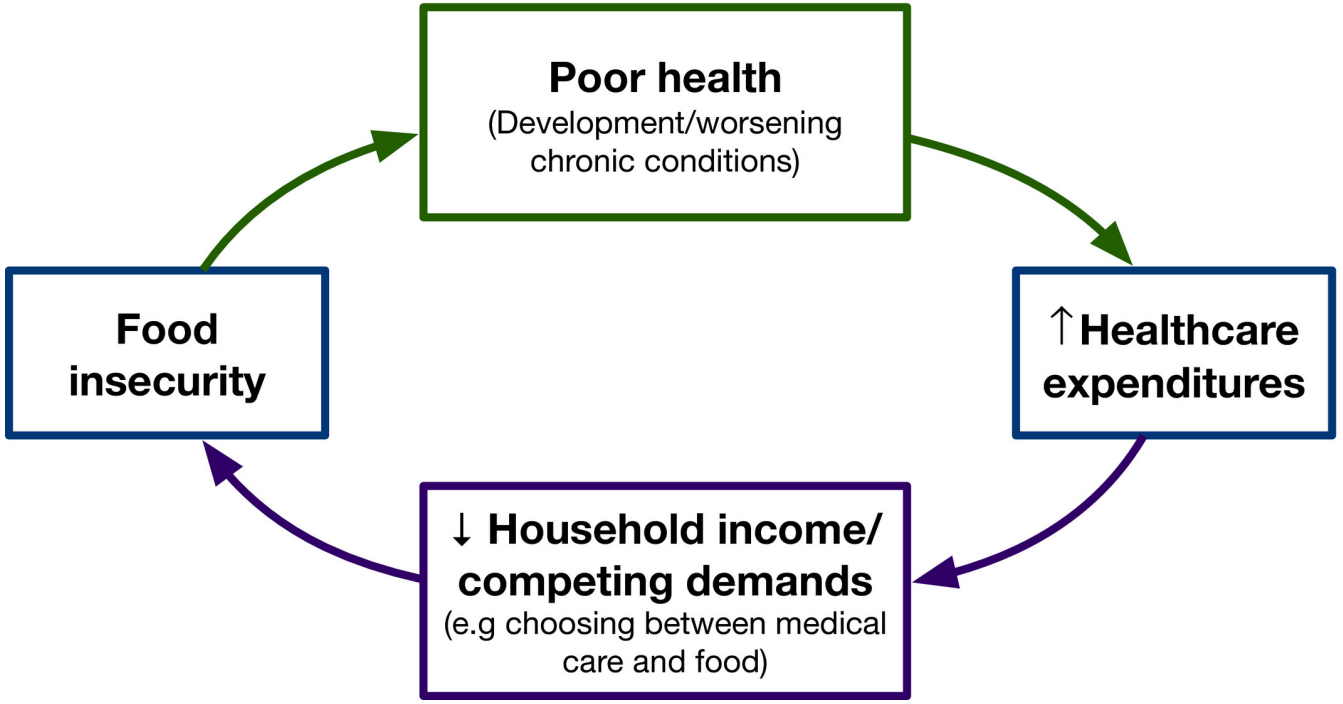


*asthma, chronic bronchitis, emphysema

Source: Food Insecurity and Chronic Disease in U.S. Young Adults: Findings from the National Longitudinal Study of Adolescent to Adult Health, JGIM. Food Insecurity is Associated with Poorer Mental Health and Sleep Outcomes in Young Adults, JAH.

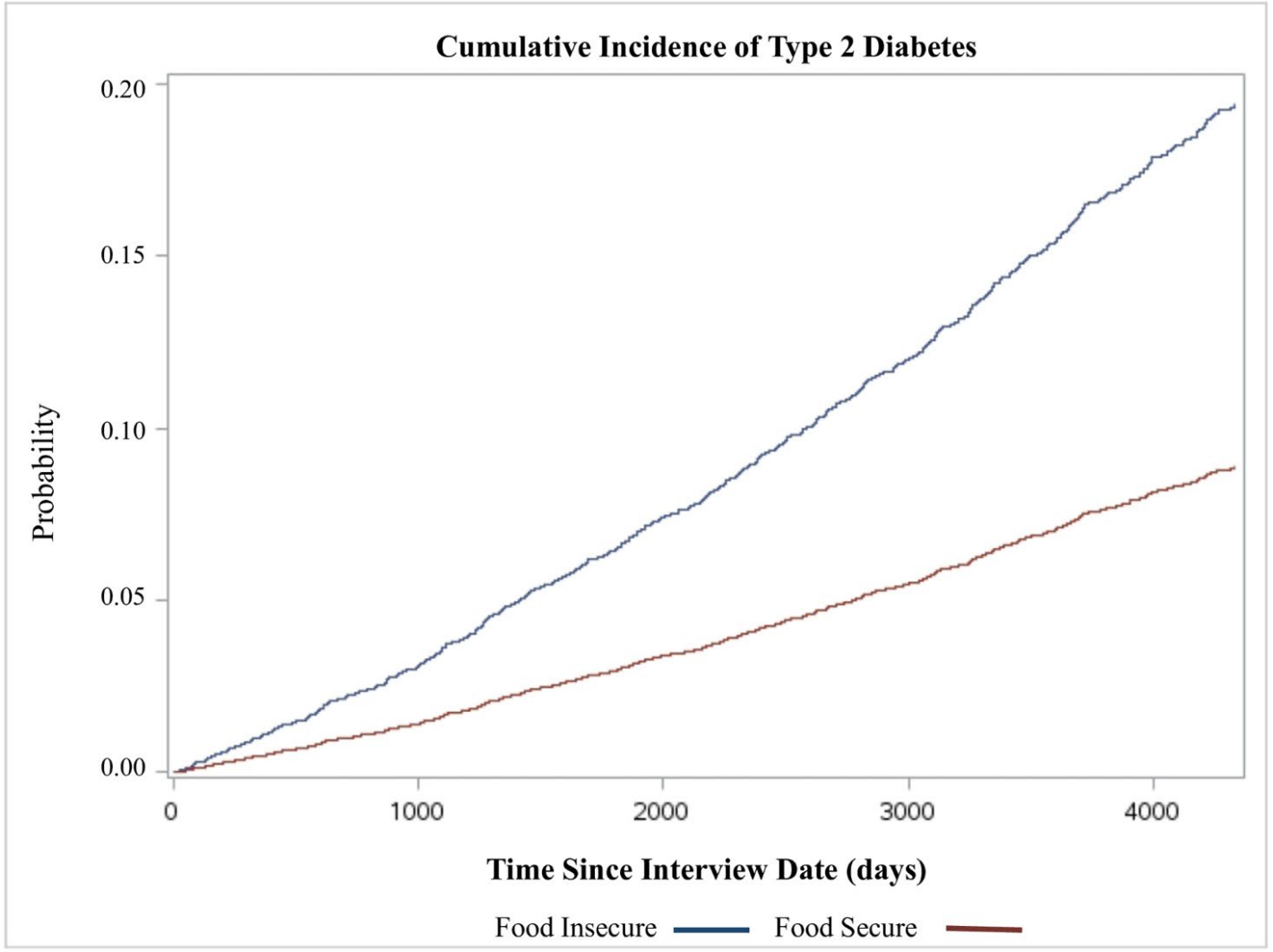
UCSF

Bidirectional relationship between food insecurity and poor health



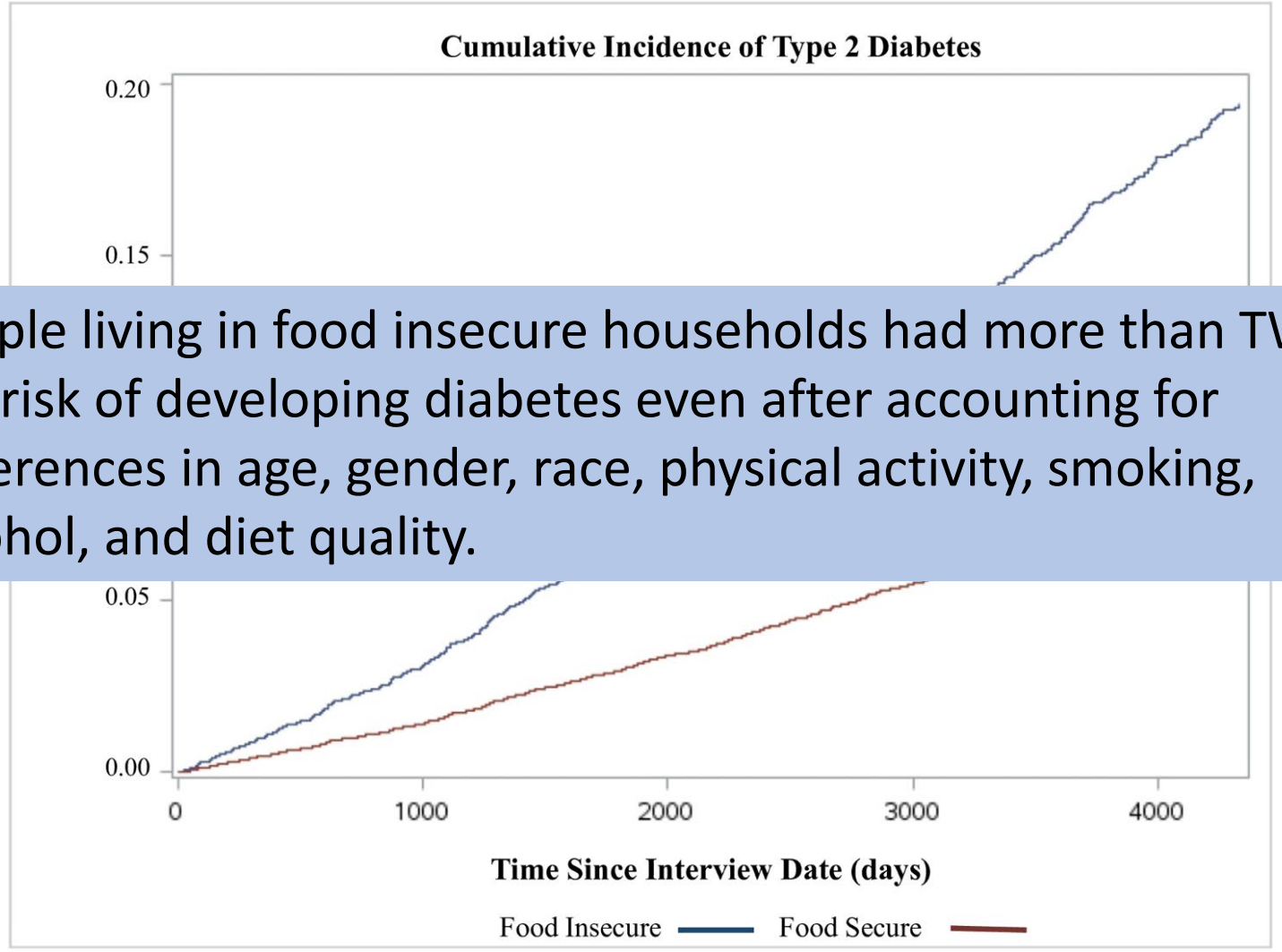
Johnson, Palakshappa, Seligman. Health Services Research, 2021.

Food insecurity → Poor Health



Tait, C. A., et al. (2018). "The association between food insecurity and incident type 2 diabetes in Canada: A population-based cohort study." PloS one **13**(5): e0195962.

