

Food Insecurity & Chronic Disease: Connecting Hunger & Health

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Objectives

- Diabetes 101
 - What is diabetes and how is it managed?
- Linkages between diabetes and food insecurity
- Community-based diabetes care

What is Diabetes?

- Every cell in your body needs energy (in the form of sugar) to survive
- Your body has a finely tuned system (*insulin*) for moving sugar from your intestines into your cells
- Insulin rapidly goes up and down depending on how much sugar is in your blood
 - Keeps your blood sugar in a precisely controlled range

How It Works Normally

You eat sugar (or glucose)



Your intestines absorb the sugar into your blood (blood glucose ↑)



Insulin acts as a key that allows the sugar to move from the blood into the cells (blood glucose ↓)



The cells use the sugar for energy

In Diabetes How It Works ~~Normally~~

You eat sugar (or glucose)

Your intestines absorb the sugar into your blood (blood glucose ↑)

Insulin SHOULD act as a key to move the sugar into your cells

Type 1: There is no insulin
Type 2: Your body starts needing more and more insulin to do the same job, and your pancreas can't keep up

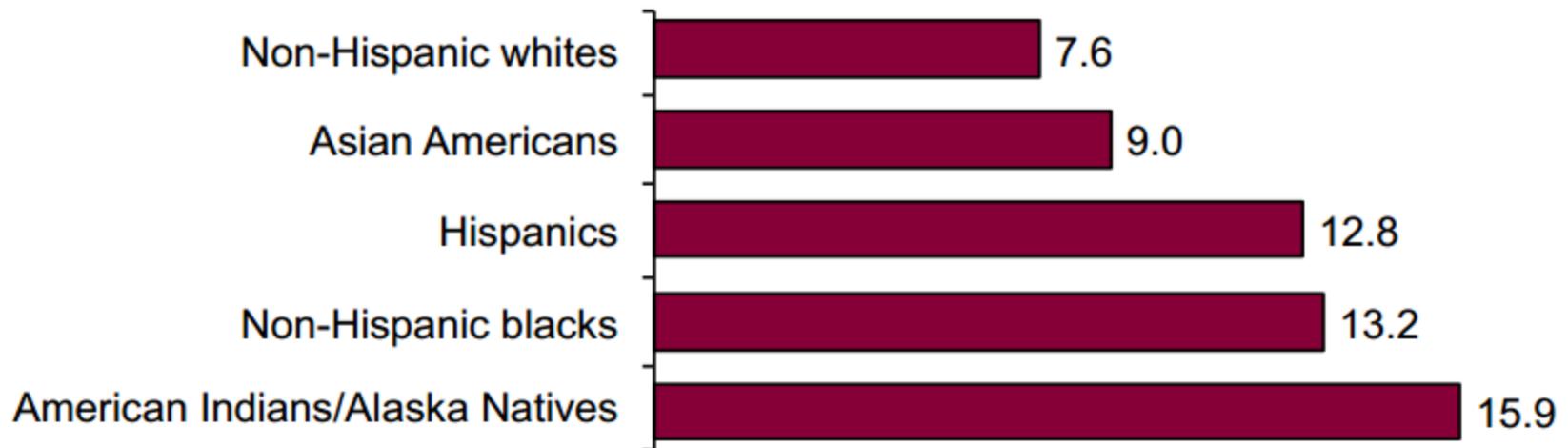
The sugar stays in your blood and doesn't get into the cells where it is needed (blood glucose does not ↓ like it should)

Our Conversation Focuses on Type 2 Diabetes

- Most common type of diabetes, especially in adults
 - 29.1 million Americans (9.3% of US population) has diabetes
 - 95% of adults with diabetes have type 2 diabetes
- Rates have been rapidly rising and have now reached epidemic proportions
- Obesity is a major risk factor
- It is increasingly a disease of the poor

Diabetes is Increasingly a Disease of the Poor

Age-adjusted* percentage of people aged 20 years or older with diagnosed diabetes, by race/ethnicity, United States, 2010–2012

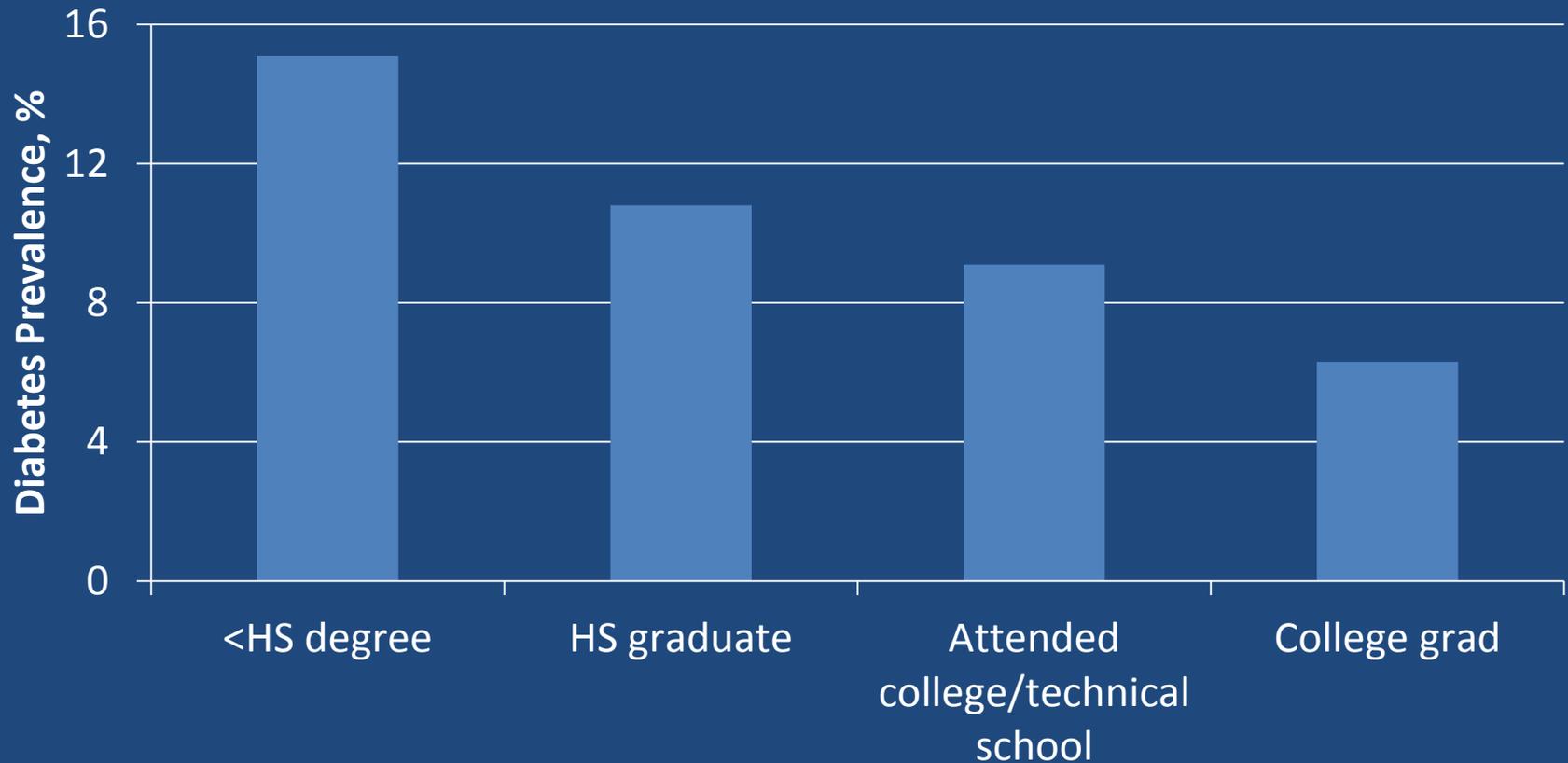


*Based on the 2000 U.S. standard population.

