

East Tennessee State University Maternal and Child Health Research Symposium

Biology, Behaviors and Environments – Resilience to Poor Health Outcomes

Nutrition and Obesogenic Environments

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Snapshot of the Appalachian Region

- Population of 23 million in 420 counties and 13 states.
 - Forty-two percent of the region's population is rural.
- Highest in the nation for percentage of overweight or obese youth (32.9% versus 31.1%)
- Compared to other areas of the country, people living in Appalachia face a heavier burden from chronic diseases and higher rates of premature mortality.

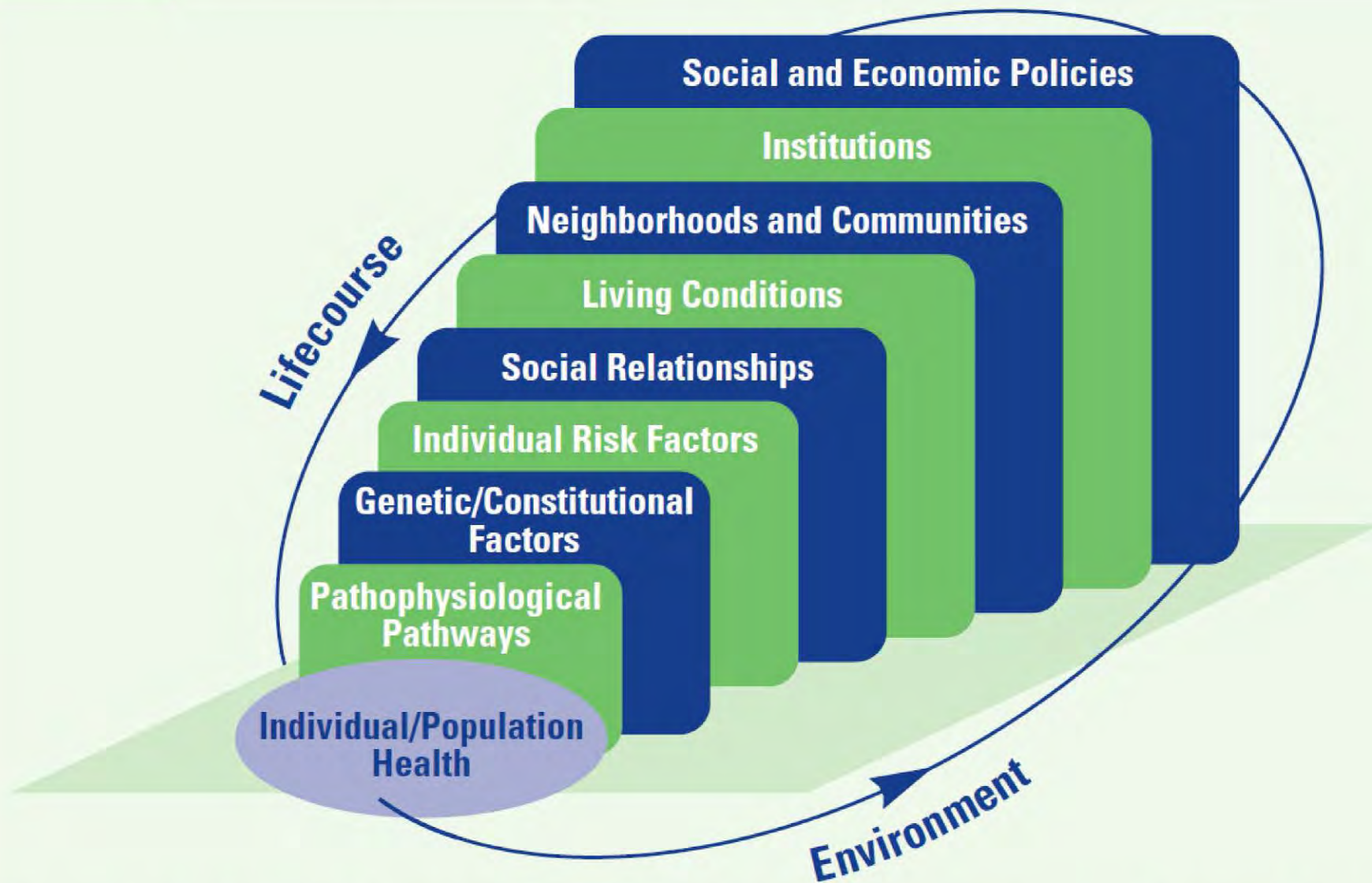


Map by Appalachian Regional Commission, November 2009.