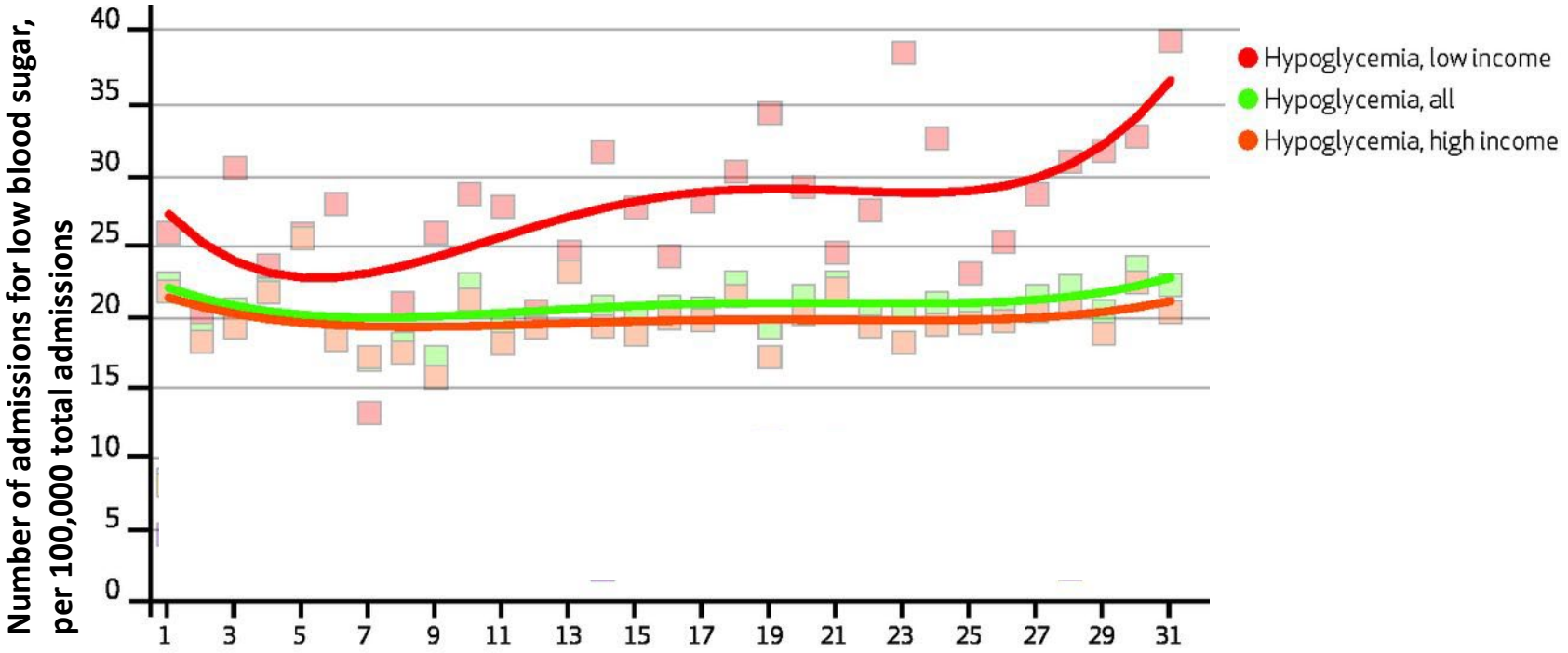
Food insecurity → Poor Health



People living in food insecure households had more than TWICE the risk of developing diabetes even after accounting for differences in age, gender, race, physical activity, smoking, alcohol, and diet quality.

Tait, C. A., et al. (2018). "The association between food insecurity and incident type 2 diabetes in Canada: A population-based cohort study." PloS one **13**(5): e0195962.

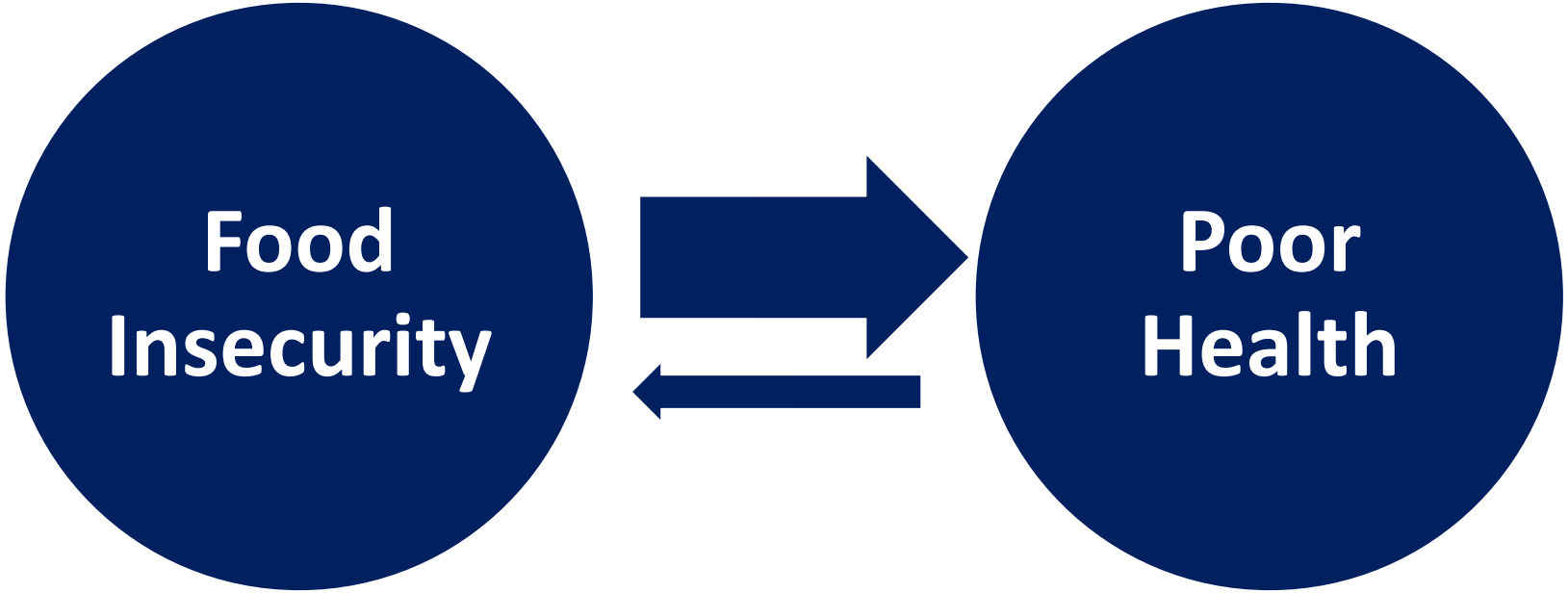
Admissions for Low Blood Sugar Increase by 27% in Last Week of the Month for Low-Income Population



HealthAffairs

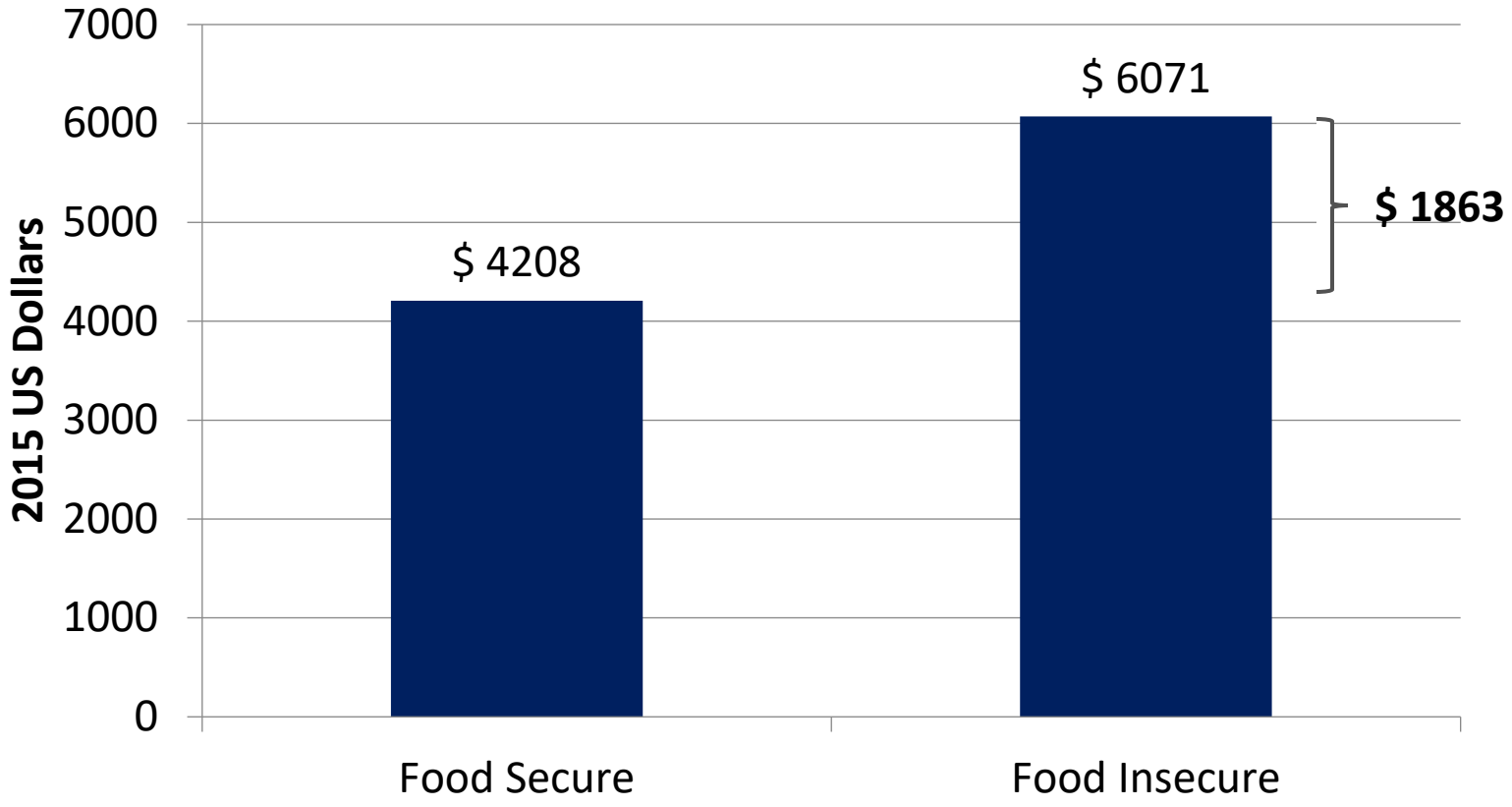
Seligman HK et al. Health Aff 2014;33:116-123

Food insecurity and poor health



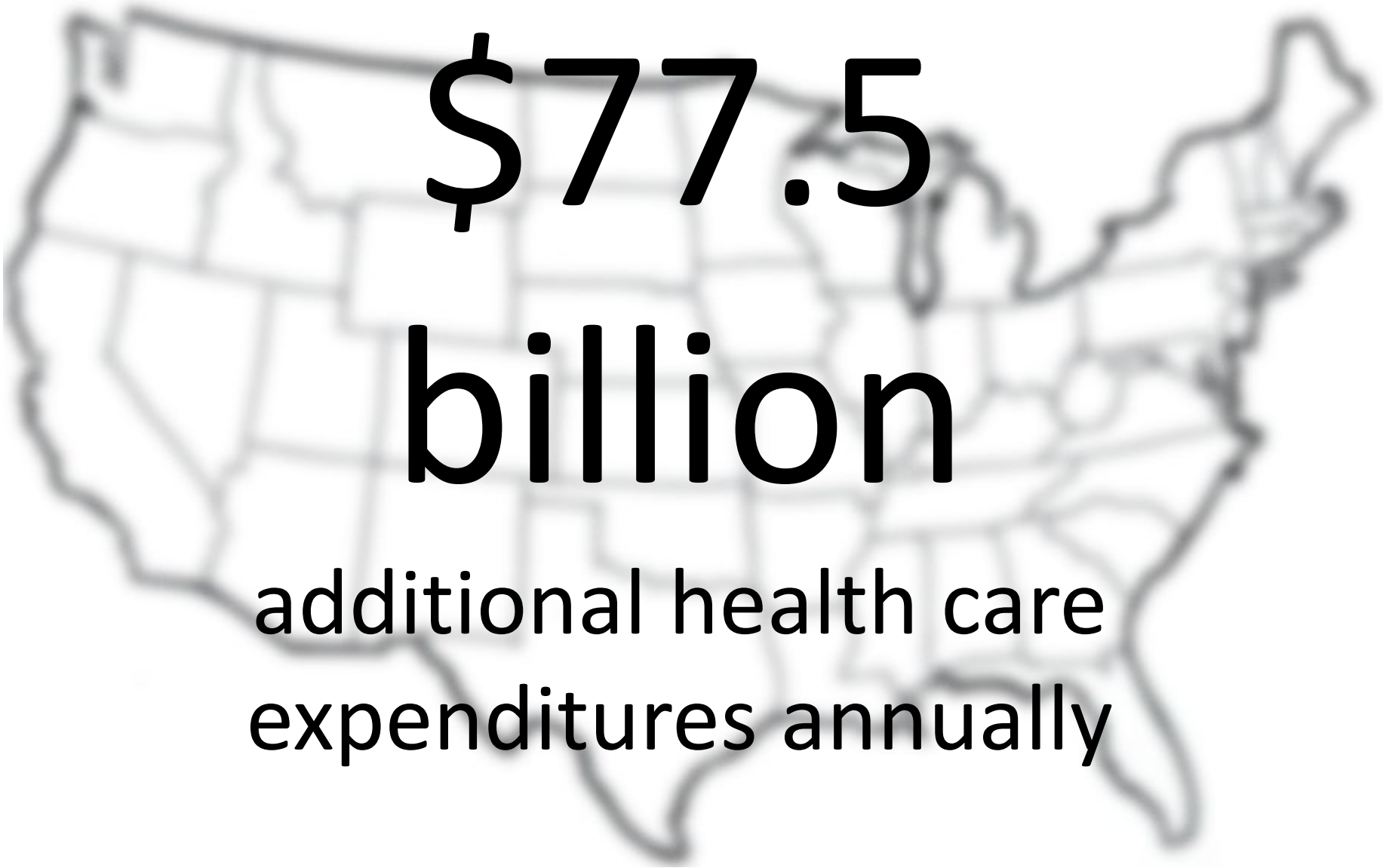
Johnson, Palakshappa, Seligman. Health Services Research, 2021.