Source: 2010–2012 National Health Interview Survey and 2012 Indian Health Service's National Patient Information Reporting System.

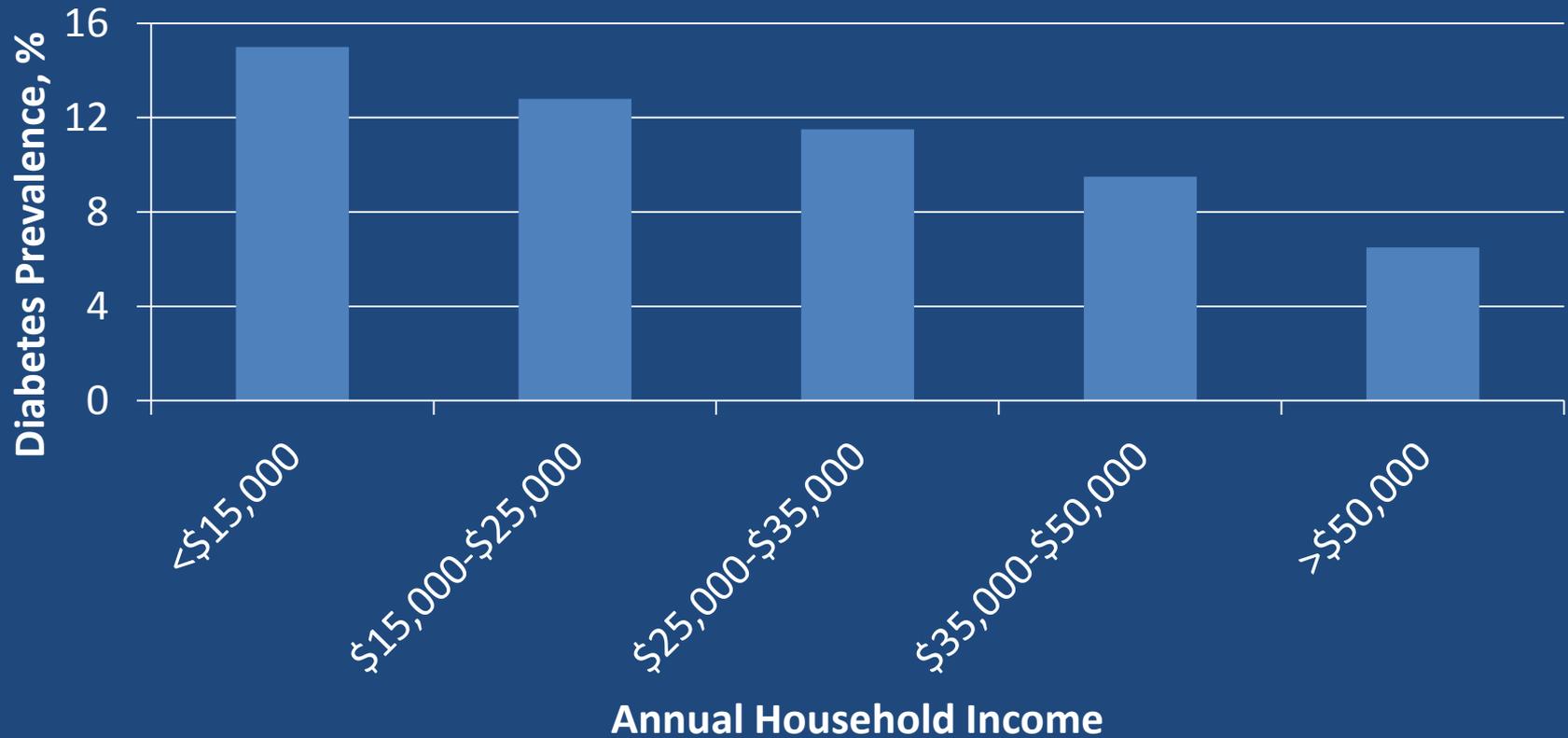
Diabetes is Increasingly a Disease of the Poor

Ever told have diabetes (excluding pregnancy)

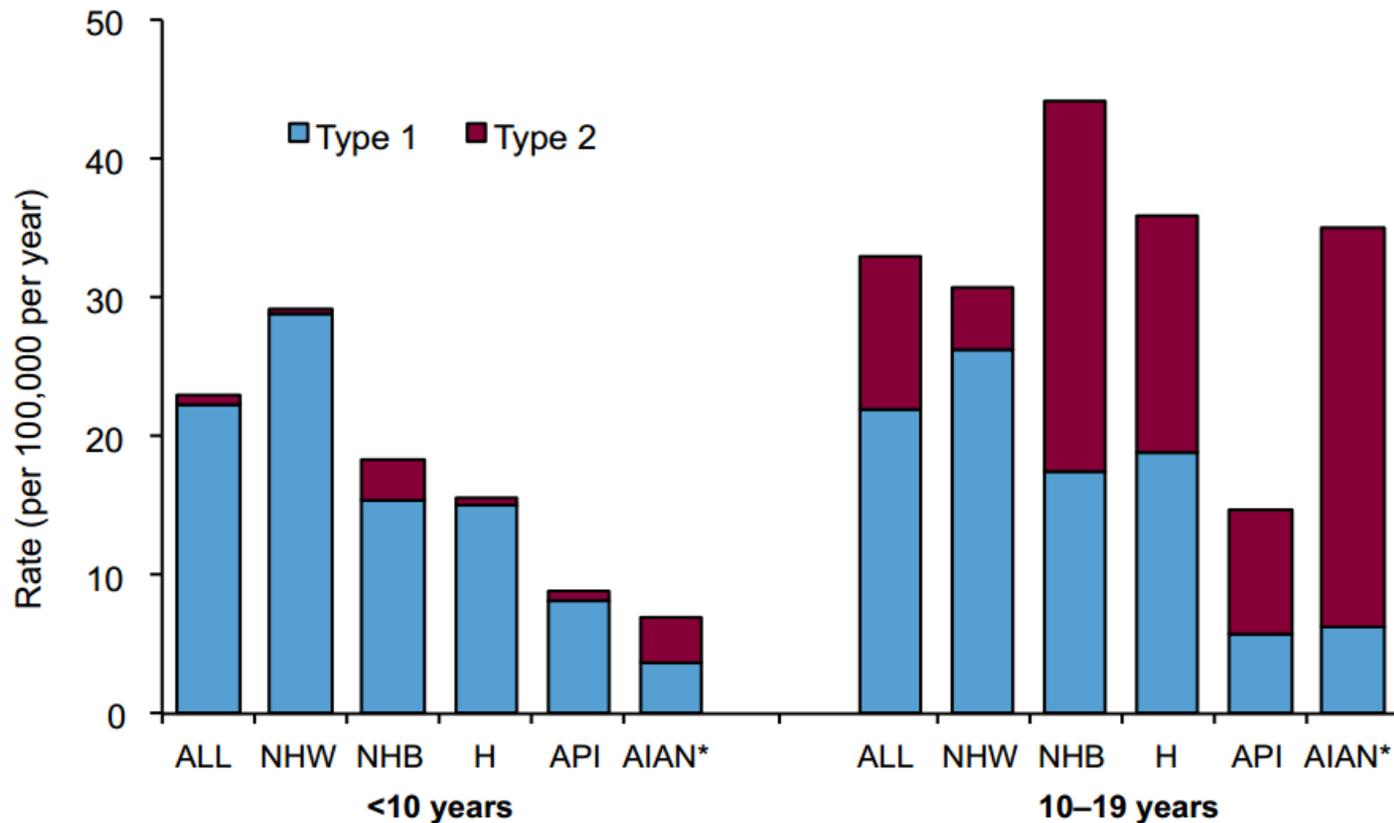


Diabetes is Increasingly a Disease of the Poor

Ever told have diabetes (excluding pregnancy)



Rate of new cases of type 1 and type 2 diabetes among people younger than 20 years, by age and race/ethnicity, 2008–2009



ALL=entire US population; NHW=non-Hispanic White; NHB=non-Hispanic Black; H=Hispanic; API=Asian/Pacific Islander; AIAN=American Indian/Alaska Native

Why Do We Care about Diabetes?

