

## Neighborhood Risks for Obesity and Diabetes

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Most people have sub-optimal dietary profiles

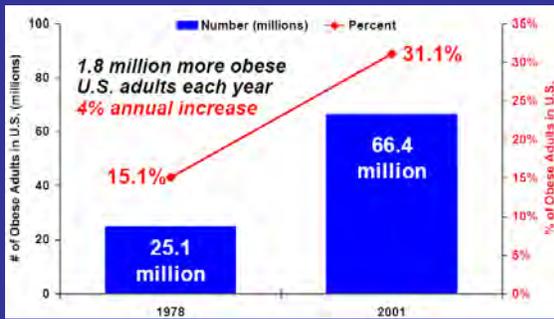
Weekly fast food consumption is high

Fruit and vegetable intake is low

<40% of US have "favorable" profile for healthy diet

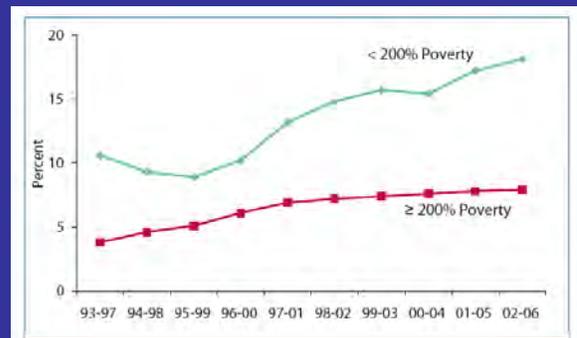
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## Obesity epidemic



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## Diabetes on the rise - especially among lower incomes -



## What has happened?

More opportunities for unhealthy eating and being physically inactive.

Changes in our food and physical activity environments.

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More opportunities for unhealthy eating and being physically inactive.

Changes in our food and physical activity environments.

Solution needs to include environmental and community change

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## What is the neighborhood contribution?



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## Neighborhood environment

### Food environment

- Types of food stores
- Selection high quality fresh fruits & vegetables
- Availability of low fat foods

### Physical activity environment

- Local sports clubs and other facilities
- Pleasant walking environment
- Easy to walk places (stores, services)
- See other people walking

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## Individual-level data

### Multi-Ethnic Study of Atherosclerosis

- Aged 45-84; Baseline exam 2000-2002.
- 6 study sites over 6,000 participants
- Detailed measures of CVD, biologic markers, and behaviors.
- 4008 participants were in this study



## Study Participants

Age (mean)		62 years
Female		53%
Family history of diabetes		8%
Family income, per-capita (mean)		\$28,000
Education (mean)		13 years
Race/ethnicity	Caucasian	43%
	Chinese	13%
	African American	23%
	Hispanic	21%
Body mass index, kg/m <sup>2</sup> (mean, SD)		28.7 (5.4)
Obese (>= 30 kg/m <sup>2</sup> ) at baseline		34%
Diet index [range 0-4] (mean, SD)		2.26 (1.35)
Physical activity hrs/day [range 0-18] (mean, SD)		5.8 (7.3) <sup>10</sup>

Homeostasis Model Assessment Index*		
HOMA-IR [glucose x insulin]/22.5 (mean, SD)	1.63 (1.44)	
Glucose level impaired at baseline (100-125 mg/dL)	14%	
Type 2 diabetes at baseline	11%	
Type 2 diabetes during 5 yr follow-up**	10%	

\* Analysis using HOMA-IR excluded persons treated for diabetes (on oral hypoglycemic agents or insulin)

\*\* Analyses of incident T2D excluded persons with baseline T2D

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## Steps in analysis

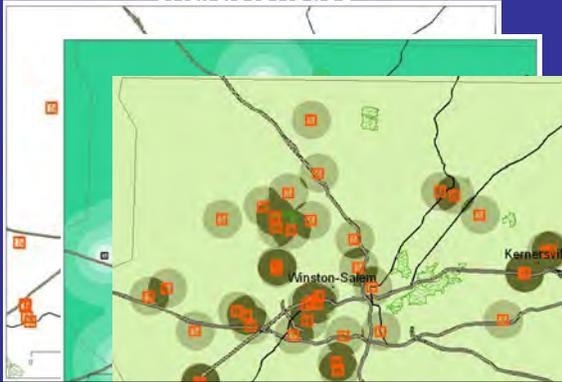
Characterize neighborhoods where participants live;

Assign neighborhood exposures to participants;

Test the epidemiologic hypotheses: the relationship between environmental exposures and insulin resistance and diabetes.

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## Measuring neighborhood characteristics



## Assign neighborhood measures to study participants



## Study Results

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## Neighborhood Determinants of Diet

Low availability of supermarkets → 32-55% less likely to have a good quality diet

For every std dev increase in neighborhood exposure to fast food....

→ Odds of eating fast food near home increased 18%

→ Odds of having healthy diet decreased 13%

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## Neighborhood Determinants of Obesity

Living in a healthy food environment and in a walkable environment was → protective of incident obesity at 5 year follow-up.

Healthy food environment showed a stronger protective association than walkability did.

No strong evidence of effect modification by

- Age, sex
- Study site
- Mobility patterns (automobile ownership, years lived in the neighborhood, relocation outside census tract [17% relocated])
- Activity space (distance from home usually shopped for food, distance from home usually exercised).

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## Neighborhood Determinants of Diabetes

Being far from a wealthy area was associated with increases in a precursor to diabetes (insulin resistance).

Physical activity resources and neighborhood healthy food resources... → protects against insulin resistance and type 2 diabetes.

Better neighborhood resources for physical activity and healthy foods, were associated with a 38% lower incidence of type 2 diabetes.

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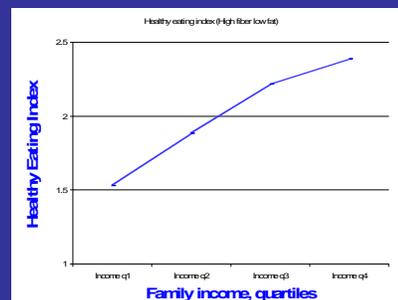
## Neighborhood environments can contribute to health disparities



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## Income inequalities in diet

Higher income, better dietary profiles



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## Disparities in resources

- Fewer supermarkets in low-income areas
  - One-half as many as middle-income neighborhoods
  - More small corner stores
  - More liquor stores (1.5x)



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Healthy Foods Availability Index (HFAI)  
of two supermarkets

Location	Baltimore City		Baltimore County	
Racial Composition	97% Black		93% White	
Median HH Income	\$ 20,833		\$ 57,391	
	Avail.	Points	Avail.	Points
Skim milk	Yes	2	Yes	3
Fruits	17	2	59	4
Vegetables	38	3	74	4
Lean meat	No	2	Yes	3
Frozen foods	No	0	Yes	3
Low Na foods	No	0	Yes	2
100% whole wheat bread	Yes	2	Yes	4
Low sugar cereals	Yes	2	Yes	2
HFAI (0 to 27)	18		25	

Franco et al 2008

Structural interventions to increase physical activity and improve diet.

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Structural interventions to increase physical activity and improve diet.

### Facilitators for healthy eating

- Fresh food financing
- Fruit and vegetable markets
- Discounting healthy foods ("Healthy Bucks")
- Menu labeling
- Fresh FV for WIC certified stores

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## Structural interventions to increase physical activity and improve diet.

### Barriers to unhealthy eating

- Zoning to block fast food restaurant
- Tax unhealthy foods
- Vending machines in schools

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Thank you

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