Food Insecurity & Subsequent Annual Health Care Expenditures



NHIS-MEPS data adjusted for: age, age squared, gender, race/ethnicity, education, income, rural residence, and insurance.

Berkowitz, Basu, and Seligman. Health Services Research: *2017.*



$77.5 billion

additional health care expenditures annually

Berkowitz, Basu, and Seligman. Health Services Research: *2017.*

Mis-Alignment Between Health Care & “Social Care” in the US

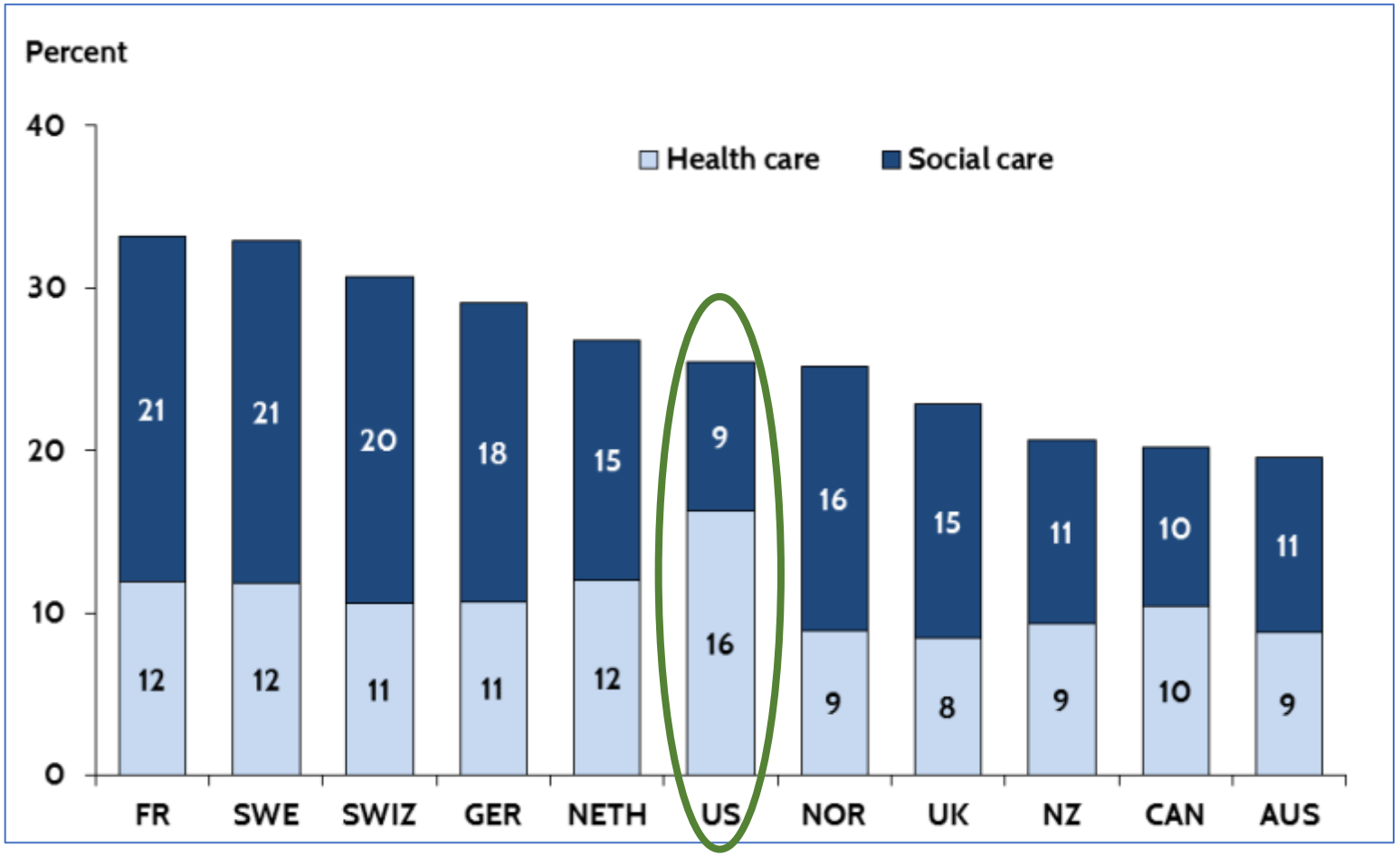
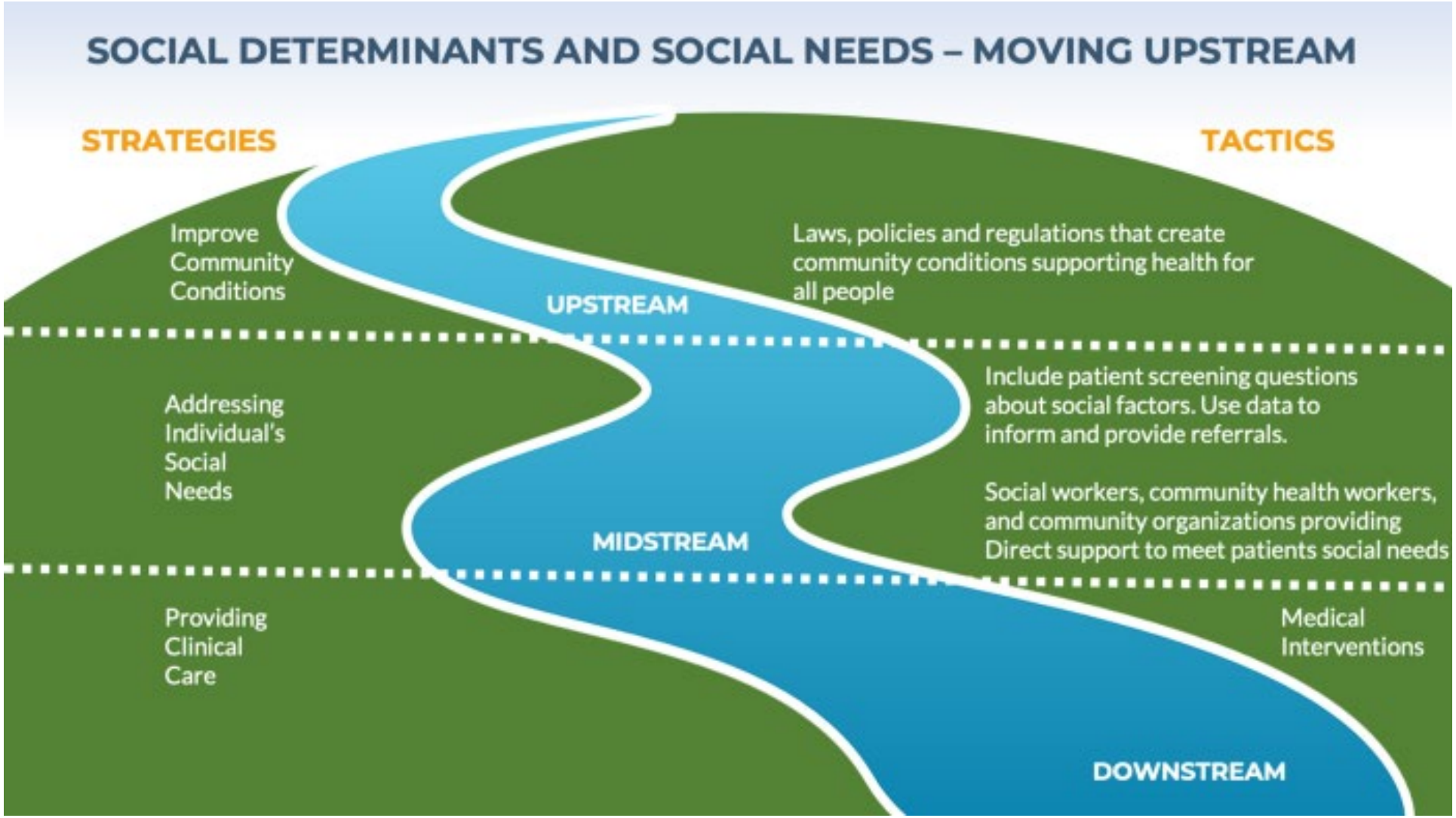


Figure 1. Health and Social Care Spending as a Percentage of GDP

Rebalancing Social & Medical Spending to Promote Health. Butler et al. Brookings Institution. 2017



Social Drivers of Health

Social Needs

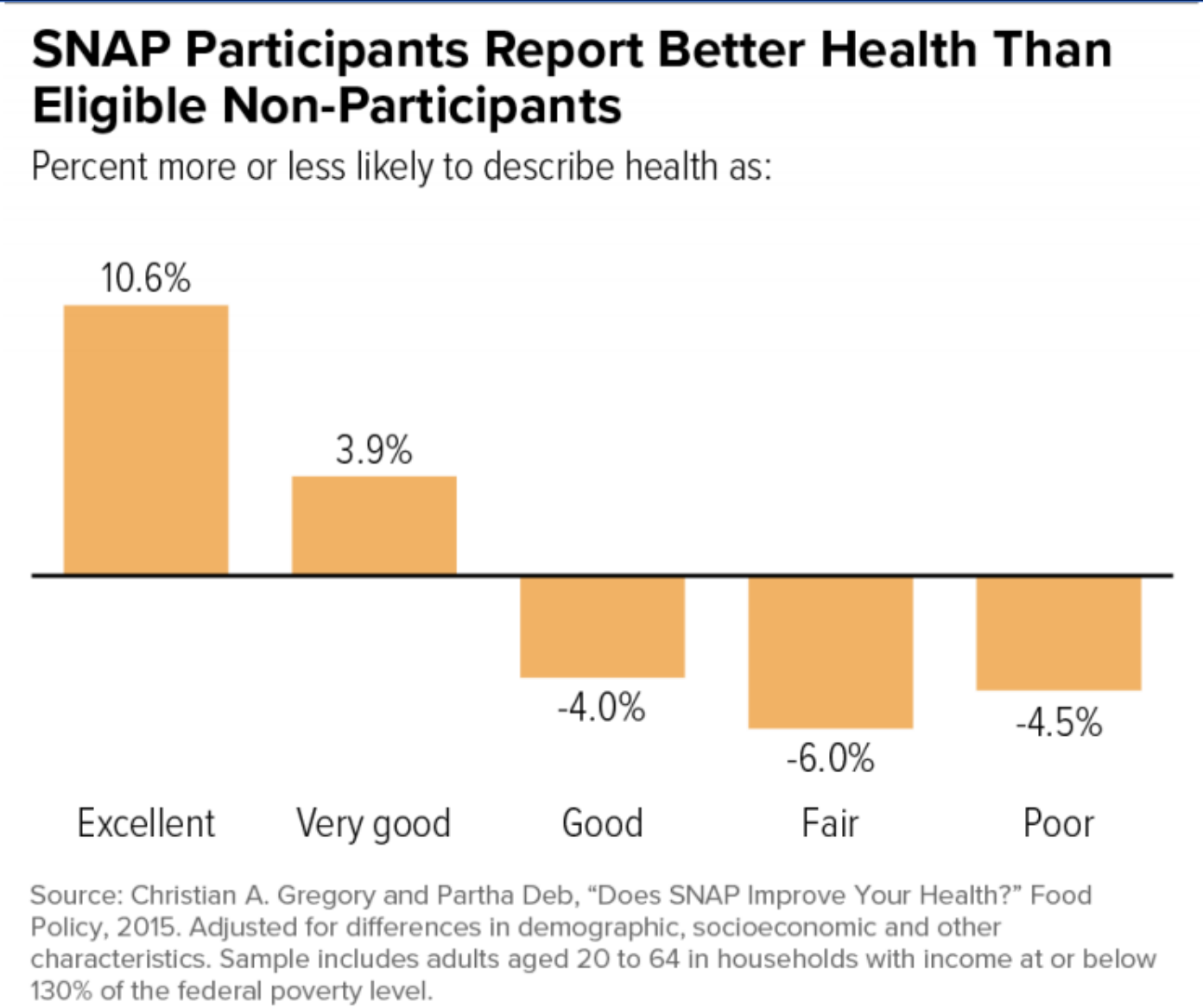
"Meeting Individual Social Needs Falls Short Of Addressing Social Determinants Of Health," Health Affairs Blog, January 16, 2019. DOI: 10.1377/hblog20190115.234942

If a clinic helps a patient with food insecurity to afford food, will it make a difference in their health?