- Symptoms: very thirsty, very hungry, pee too much, blurred vision, fatigue, increased risk of infection
 - Or you may feel like exactly the same as you always do
 - Some people unaware they have diabetes
- Over time, high blood sugar poisons your:
 - Heart attacks, strokes, peripheral arterial disease
 - Heart attack is most common cause of death
 - Nerves (→ulcers and amputations)
 - Eyes (→blindness)
 - Kidneys (→kidney failure & dialysis)

Factors Driving Blood Sugar Up and Down



Hyperglycemia

Food
(carbohydrates:
sugars & starches)

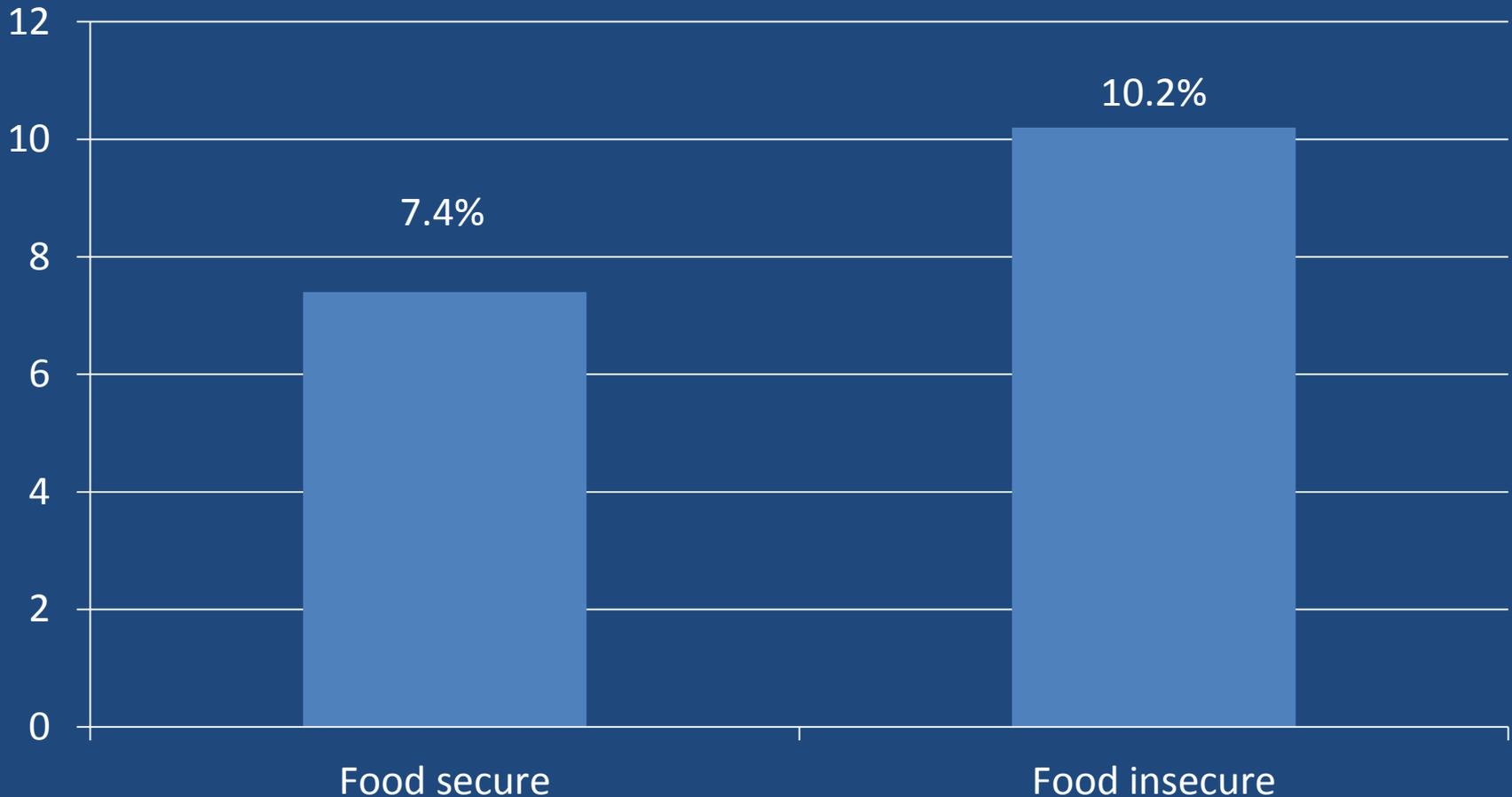


Hypoglycemia

Diabetes medicine
(pills or insulin injections)
Physical Activity

Food Insecurity & Diabetes

(US Low-Income Population, NHANES 1999-2004)



$p=0.03$ after adjusting for age, gender, race/ethnicity;

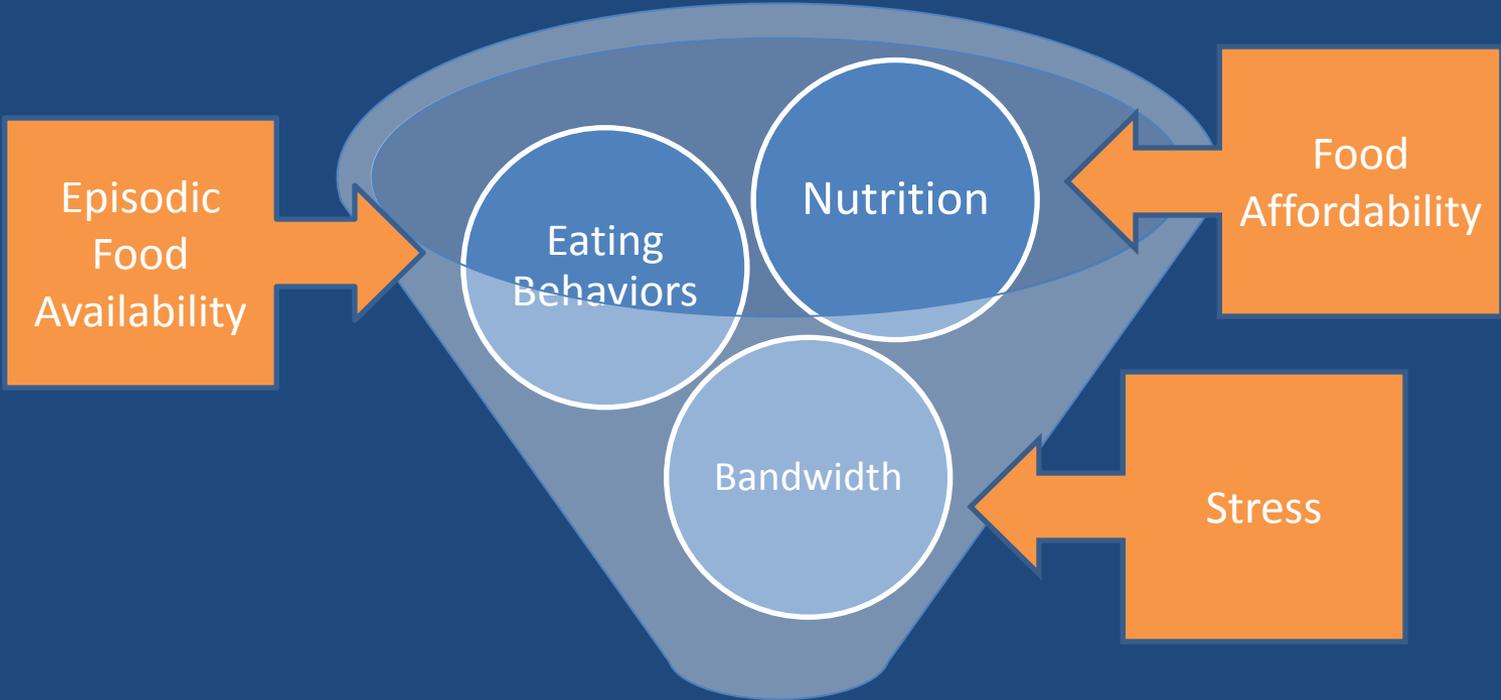
$p=0.09$ after adjusting for above + education + income as continuous variable + income as ordinal variable