Objectives

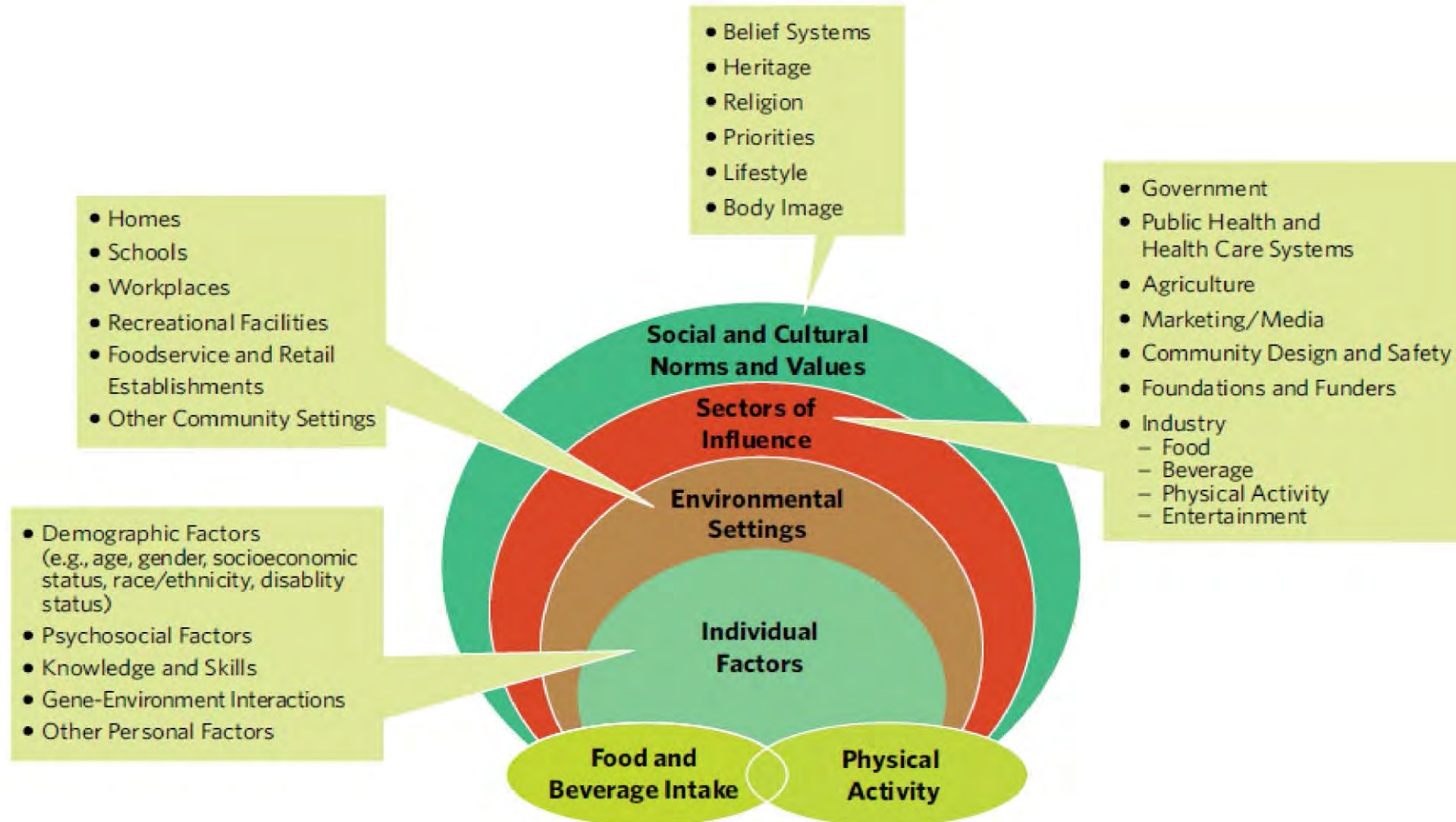
1. Describe key features of community and consumer food environments, the types of methods used to measure food environments, and their strengths and limitations.
2. Discuss the roles of geography and rurality in producing food environments that promote obesity.
3. Identify potential environmental and policy-related solutions to prevent obesity among rural children and their caregivers.