Evidence from SNAP



Adults Enrolled in SNAP Report Better Health

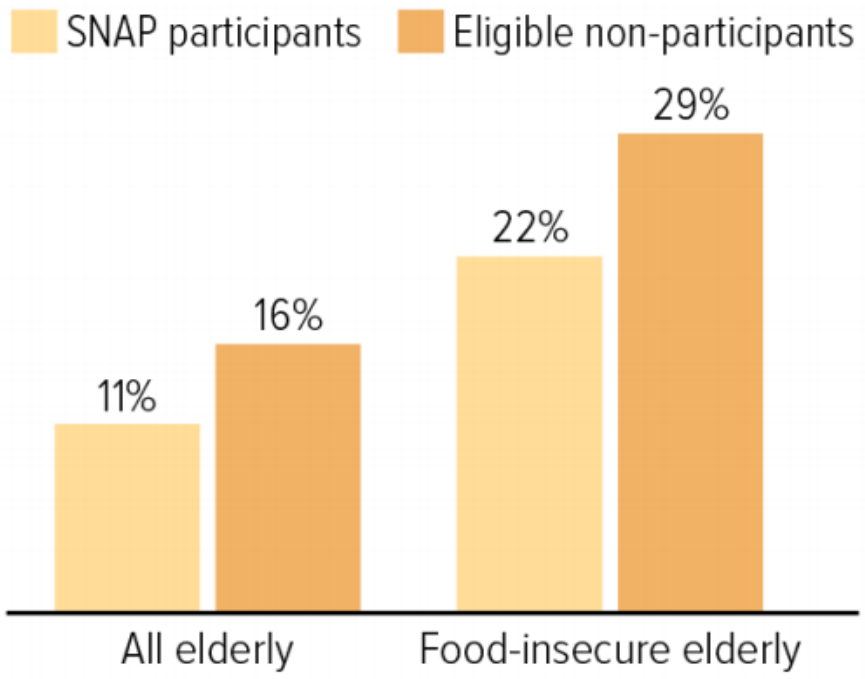


Source: Christian A. Gregory and Partha Deb, "Does SNAP Improve Your Health?" Food Policy, 2015. Adjusted for differences in demographic, socioeconomic and other characteristics. Sample includes adults aged 20 to 64 in households with income at or below 130% of the federal poverty level.

Older Adults Enrolled in SNAP Have Better Access to Medication and Use Less Health Care

Elderly SNAP Participants Less Likely to Skip Needed Medications

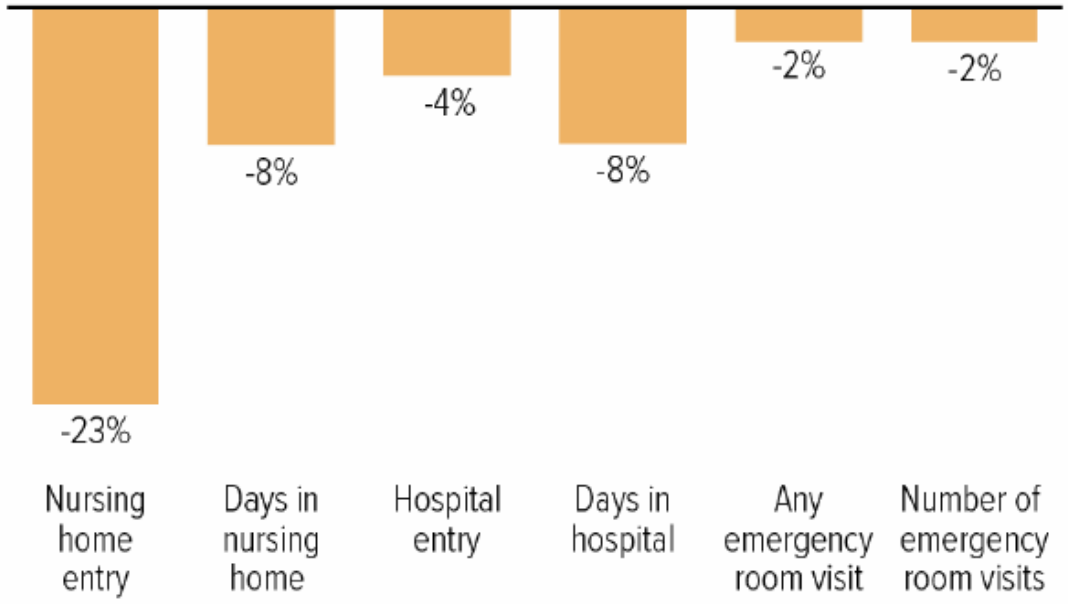
Percent who skip or stop medications, take smaller doses, or delay a prescription due to cost



Source: Mithuna Srinivasan and Jennifer A. Pooler, "Cost-Related Medication Nonadherence for Older Adults Participating in SNAP, 2013–2015." American Journal of Public Health, December 2017

Elderly SNAP Participants Are Less Likely to Use Health Care Services

Percent relative to low-income elderly non-participants



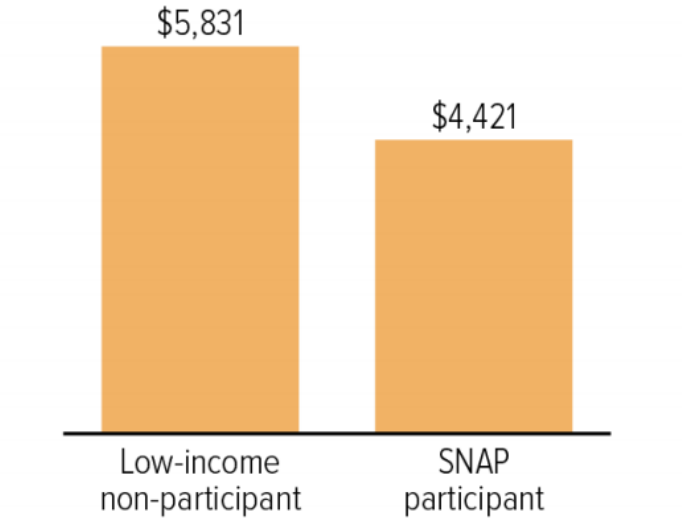
Source: Sarah L. Szanton et al., "Food assistance is associated with decreased nursing home admissions for Maryland's dually eligible older adults," BMC Geriatrics, July 2017; and Laura J. Samuel et al., "Does the Supplemental Nutrition Assistance Program Affect Hospital Utilization Among Older Adults? The Case of Maryland," Population Health Management, 2017. Adjusted for differences in demographic, socioeconomic and other characteristics. Results for hospital and emerency room visits adjust for proportion of the year on Medicaid. Sample includes adults age 65 and older eligible for both Medicare and Medicaid in Maryland.

Adults Enrolled in SNAP Have Lower Health Care Costs

FIGURE 10

A SNAP Participant Incurs $1,400 Less for Health Care

Estimated annual per-person health care spending



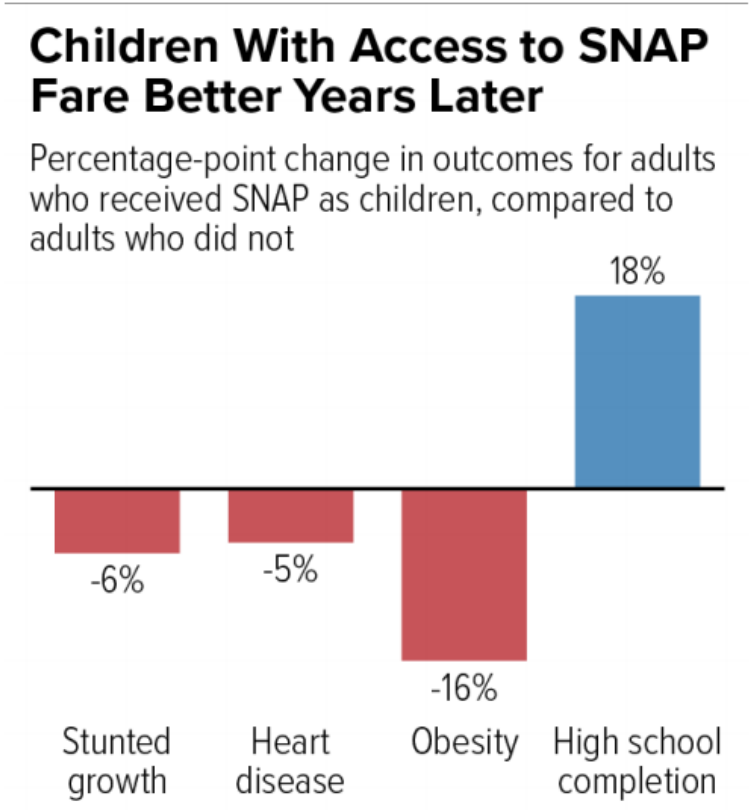
Note: Health care spending includes out-of-pocket expenses and costs paid by private and public insurance, including Medicare and Medicaid.

Source: Seth Berkowitz, Hilary K., Seligman, and Sanjay Basu, "Impact of Food Insecurity and SNAP Participation on Healthcare Utilization and Expenditures," University of Kentucky Center for Poverty Research, 2017.

CENTER ON BUDGET AND POLICY PRIORITIES | CBPP.ORG

SNAP Improves Long-Term Health Outcomes for Children Too

FIGURE 7



Hoynes H, Schanzenbach DW, Almond D. Long-Run Impacts of Childhood Access to the Safety Net. Am Econ Rev. 2016; 106(4):903–34.

So SNAP improves health…

_____

but it doesn't reach everyone…
& benefit levels are not enough for many of the households it does reach



Food is Medicine

- Integration of specific food and nutrition interventions in, or in close collaboration with, the health care system

- Target population
  - People with or at high risk for certain health conditions (often diet-related)
  - People with or at high risk of food insecurity

Sneak Peek!