Seligman, JI Nutr, 2010.

Coping Strategies to *Avoid* Hunger

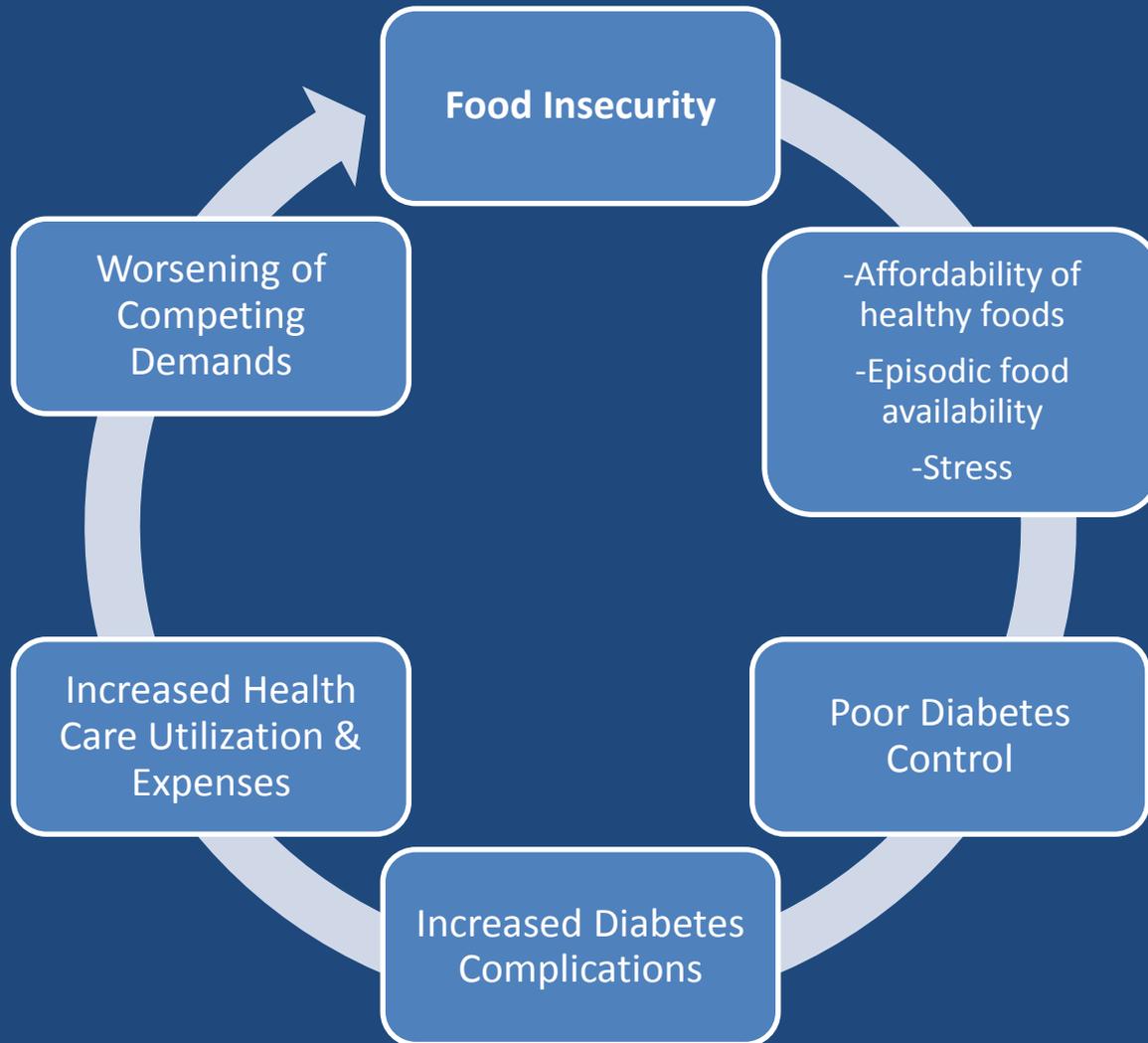
- Eating low-cost foods
 - Fewer F&V
 - More fats/carbs
 - Eating highly filling foods
 - Small variety of foods
 - Avoiding food waste
 - Binging when food is available
- 
- Higher risk of obesity & diabetes
 - Once you have obesity or diabetes, poorer ability to manage it effectively