Figure 2. A Multilevel Approach to Epidemiology

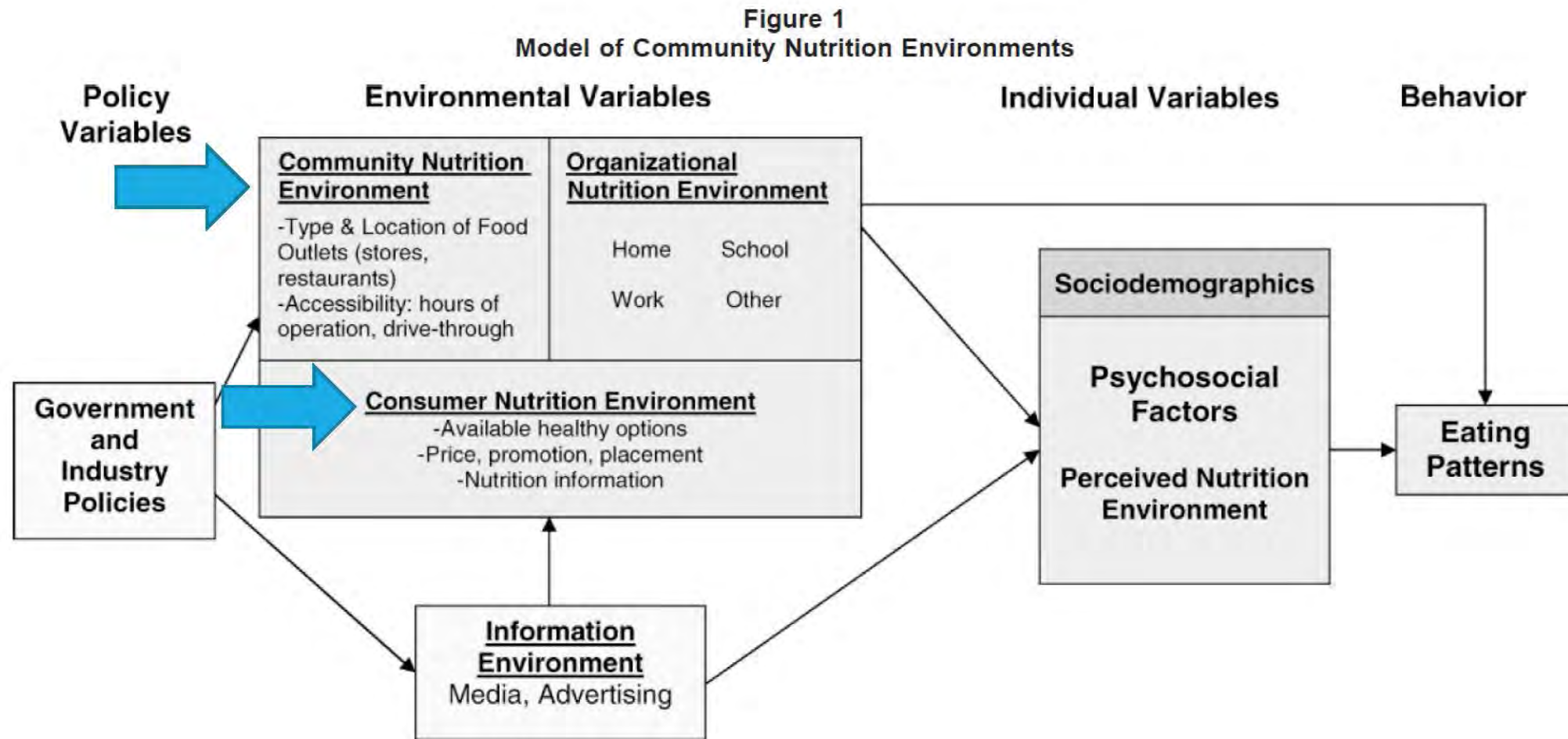


Source: Smedley BD, Syme SL (eds.), Institute of Medicine. Promoting Health: Strategies from Social and Behavioral Research. Washington, D.C.; National Academies Press, 2000.

FIGURE 6 1: A Social Ecological Framework for Nutrition and Physical Activity Decisions



Community and consumer food environments



Obesogenic food environment

Obesogenic environment – “an environment that promotes gaining weight and one that is not conducive to weight loss within the home or workplace.” (Swinburn B, et al (1999))

Factors in the environment that support obesity-related behaviors

- Lack of access to healthy foods (food deserts)
- Plenty of access to less healthy foods (food swamps)

Food Deserts and Food Swamps

- Van Ploeg, M. (June 2009). Access to Affordable and Nutritious Food: Understanding Food Deserts and their Consequences, Economic Research Service, United States Department of Agriculture.
- Cohen DA, Sturm R, Scott M, Farley TA, Bluthenthal R. Not enough fruit and vegetables or too many cookies, candies, salty snacks, and soft drinks? *Public Health Rep* 2010;125(1):88-95.