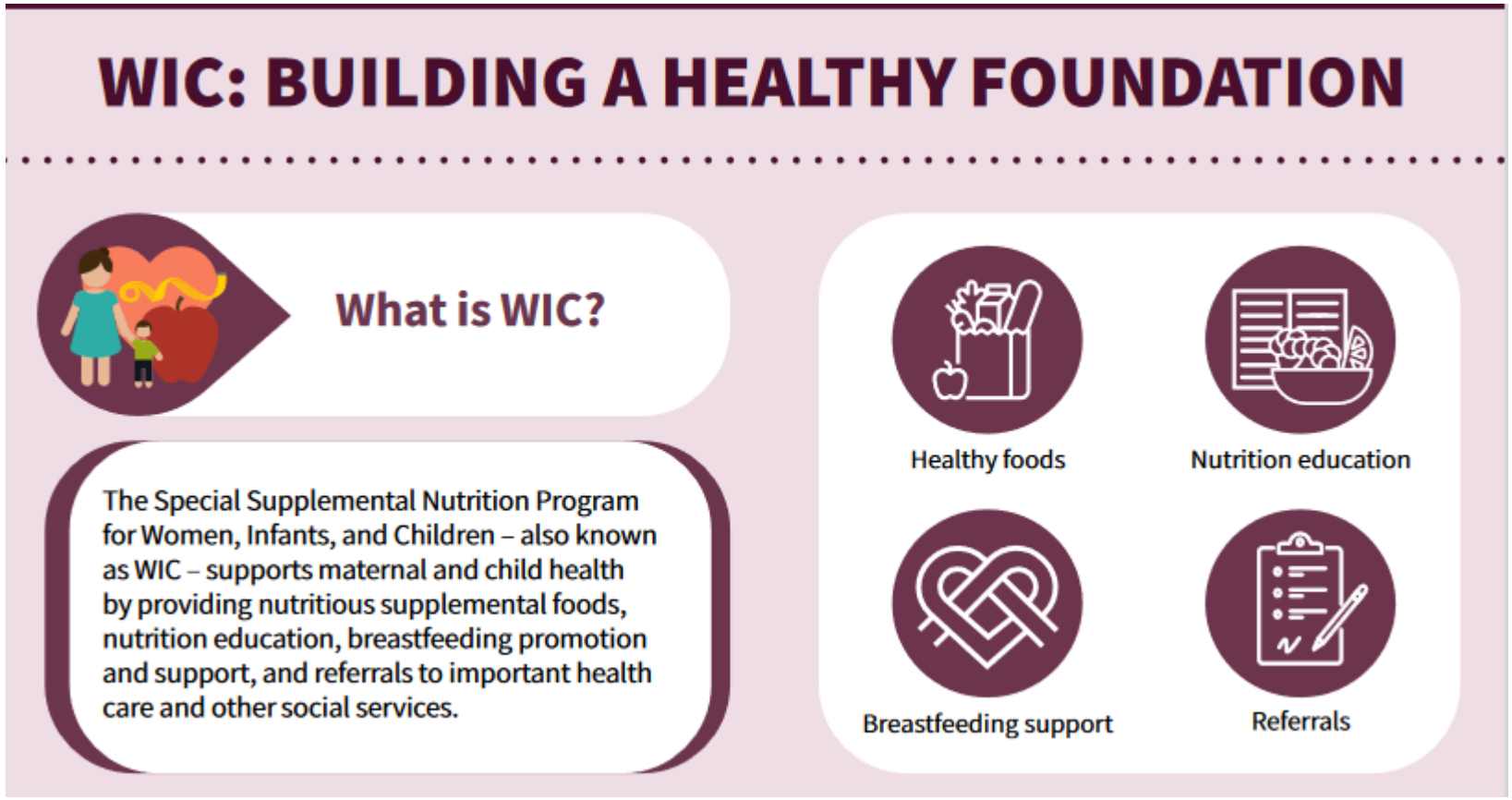
Can FIM programs be scaled?

Can FIM programs impact short and long term health outcomes?

WIC: The Original FIM Program

Can FIM programs be scaled?

Can FIM programs impact short and long term health outcomes?



WIC: The Original FIM Program

Can FIM programs be scaled?

PROVEN

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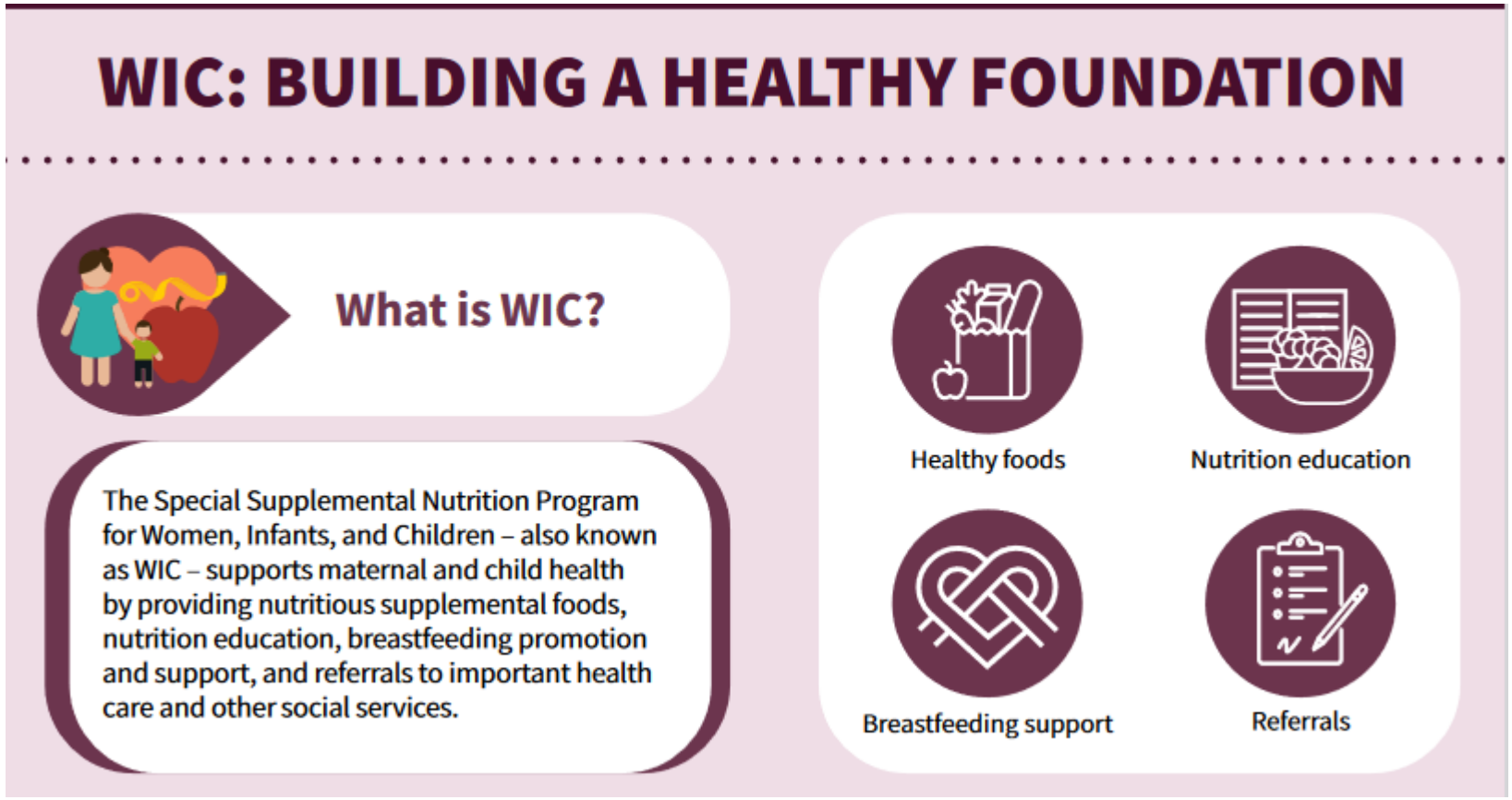
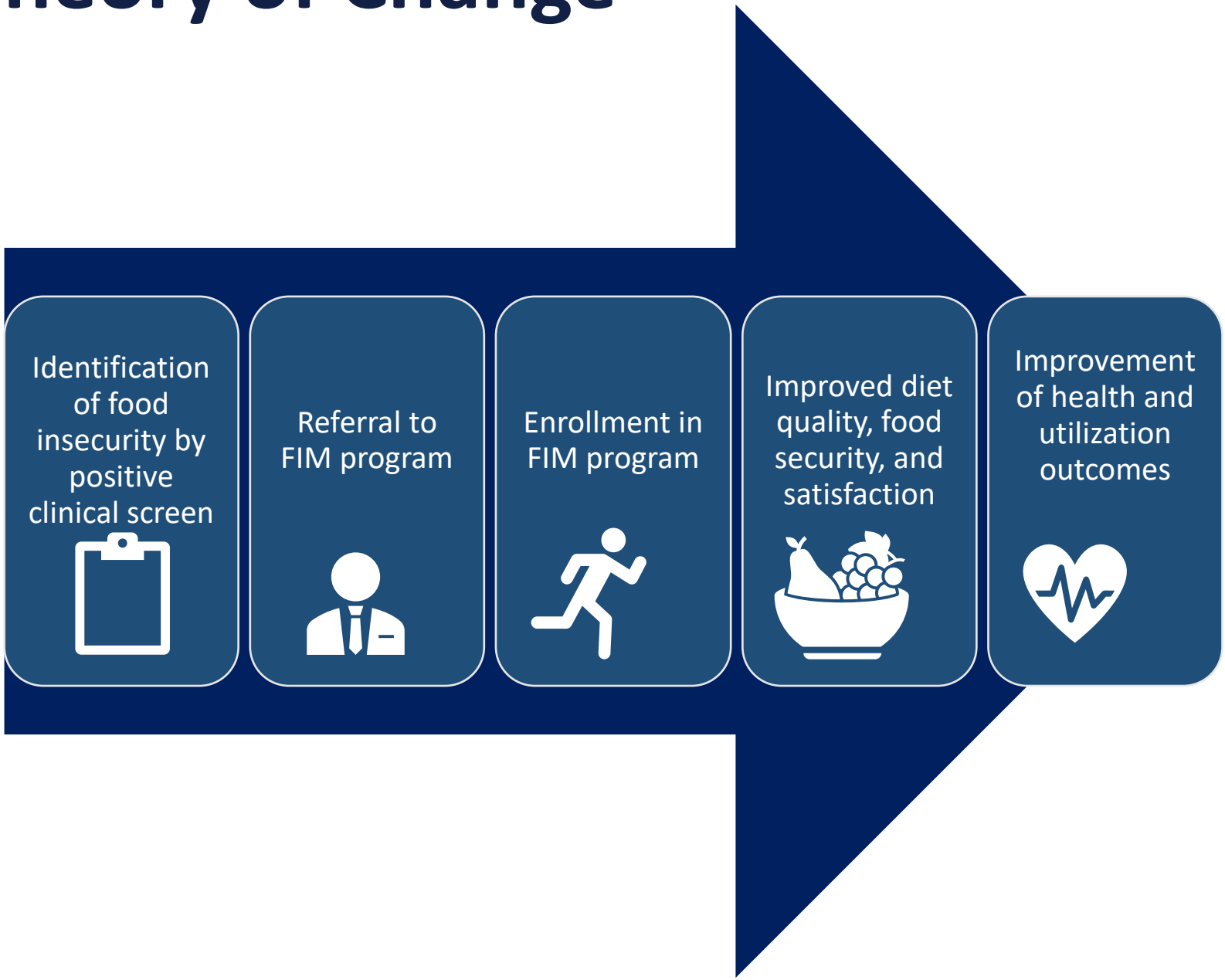
PROVEN