Food Insecurity



Obesity and Diabetes

Food Insecurity & Diabetes

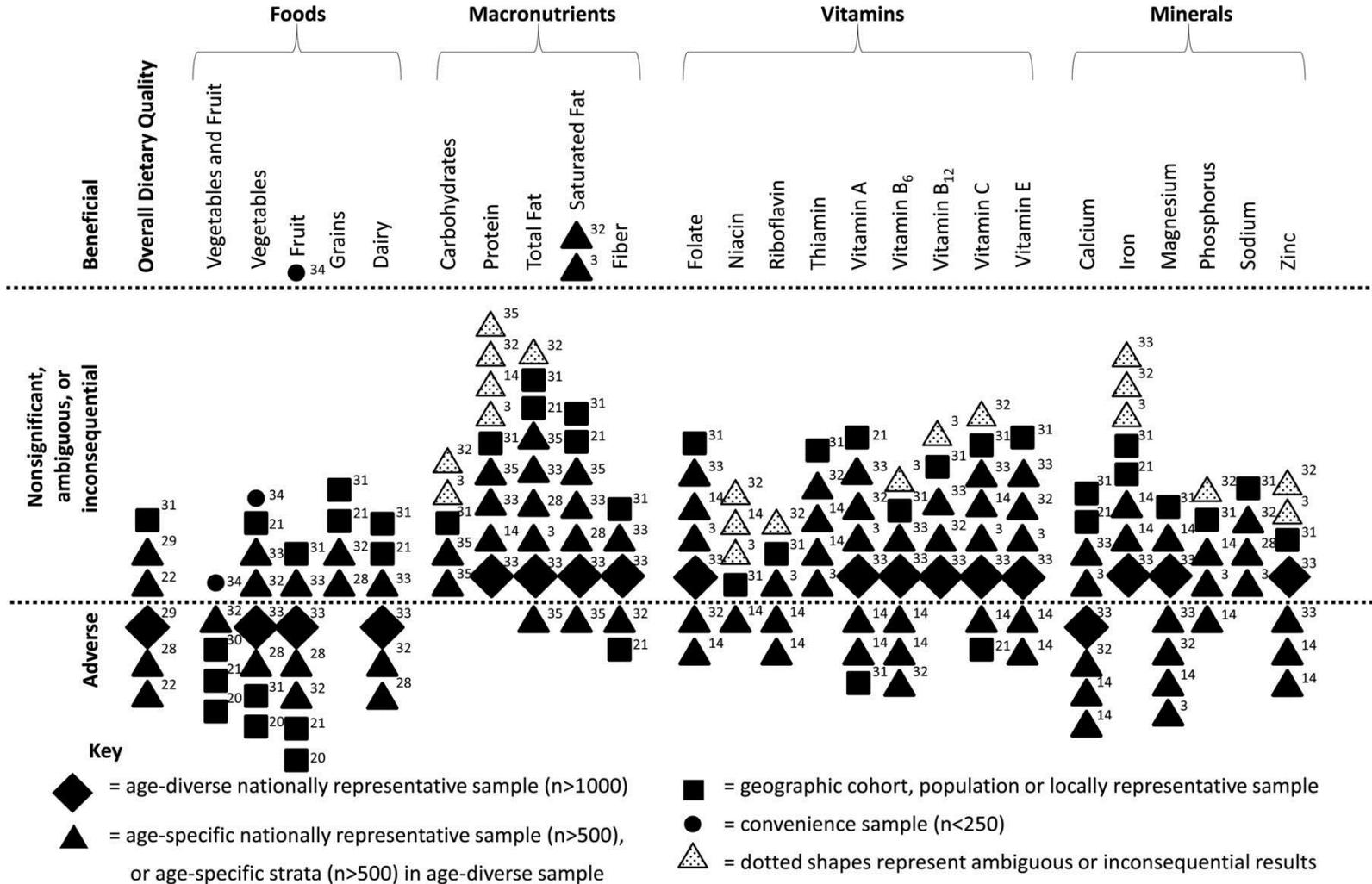


Obesity-Hunger Paradox

- *Food affordability*
- Episodic food availability
- Bandwidth



Associations between food insecurity and dietary intake in US adults.



Hanson K L , and Connor L M Am J Clin Nutr 2014;100:684-692

Food Costs, Dietary Intake, & Weight Gain

	Weight Gain/ Obesity
Increased consumption of calorically-dense foods (refined grains, added sugars/fats)	X
Reduced intake of fruits & vegetables	X

Bhattacharya, 2004; Kendall, 1996; Olson, 1999; Tarasuk, 2001; Tarasuk, 1999; Dixon, 2001; Lee, 2001

Diabetes and Dietary Intake

	Food Insecure	Food Secure
Fruit, Daily Servings	0.8	1.1
Vegetables, Daily Servings	1.8	2.1
Difficulty Following a Diabetic Diet	64%	49%

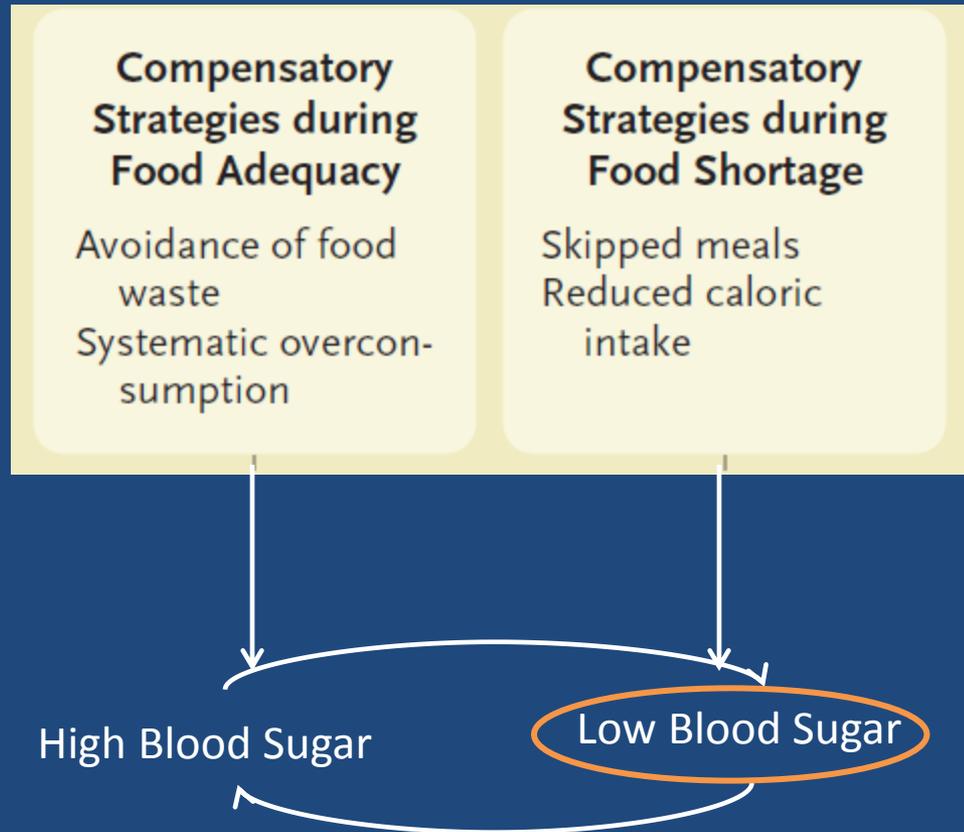
Obesity-Hunger Paradox

- Food affordability
- *Episodic food availability*
- Stress

Disordered Eating Practices

- Binge eating
- Hoarding
- Food obsessions
- Extreme avoidance of food waste
- Strong preferences for highly filling foods

Cycles of Food Adequacy and Shortage

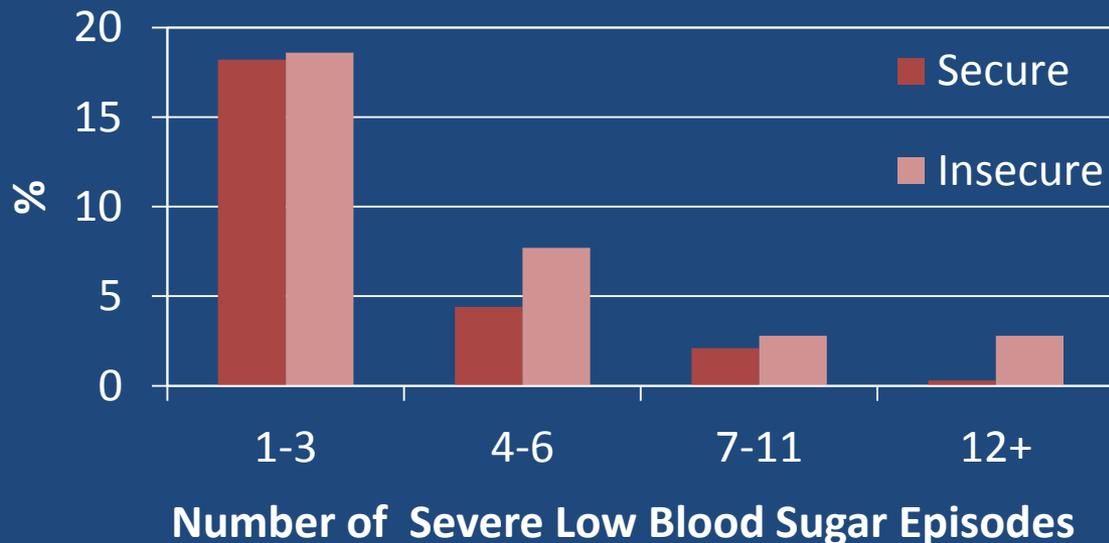


Low Blood Sugar & Food Access

- Pre-recession: Patients with diabetes in an urban, safety net hospital
 - 1/3 of those who reported low blood sugar attributed it to the inability to afford food
- Post-recession: Primary care patients with diabetes at community health centers (38% food insecure)
 - Blood sugar ever gotten too low because you couldn't afford food (33% FI vs 5% FS)
 - Ever been to the Emergency Room because your blood sugar was too low (28% FI vs 5% FS)

Food Insecurity and Low Blood Sugar

Of the 711 participants, 197 (28%) reported at least one significant episode of low blood sugar in the previous year.