Methods used to measure food environments: Five “As” of Access

Availability—Is there an adequate supply of healthy foods?

- Number of supermarkets near home.

Accessibility—Where is the location of the food supply and ease of getting to that location?

- Travel time and distance.

Affordability—What is the price of food and perceptions of worth relative to the cost?

- Salad versus French fries.

Acceptability—Does the given food environment meet personal standards?

- Quality of products.

Accommodation—How well do local food sources meet residents’ needs?

- Hours open, types of payment accepted.

Methods used to measure food environments: Community food environment

- Type and location of food outlets
- Geographic Information Systems databases constructed to determine coverage of or proximity to various food venues:
 - Sharkey, J. R. Measuring potential access to food stores and food-service places in rural areas in the U.S. *AJPM* 2009; 36(4 Suppl): S151-5.
- Retail Food Environment Index (RFEI)
 - Babey S, et al. Designed for Disease: The Link Between Local Food Environments and Obesity and Diabetes. April 2008.
 - Spence JC, et al. Relation between local food environments and obesity among adults. *BMC Public Health* 2009;9:192.

The Retail Food Environment Index (RFEI)

The Retail Food Environment Index is constructed by dividing the total number of fast-food restaurants and convenience stores by the total number of grocery stores (including supermarkets) and produce vendors (produce stores and farmers' markets) within a radius around an individual CHS respondent's home (0.5 mile in urban areas, 1 mile in smaller cities and suburban areas, and 5 miles in rural areas).

$$\text{RFEI} = \frac{\# \text{ Fast-Food Restaurants} + \# \text{ Convenience Stores}}{\# \text{ Grocery Stores} + \# \text{ Produce Vendors}}$$

The result is the ratio of retail food outlets around an individual's home that are likely to offer little in the way of fresh fruits and vegetables or other healthy foods to those in which such products are likely to be more readily available. For example, an individual whose RFEI is 2.0 has twice as many fast-food restaurants and convenience stores nearby as grocery stores and produce vendors.



The average local RFEI for California adults is approximately 4.5, meaning that for each grocery store or produce vendor around Californians' homes, there are more than four fast-food restaurants and convenience stores.

Methods used to measure food environments: Community food environment

Jilcott Pitts, S. B., et al. (2013). Associations between access to farmers' markets and supermarkets, shopping patterns, fruit and vegetable consumption, and health indicators among women of reproductive age in eastern North Carolina. *Public Health Nutrition*, 16 (11), 1944-1952.

→ Take home: Used a novel measure of access that took into account hours markets were open (relative to supermarkets) + distance to markets.

→ Among students, greater access was associated with less frequent farmers' market shopping.

Methods used to measure food environments: Community food environment

Crawford, T., et al. (2014). Conceptualizing and Comparing Neighborhood and Activity Space Measures for Food Environment Research. *Health and Place (30)*, 215-225.

→ Take home: Rural participants had larger activity spaces than urban participants.

→ Employed participants had larger participant-defined neighborhood size than unemployed participants.