Theory of Change



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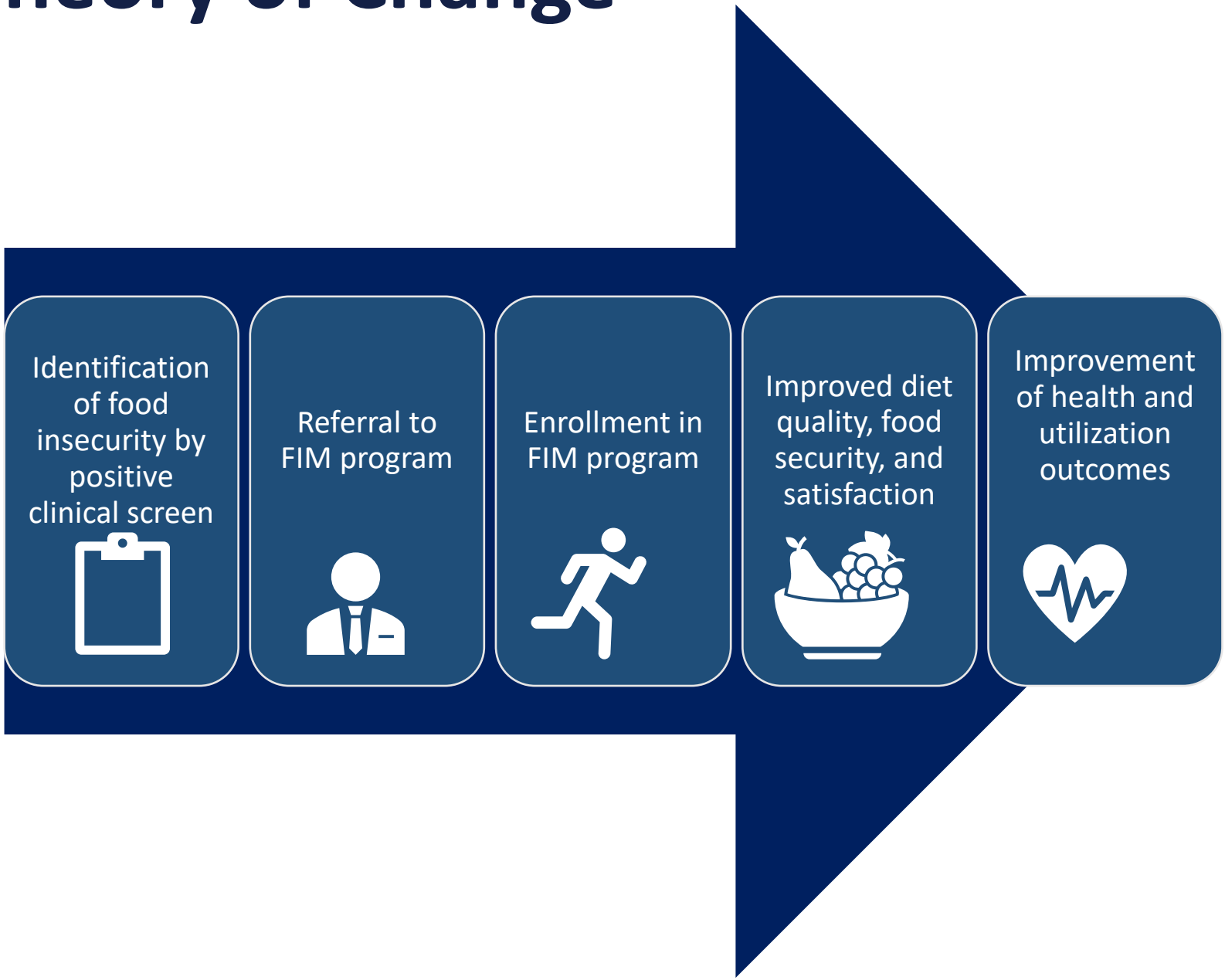
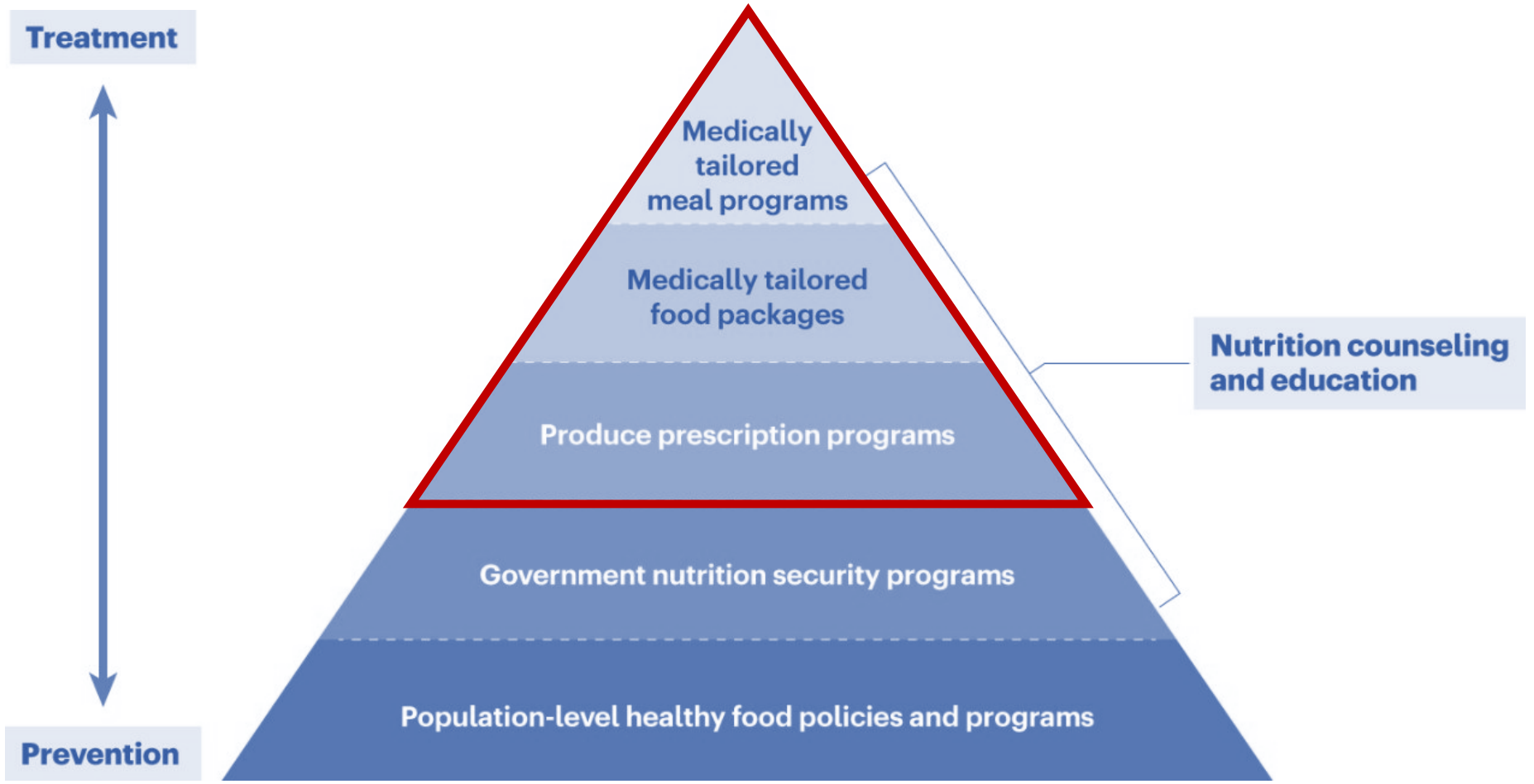


- Data transfer between sectors (health care, CBO, & food vendor)
- Data tracking within the electronic health record
- CBO capacity to provide food how, when, where and at the price that healthcare desires
- Fragmentation of the ecosystem outside of healthcare

Food is Medicine

From the perspective of population health



Mozaffarian, D., Blanck, H.M., Garfield, K.M. *et al.* A Food is Medicine approach to achieve nutrition security and improve health. *Nat Med* **28**, 2238–2240 (2022). https://doi.org/10.1038/s41591-022-02027-3

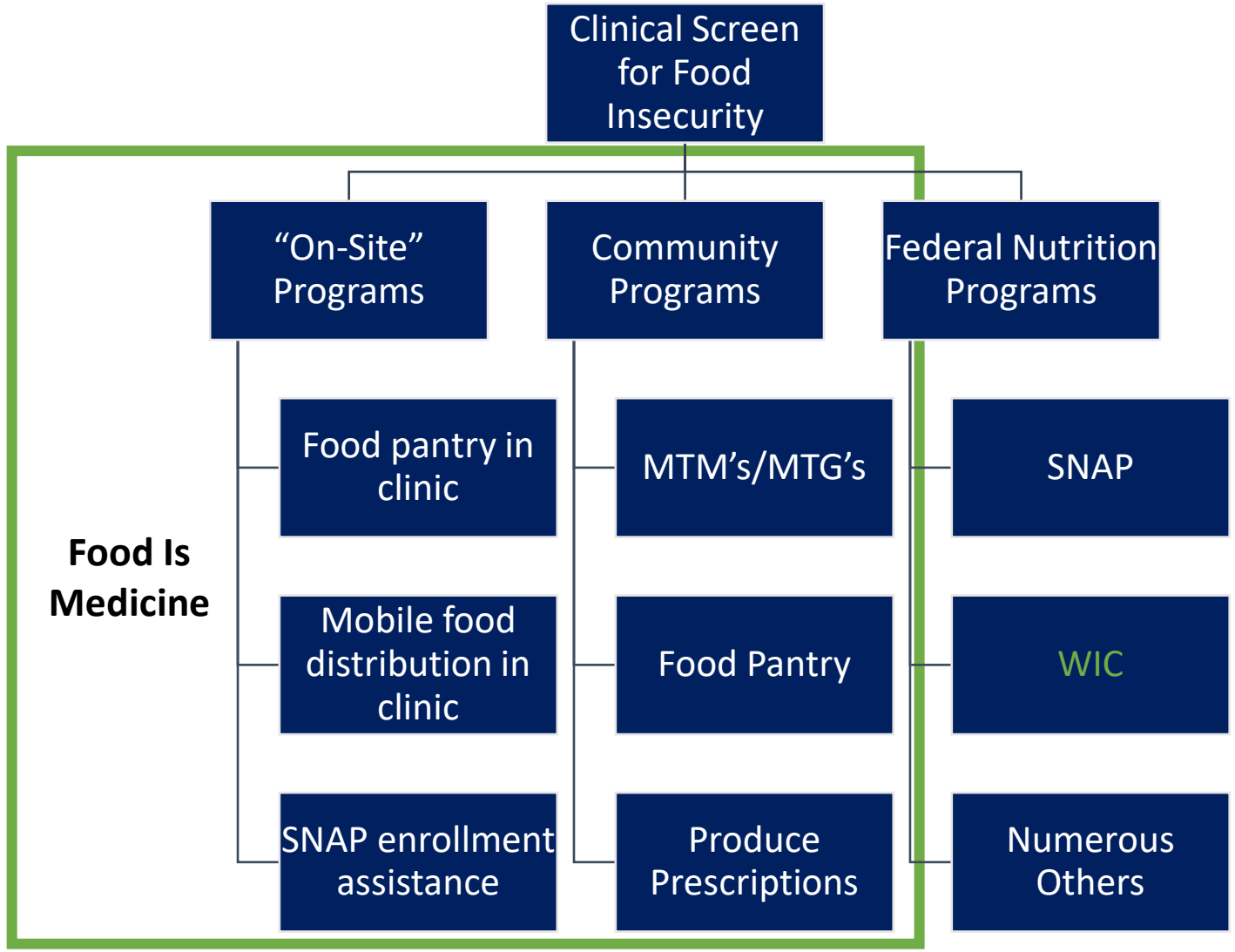
Food is Medicine

From the perspective of health care

MTM=Medically Tailored Meals

MTG=Medically Tailored Groceries

SNAP=Supplemental Nutrition Assistance Program



= "food is medicine"