90% higher odds of repeated (4+) episodes of low blood sugar if you are food insecure (adjusted)

*Adjusted model includes age, race/ethnicity, tobacco use, English proficiency, income, educational attainment, body weight, insulin, renal disease, adherence to medication and blood glucose testing, comorbid conditions, and alcohol abuse.

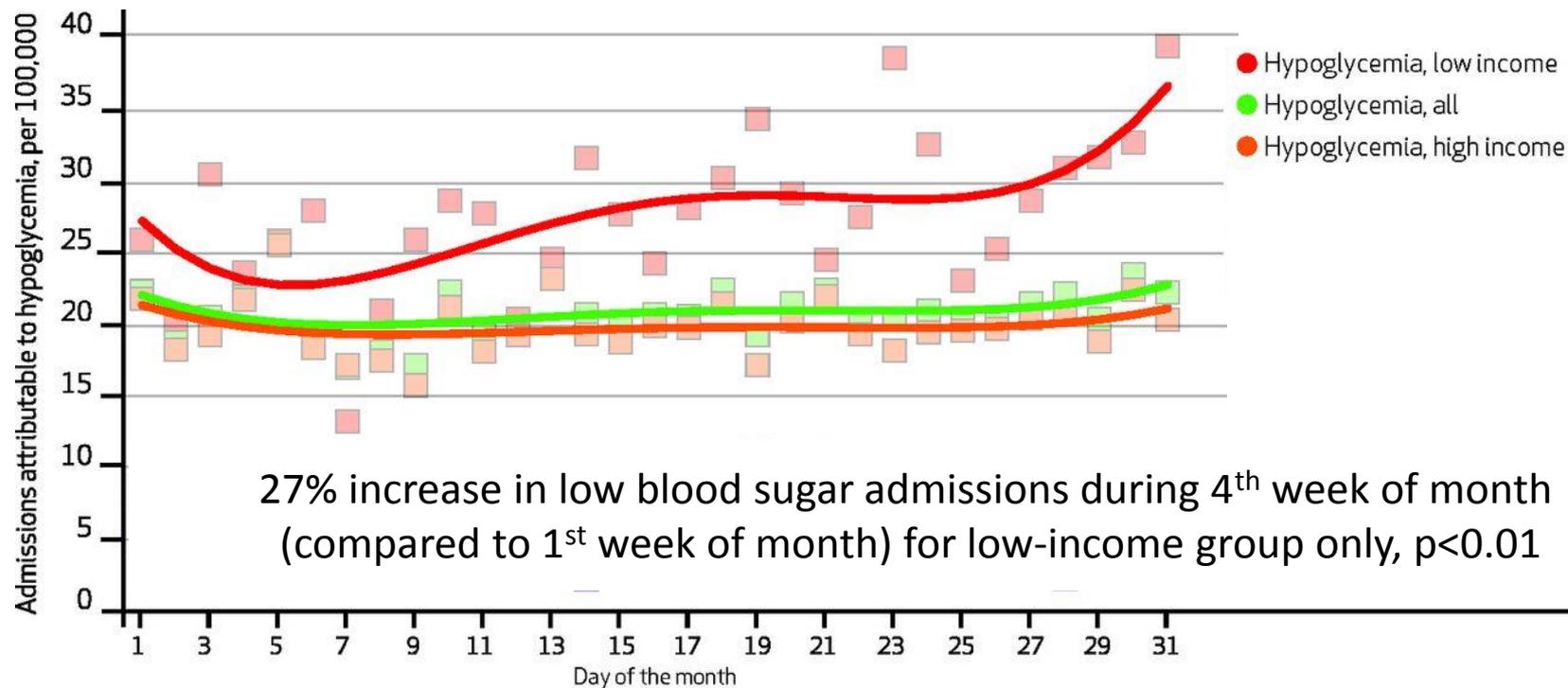
Seligman, *Arch Int Med*, 2011.

Food Insecurity is the Strongest Risk Factor for Severe Low Blood Sugar Noted in Safety Net Clinics

	Odds Ratio (Adjusted)
Food Insecurity	3.0 (1.5-5.9)
Alcohol abuse	2.2 (1.1-4.5)
Comorbid illnesses	1.5 (1.1-2.0)
Obesity	0.3 (0.1-0.7)

Not significant: renal disease, insulin use, hypoglycemia knowledge, English proficiency, age, race/ethnicity, education, income, tobacco use, glucose monitoring, and medication adherence

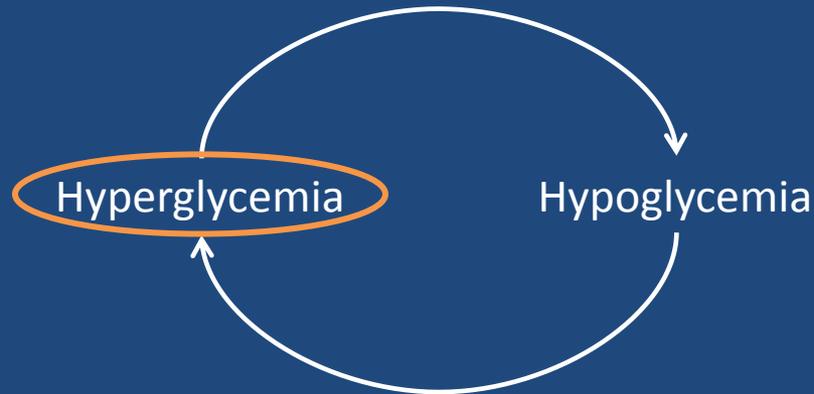
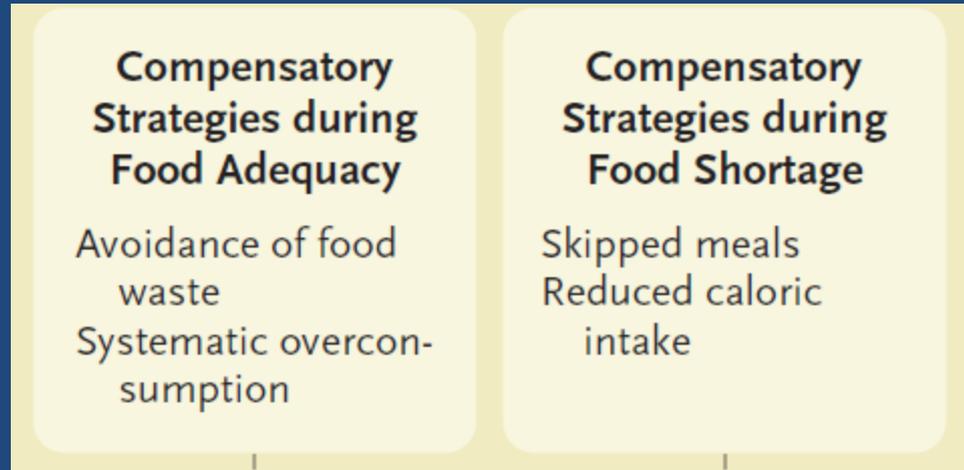
Admissions Attributable To Low Blood Sugar Among Patients Ages 19 And Older To Accredited California Hospitals On Each Day Of The Month, By Income Level, 2000–08.