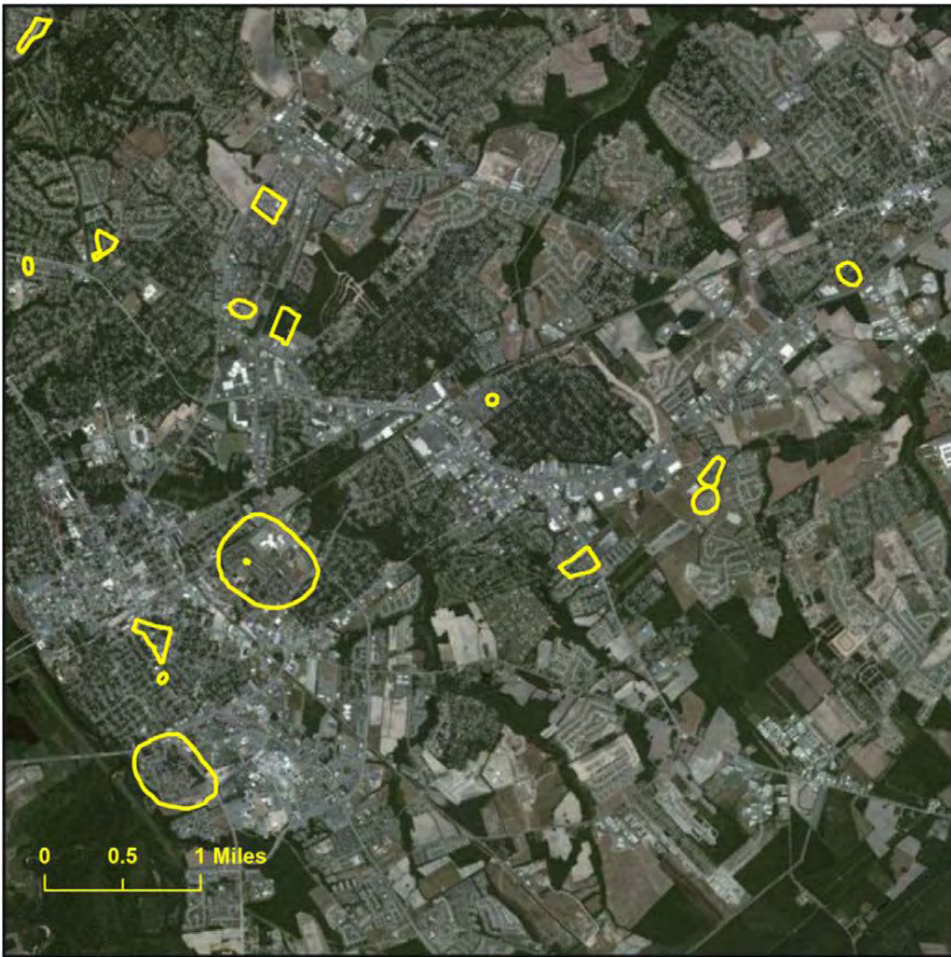


Fig. 2. Self-defined sketch neighborhoods for selected participants, map image randomly rotated for confidentiality.

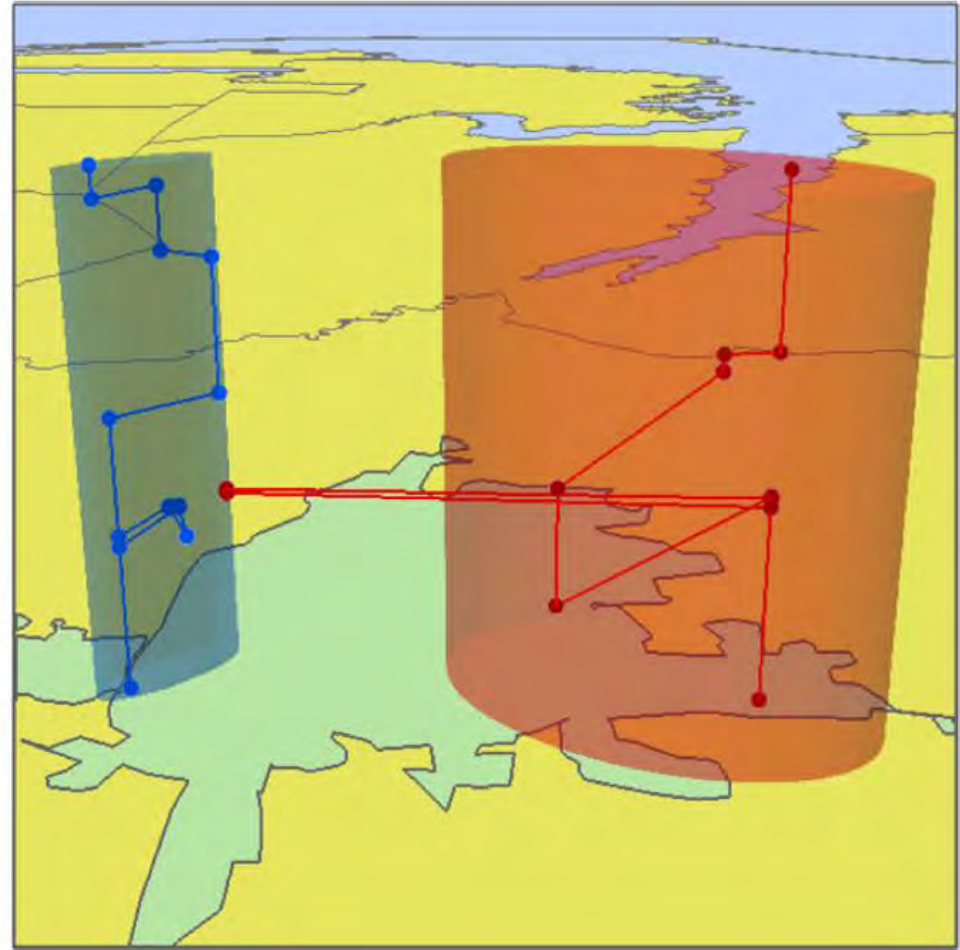


Fig. 4. Time-weighted standard deviational ellipses (SDE) and time-space path for 2 selected participants. Vertical dimension represents a single 24-h day. Paths are for one 24-h day, ellipses are based on a 3-day period, green shaded and bounded area is the city of Greenville NC.