Food is Medicine

From the perspective of health care

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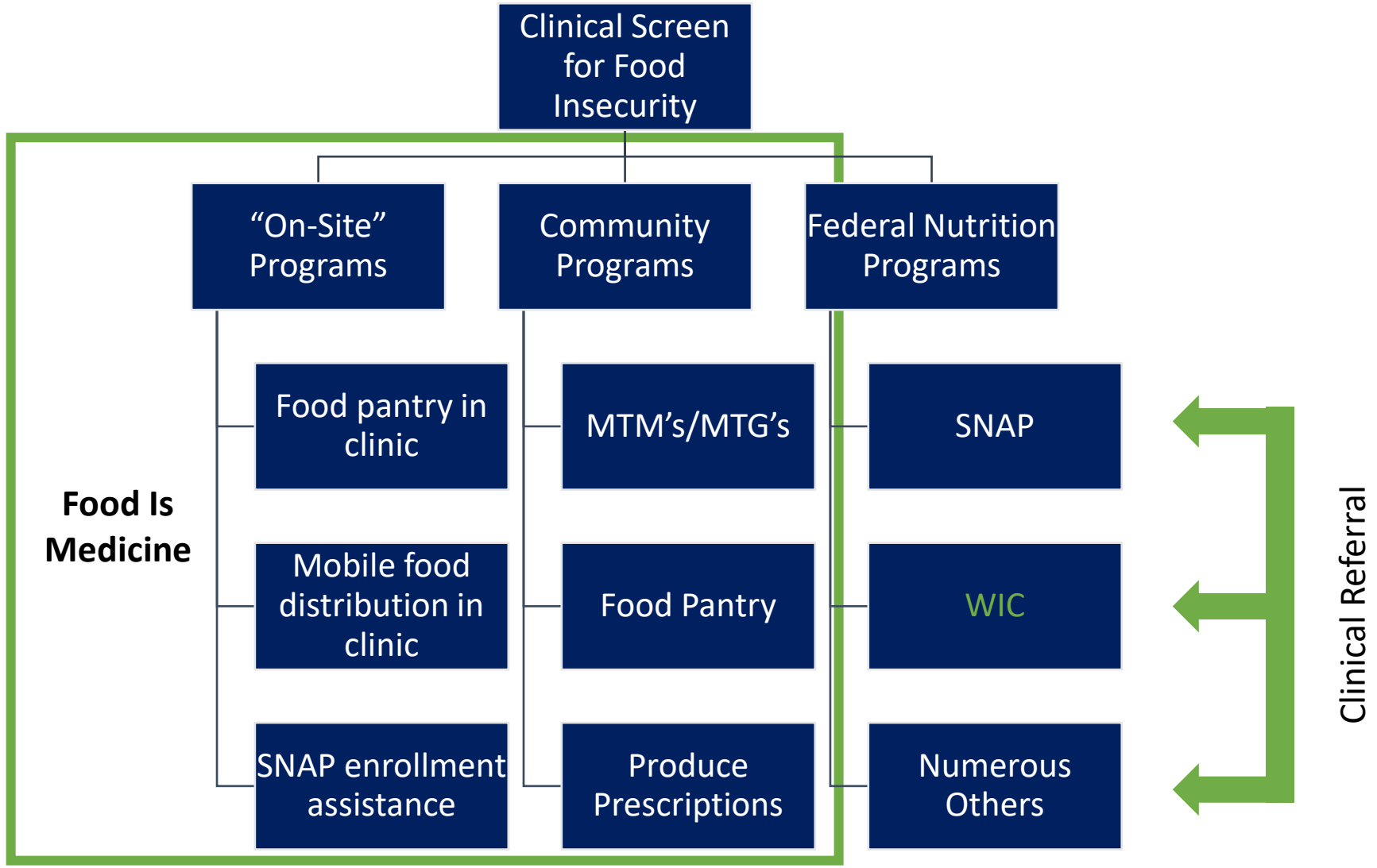
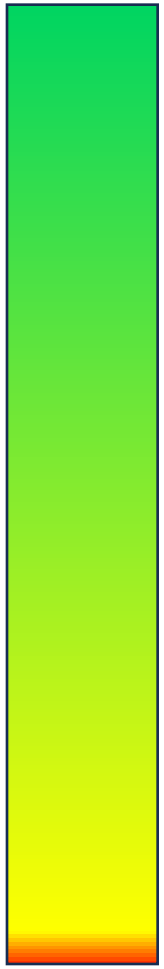


= "food is medicine"

What do we know about the impact of FIM programs?

Studies of FIM Programs Show Improvements in Some, but Not All, Outcomes



- Resource Use
- Food Security
- Health behaviors (inc Diet Quality)
- Clinical outcomes
- Cost & utilization

Seligman HK, Angell SY, Berkowitz SA, Elkind MSV, Hager K, Moise N, Posner H, Muse J, Odoms-Young A, Ridberg R, Troxel AB, Yaroch AL, Volpp KG. A Systematic Review of "Food Is Medicine" Randomized Controlled Trials for Noncommunicable Disease in the United States: A Scientific Statement From the American Heart Association. Circulation. 2025 Jul 29;152(4):e32-e46. doi: 10.1161/CIR.0000000000001343. Epub 2025 Jun 18. PMID: 40528749.

Summary of the Research

https://aspenfood.org/wp-content/uploads/2024/04/Food-is-Medicine-Action-Plan-2024-Final.pdf

	Weak Evidence	Moderate Evidence	Strong Evidence
WIC			✓
	diet quality, food security, maternal & childbirth outcomes, immunization rates, child academic performance		
SNAP			✓
	health outcomes, reduces medication non-adherence, and reduces health care expenditures		
MTM's		✓	
	hospital admissions and readmissions, lower medical costs, and improve medication adherence		
MTG's		✓	
	food security		
Produce Prescriptions		✓	
	diet quality, food security, diabetes outcomes		
On-site programs	✓		
	diet quality, food security, diabetes outcomes		

Aspen Inst FIM Research Action Plan 2024

- MTM's: 23 studies, 7 RCT's, 12 with a ctl/comp group, & 15 with >100 ppts
- MTG's: 25 studies, 3 RCT's, 4 with a ctl/comp group, & 10 with >100 ppts
- PPR: 59 studies, 2 RCT's, 9 with a ctl/comp group, & 14 with >100 ppts

The Field is Rapidly Expanding!

Home | JAMA Network Open | Vol. 9, No. 2

Original Investigation | Cardiology

Feasibility of an Indigenous Food Is Medicine Program for Patients With Heart Failure in Rural Navajo Nation

The MUTTON-HF Nonrandomized Clinical Trial

Lauren A. Eberly, MD, MPH[1,2,3,4,5]; Carmen George, MS[6]; Sharon Sandman, BA[2]; Denee Bex, MPH, RDN, CDCES[7]; Matt Chandra, BA[8]; Kaitlyn Shultz, MS[2]; Ada Tennison, CNA[1]; Rebecca Wickre, BS[8]; Bennett Wickre, BS[8]; Larissa Morgan, CNA[1]; Leah Gray, RN[1]; Mackenzie Bolas, MPH[2]; Benjamin Feliciano, RN, MBA, MHSA[9]; DezBaa Damon-Mallette, DMD[1]; Erica Lindsey, MD, MPH[1]; Jacob Manche, MPH[1]; Pamela Detsoi-Smiley, RN, BS, BCH, CAPT[1]; Paula Mora, MD[1]; Maricruz Merino, MD[1]; Sonya S. Shin, MD, MPH[6,10]

» Author Affiliations | Article Information

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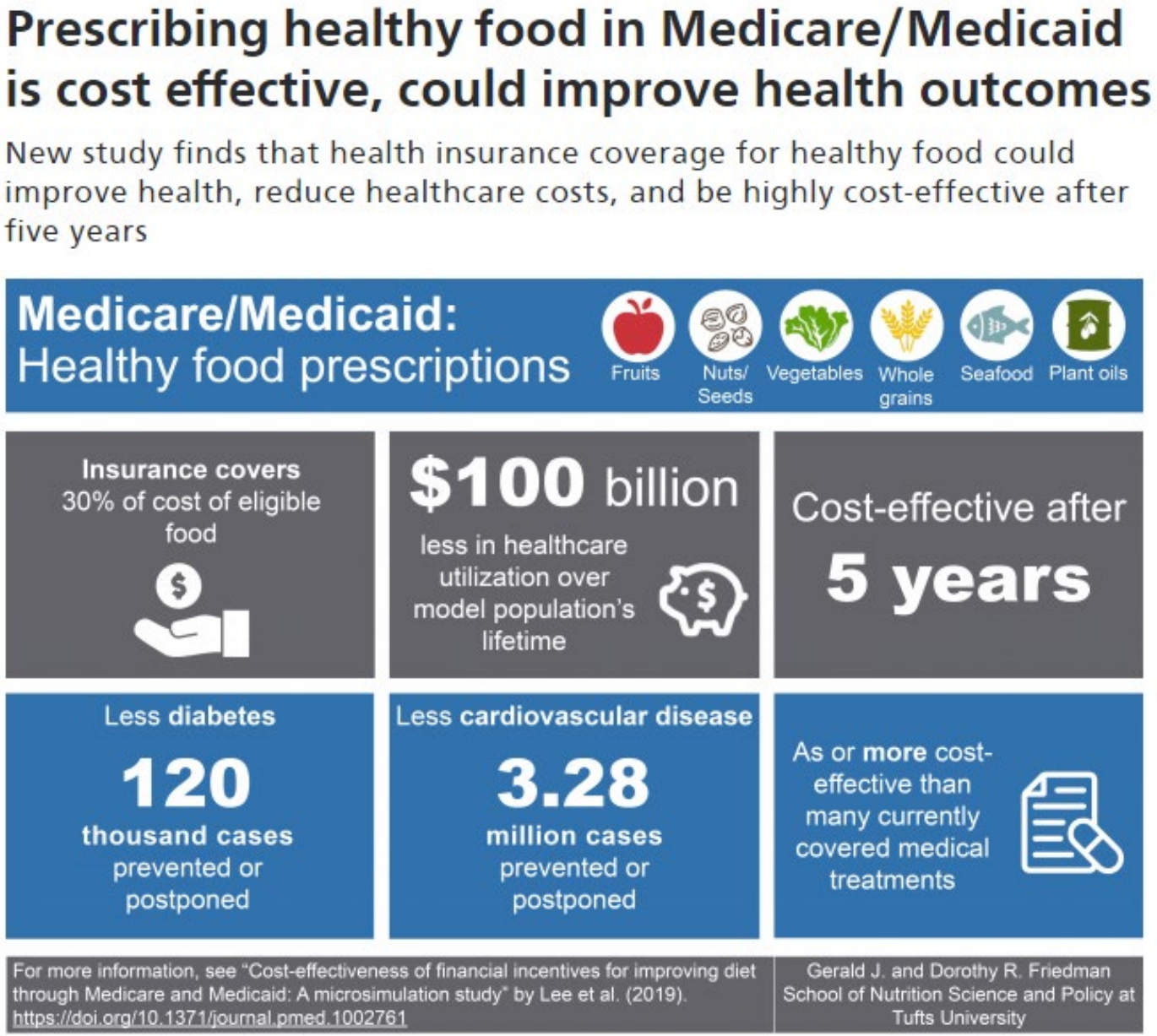
doi:10.1001/jamanetworkopen.2025.56117

Modelling Studies Have Limitations but Can Fill in Some Gaps



Why is the data so limited?

Why is so much data needed to prove impact on health outcomes, utilization, & cost?

- Food security and nutrition programs are generally
  - Better at prevention than at treatment
  - Expected to have an impact over a long length of time
  - Proven by their SMALL effect on a LARGE number of people, rather than their LARGE effect on a SMALL number of people

- If you anticipate a SMALL effect, to show an impact you need
  - A lot of people
  - A long duration of “treatment”
  - A high “dose”
  - A long duration of observation

Evaluation Challenges

- Almost all programs reach a small number of people
  - Not suitable* for examining health outcomes, utilization, & cost
- Almost all programs offer a relatively small dose & duration
  - Not suitable* for examining health outcomes, utilization & cost
- Many programs are single-site
  - Limited applicability to the field as a whole
- Bottom line: You need a LOT of data to show an impact
  - Most programs have limited funds available for evaluation

“ This is really hard!

* I would argue it is also not ethical

Healthcare Partner Perspectives on Implementing a FIM Intervention

Work is being accelerated by…

- Internal champions who recognize value of these programs
- Insurance flexibilities that allow for reimbursement (eg Medicare Advantage)
- Recent pushes to screen for social needs (including food insecurity) in the clinical setting

But there are tensions in implementation….