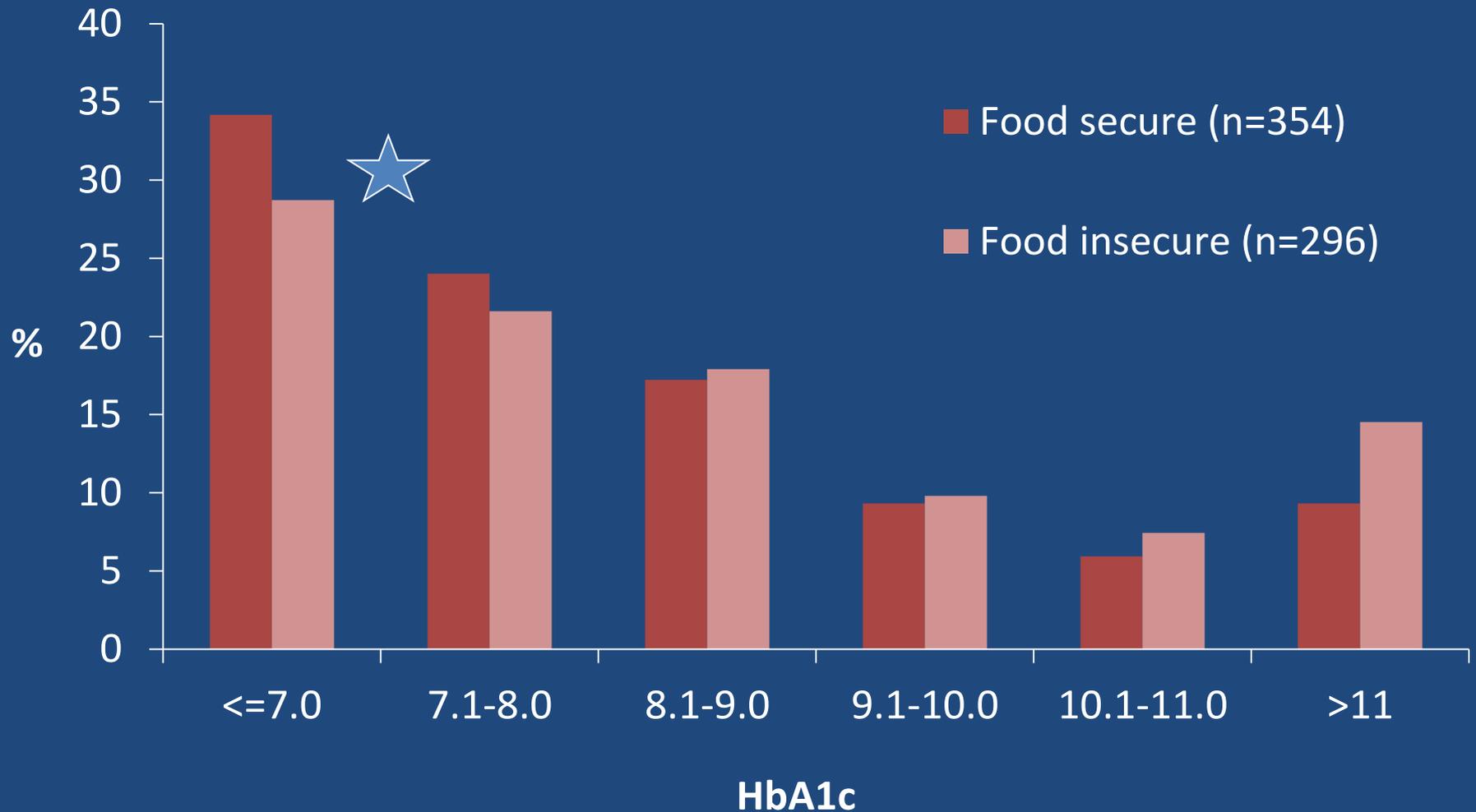
Seligman H K et al. Health Aff 2014;33:116-123

HealthAffairs

Cycles of Food Adequacy and Inadequacy



Food Insecure Adults with Diabetes Have Higher Average Blood Sugars



Seligman, *Diabetes Care*, 2012.

Food Insecure Adults with Diabetes Have Higher Average Blood Sugars

	Food Secure	Food Insecure
HbA1c >7% (NHANES, known diabetics <200% FPL)	49%	70%
Mean HbA1c (ICHHC, n=711)	8.1%	8.5%
Mean HbA1c (MFFH, n=621)	8.0%	8.4%

Seligman, *Jl Nutrition*, 2010; Seligman, *Diabetes Care*, 2012; Lyles, *Diabetes Care*, 2013.

Obesity-Hunger Paradox

- Food affordability
- Episodic food availability
- *Bandwidth*

Hunger Takes Up a Lot of Brain Space

- Less space left over for:
 - Registering/re-registering for benefits
 - Applying for/maintaining employment
 - Parenting children

 - Taking care of health needs

Diabetes Adds Additional Stress to the Experience of Food Insecurity

“A diabetic is supposed to eat three meals a day and something before going to bed but sometimes I don’t have the three meals and that makes me worry.”

“The end of the month, I start getting out of food...but I have to eat something, ‘cause if I don’t eat behind my [insulin] shot, that shot will make you so sick. I just eat anything I can find during that time just to keep me from getting sick.”

Hamelin, 2002; Wolfe, 1998; Wolfe, 2003;

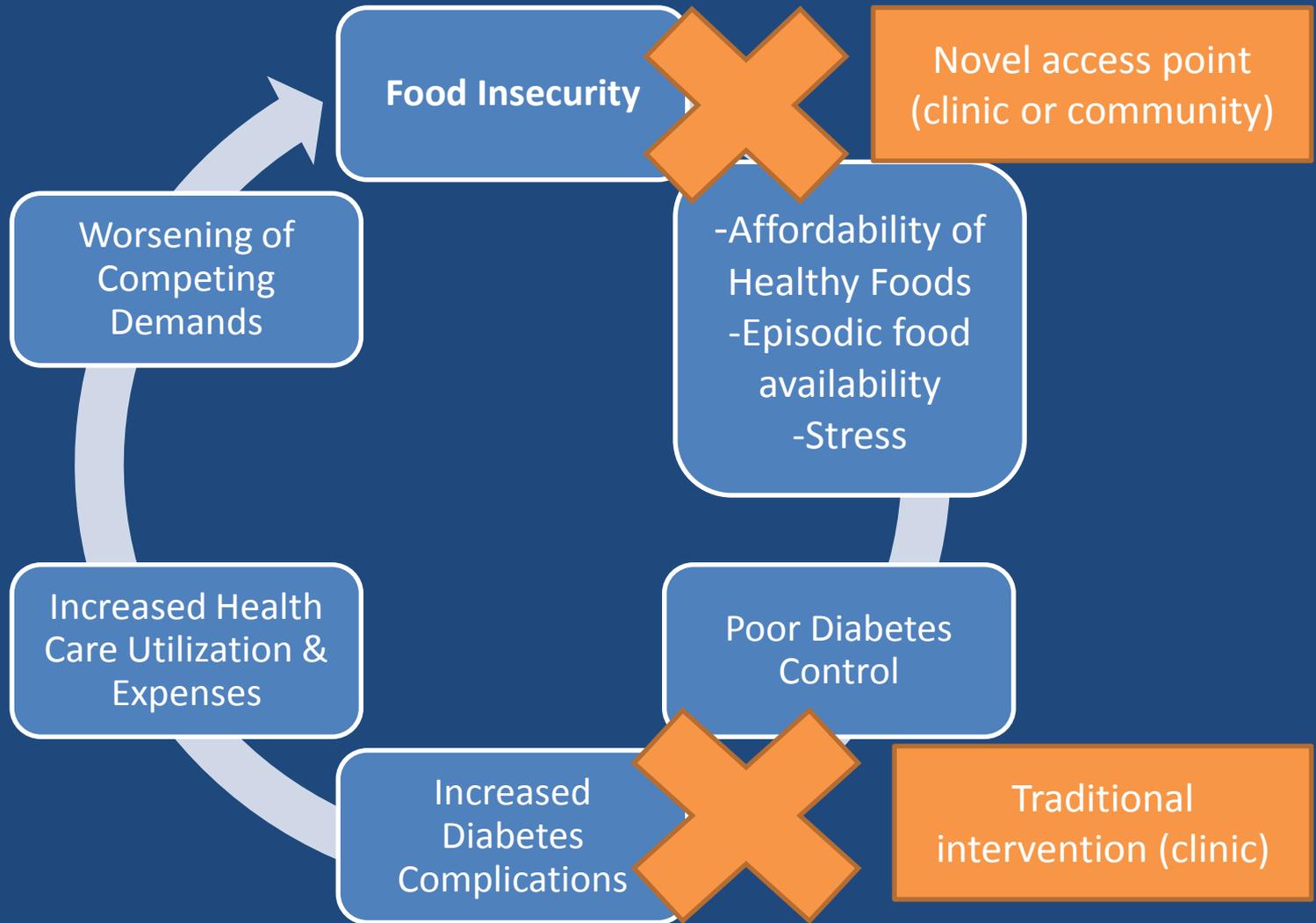
Patient-Related Factors Related to Higher Blood Sugar

	Food Insecure (n=325)	Food Secure (n=386)
Confidence in ability to manage their diabetes, mean score	7.1	7.7
Emotional distress related to diabetes, mean score	3.9	3.0

Increased Health Care Utilization

- Food insecure adults with diabetes
 - more physician encounters
 - more frequently in the ED
 - admitted more frequently to the hospital

Food Insecurity & Diabetes



Adapted from Seligman & Schillinger.



The NEW ENGLAND
JOURNAL of MEDICINE

Community-Based Diabetes Programs

- ****Key Point*: Clinics have had a challenging time engaging many people with diabetes, especially the most vulnerable
 - Food pantries offer another point of engagement: friendly, familiar, neighborhood oriented, and already associated with food

Components of a Community-Based Diabetes Program

1. Access to diabetes appropriate foods
 - Fruits and vegetables, whole grains, and lean protein
2. Screening for diabetes and/or monitoring diabetes control
 - Reaching clients who the clinics have a challenging time reaching
3. Diabetes education
4. Coordinating/partnering with primary care clinics

What is NOT on this list: PROVIDING DIABETES CARE

1. Access to diabetes appropriate foods

- Diet is a cornerstone of diabetes self-management
- Adults with diabetes don't *only* need fruits & vegetables
 - Lean proteins are important for stabilizing blood sugars throughout the day
 - Providing complex carbohydrates as a substitute for simple carbohydrates will blunt the rapid and severe increase in blood sugar
 - Complex carbs: whole grain bread and pasta, brown rice, starchy vegetables
 - Simple carbs: refined sugars, candy, SSB's
 - Fruits raise blood sugar but are important for the vitamins they provide; preferred to other foods that raise blood sugar

2. Point-Of-Care Hemoglobin A1c Testing

- Point-of-care testing refers to on-site testing with a portable machine
- The SAME point-of-care tests are used for:
 - Screening clients without a diagnosis of diabetes to see if they have diabetes
 - Monitoring diabetes control in clients who know they have diabetes
- Feasible and desirable to clients
- Advantages and disadvantages to HbA1c testing and blood sugar testing



3. Diabetes Education

- Must be tailored to this patient population
 - Cultural competency
 - Health literacy and health numeracy
 - Language concordance
- Partnering with existing education providers
 - Advantages: it's already there
 - Disadvantages: may not be adequately tailored, may be limited in where/when it can be provided (negating a key advantage of providing food pantry support)

Partners Providing Diabetes Education Should Be Familiar Working With Food Insecure Population

- Nutrition counseling strategies that are budget-neutral (when possible)
- A “sick day” applies to both not eating because you are sick, and not eating because you have no access to food
- Smoking cessation

4. Coordinating/Partnering with Primary Care

- Diabetes self-management support and education alone will not treat the majority of diabetes
 - Medications are usually critical
- Wide variability in community capacity for primary care for underserved populations
 - Partner with the safety net system if there is one—they are experts in working with this population

Opening Conversations with Clinics

- Health care providers are often (but not always) aware of food insecurity among their patients
- Clinics are often excited about
 - Providing their patients with better food access, especially if it is tailored to diabetes
 - Providing diabetes education
 - Clinics vary greatly in their capacity
- Clinics do not generally get excited about monitoring HbA1c at a pantry
 - Is not of great benefit to the clinic (clinic has to recheck it anyway), but may be to the client
- Referrals in both directions must have minimal impact on work flow
 - Clinics #1 priority is time

Opening Conversations with Clinics

- Identify the appropriate clinics in your area
 - Federally qualified health centers
 - Clinics in low-income neighborhoods
- Clinics associated with academic medical centers may or may not be interested, depending on the population they target
- Find a clinical champion

Feeding America Pilot Diabetes Initiative: 2011-2014



Funded by Bristol-Myers
Squibb Foundation
3 FOOD BANKS
CA, TX, OH



Monthly Food Boxes
**IMPROVE FOOD
ACCESS**
with diabetes-appropriate
foods



We Screened & Enrolled
1,500 INDIVIDUALS
struggling with diabetes &
food insecurity



We offered
**NUTRITION & HEALTH
EDUCATION**
through written materials,
classes & 1-on-1 discussion

Client
Screening

Client Screening



Food Bank Screening:

- Offered BS and HbA1c testing at food distributions
- Referred to healthcare partner if client didn't currently have primary care access

Healthcare Partner Screening:

- Used 2-item Food Insecurity Screener to identify patients at the clinic in need of food assistance
- Patients referred to food bank for enrollment in program

Improving
Food Access

Monthly Food Boxes Provided to Clients in the Project

- Pre-packed boxes with shelf-stable diabetes appropriate foods
- Fresh & frozen items
- **Cost:** Boxes provided free to clients.

Items were a mix of purchased and donated foods. Average cost ~ \$18 per box, paid for by the grant.



Nutrition &
Health
Education

Diabetes & Health Education Offered through a Variety of Approaches



- **Written Information Accompanied Food Boxes**
- **Group Classes**
- **Videos**



Diabetes Intervention at 3 Food Banks

	Total
	n = 1265
Age, mean (SD)	56.4 (12.5)
Female, %	889 (70%)
Race/ethnicity, %	
Latino or Hispanic	680 (55%)
White	317 (25%)
Black or African American	121 (10%)
Native American, Pacific Islander, or other	124 (10%)
Education, %	
<High school degree/GED	530 (42%)
High school degree/GED	286 (23%)
>High school degree/GED	432 (35%)
Food insecurity, %	
Very low security	529 (42%)
Low security	520 (42%)
Secure	201 (16%)
BMI (kg/m ²), mean (SD) (n=1082)	34.3 (8.5)
Tobacco use, %	263 (21%)

Preliminary Results: Unadjusted pre-post changes

Variable	N	Pre-post change	P-value
HbA1c	769	8.11 to 7.96% (overall reduction of 0.15%) CA: -0.14% TX: -0.19% OH: -0.39%	<0.01
Severe hypoglycemic events	646	15% to 11%	0.07
Medication non-adherence, scored 0-4	630	1.2 to 1.1	<0.01
Self-efficacy, scored 1-10	651	6.8 to 7.3	<0.01
Diabetes distress, scored 1-6	650	3.1 to 2.7	<0.01
Depressive symptoms	684	68% to 59%	<0.01
Med affordability challenges	641	47% to 36%	<0.01

Thank You !



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