- Local vs national food provider
- Focus on treatment or prevention
- Choice vs pre-selection
- Target programs toward food insecurity or chronic disease
- How to use a limited amount of funding
  - High “dose” to a few people, or a low “dose” to many people
- Demonstrating an ROI in the one-year time frame of a HC budget

LOCAL ORGANIZATIONS

- Embedded in communities
- Cultural competency
- Personalized service
- Decades of experience
- Non-profit mission

NATIONAL COMPANIES

- Shovel-ready
- Enormous scale
- Access to rural areas
- Efficiency
- Capacity to bill healthcare for services

FOCUS ON PEOPLE WITH HIGH DISEASE BURDEN

- Momentum
- Can “prove ROI” in a short-time frame
- Aligns with an annual HC budget

FOCUS ON PREVENTION

- Many more people are eligible
- May prevent onset of disease completely
- Population as well as individual impacts
- ROI is greater in the end

HIGH DOSE – LOW REACH

- Smaller number of people benefit
- More likely to have a demonstrable impact on health outcomes
- Habit formation allows for maintenance of effect

LOW DOSE – HIGH REACH

- Reach more people & leave out fewer people
- Households, rather than individuals (multi-generational impacts)
- Population level impact likely even with a small effect size

CHOICE

- Dignity
- Support of local retail
- May be higher value for the individual participant

PRE-SELECTED FOOD ITEMS

- Efficient
- Local sourcing
- Exposure to new foods

TARGET POPULATION: FOOD INSECURITY

- Roots of FIM movement
- Focuses resources on a less advantaged group
- Pushes healthcare to develop systems to address SDH

TARGET POPULATION: CHRONIC DISEASE

- May be more politically feasible
- Does not require screening for food insecurity
- Allows wider access to healthy food benefits

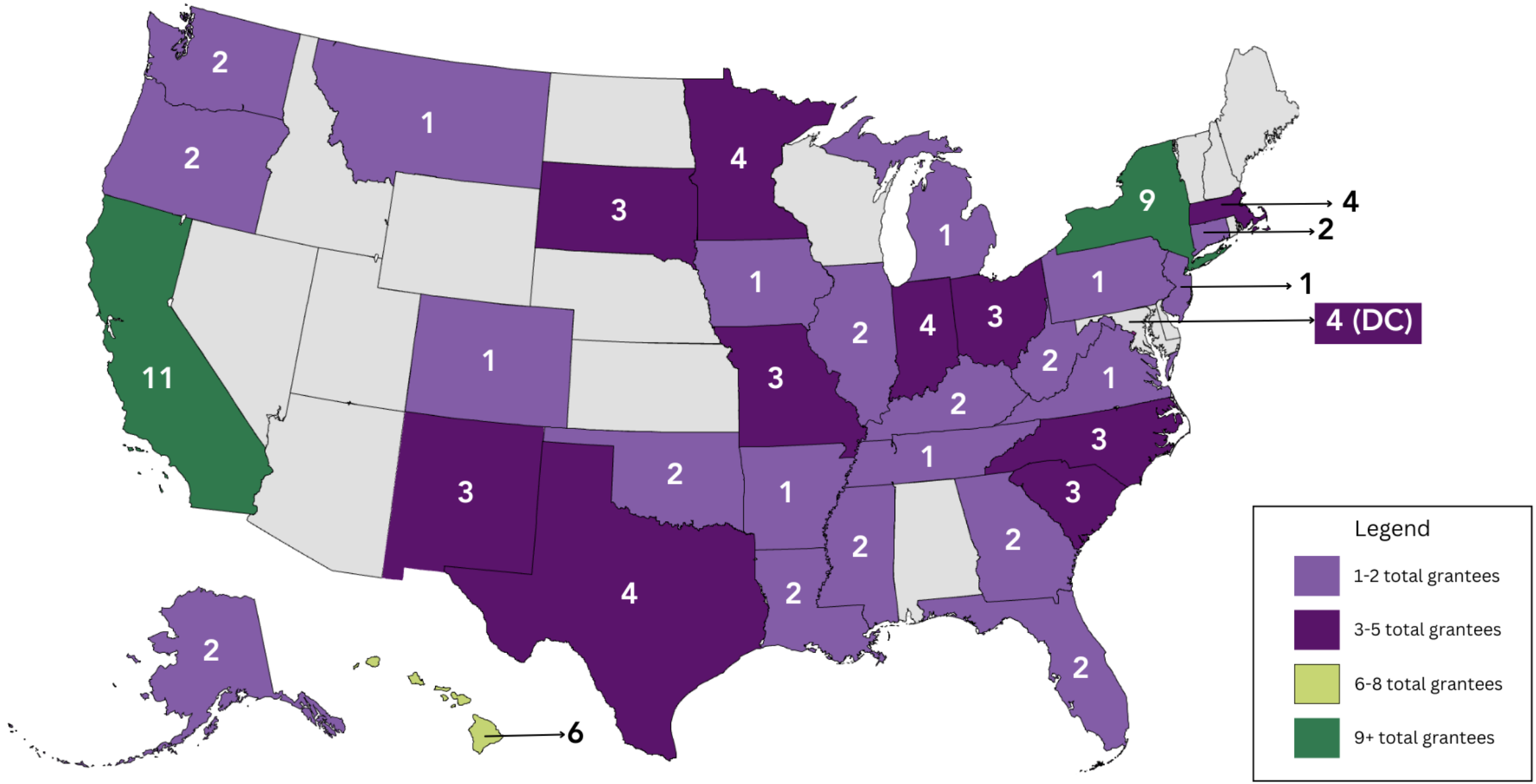
Disparities

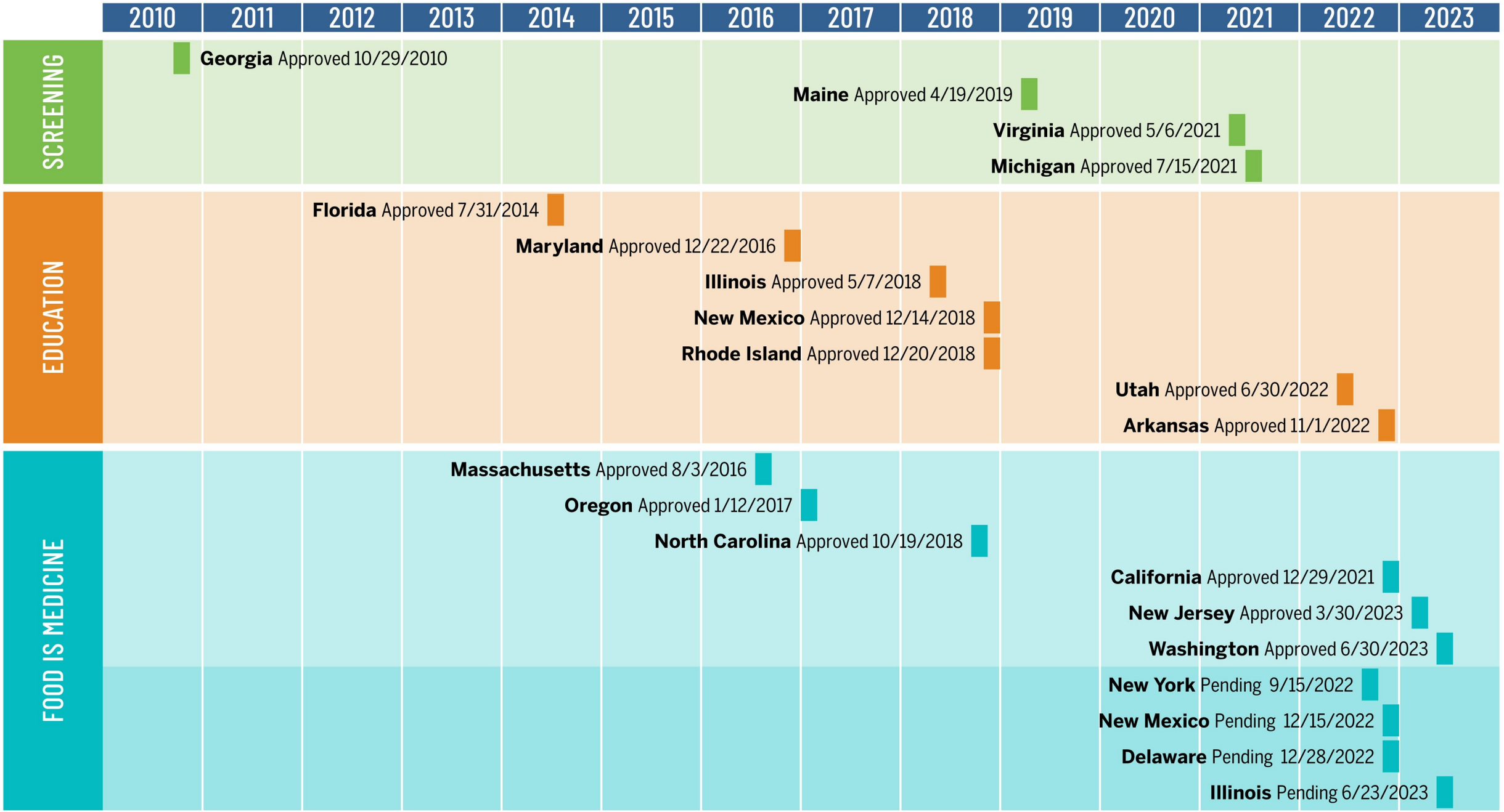
- People with reduced access to health care
  - Uninsured and underinsured
  - States that did not expand (or will be rolling back) Medicaid
- Communities that had poorer access to healthy food to begin with
  - Rural vs urban
  - Neighborhoods with full-service grocery stores vs neighborhoods without
- Reinforcing existing disparities in the agricultural sector

What does equity mean in the context of scale?

Where are the opportunities?

GusNIP Produce Prescription
Total Number of Grantees by State 2019-2023





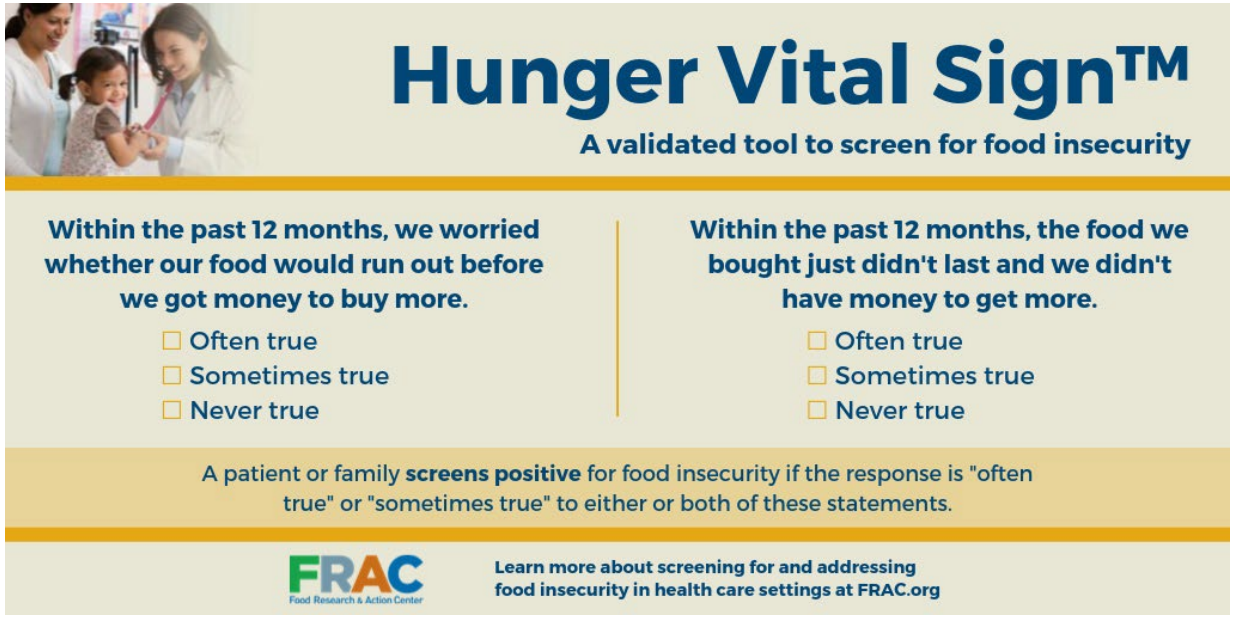
PREPUBLICATION: Hanson E. et al. The Evolution and Scope of Medicaid Section 1115 Demonstrations to Address Nutrition: A U.S. Survey. 2023

Challenges for Food is Medicine (FIM)

- Medicaid 1115 waivers have been an important funding mechanism, but anticipated Medicaid cuts are likely to slow or reverse current momentum
- Medicare Advantage and private insurers have been key drivers of FIM innovation
  - Value-Based Insurance Design (VBID) previously enabled Medicare Advantage plans to offer FIM as a supplemental benefit
    - Model recently terminated (not a Trump admin decision)
  - Some FIM services may continue under other pathways

Should we be screening for FI among patients with DM in the clinical setting ?

- Food insecurity is more common among people with DM than without
- Food insecurity complicates diabetes management
- FIM resources may help improve diabetes outcomes
- We have well-validated clinical screening tools



But…

- It takes a lot of time to screen
- You have to have something to do about a positive screen
- In some clinical populations, it makes more sense to refer based on diagnosis or complications

Conclusions

- FIM is already proven to improve health; no more research is necessary for the following outcomes:
  - Food security
  - Healthy diet
- WIC, the prototype FIM intervention, is effective and scalable
- SNAP enrollment improves food security, health outcomes, and health care utilization (likely extends to FDPIR)
- Tremendous momentum toward implementing & evaluating FIM programs across the US
  - More research is necessary to understand how best to **deliver and scale** a FIM intervention that will support food security and healthy dietary intake
  - If your clinic does not have access to 1 or more FIM options, you may need a clinical champion