Types of methods used to measure food environments: Community food environment

- **Policy observation form**

- Jilcott Pitts SB., et al. (2015). Disparities in healthy food zoning, farmers' market availability, and fruit and vegetable consumption among North Carolina residents. *Archives of Public Health*, 73, 35.
- → Take home: At the county-level, healthier food zoning was greater in more urban areas and areas with less poverty.
- → At the individual-level, self-reported fruit and vegetable consumption was associated with healthier food zoning.

BTG-COMP FOOD CODE/ POLICY AUDIT FORM--2011

Date: / / Coder: Coding Time (in hrs/mins): Hrs Min

Community Name:	Community Type [Select all that apply]	Policy Source(s) [Select all that apply]	1
State:	Region	On-line publisher	2
State FIPS:	County	Other code publisher	3
County FIPS 1:	Municipality	Community web site	4
County FIPS 2:	Town/Township	Planning/Zoning Office web site	5
Place FIPS:	Other (specify)	Community mail/email	6
	Specify:	Other	7
		No policy (verified)	8
		General code or other but nothing relevant	9
		Missing some policies	10
		Missing all policies (non-responder)	11

A. FOOD STORE PROVISIONS

Categories of districts/zones**	A0. DISTRICT PRESENT		TYPE OF STORE AND USES												
	y	n	a. SUPERMARKETS						b. GROCERY						
			A1. Addressed*		A2. Types of uses*				A1. Addressed*		A234. Types of uses*				
Agricultural	1	0	1	0	2	1	0	1	0	2	1	0	2	1	0
Code reform	1	0	1	0	2	1	0	1	0	2	1	0	2	1	0
Commercial zones	1	0	1	0	2	1	0	1	0	2	1	0	2	1	0
Mixed use zones	1	0	1	0	2	1	0	1	0	2	1	0	2	1	0
Public/Civic/Government/School	1	0	1	0	2	1	0	1	0	2	1	0	2	1	0
Recreation/Open Space	1	0	1	0	2	1	0	1	0	2	1	0	2	1	0
Residential	1	0	1	0	2	1	0	1	0	2	1	0	2	1	0
Applies to all zones/districts	1	0	1	0	2	1	0	1	0	2	1	0	2	1	0

Categories of districts/zones**	DISTRICT PRESENT [x if yes]	c. CONVENIENCE STORES						d. RETAIL SALES GENERAL					
		A1. Addressed*		A2. Types of uses*				A1. Addressed*		A234. Types of uses*			
		y	n	Use				y	n	Use			
Agricultural	1	0	2	1	0	1	0	2	1	0	2	1	0
Code reform	1	0	2	1	0	1	0	2	1	0	2	1	0
Commercial zones	1	0	2	1	0	1	0	2	1	0	2	1	0
Mixed use zones	1	0	2	1	0	1	0	2	1	0	2	1	0
Public/Civ/Government/School	1	0	2	1	0	1	0	2	1	0	2	1	0
Recreation/Open Space	1	0	2	1	0	1	0	2	1	0	2	1	0
Residential	1	0	2	1	0	1	0	2	1	0	2	1	0
Applies to all zones/districts	1	0	2	1	0	1	0	2	1	0	2	1	0

B. RESTAURANT-RELATED PROVISIONS

Categories of districts/zones**	DISTRICT PRESENT [X if yes]	a. FAST FOOD RESTAURANTS						b. FORMULA RESTAURANTS					
		B1. Addressed*		B234. Types of uses*				B1. Addressed*		B234. Types of uses*			
		y	n	Use				y	n	Use			
Agricultural	1	0	2	1	0	1	0	2	1	0	2	1	0
Code reform	1	0	2	1	0	1	0	2	1	0	2	1	0
Commercial zones	1	0	2	1	0	1	0	2	1	0	2	1	0
Mixed use zones	1	0	2	1	0	1	0	2	1	0	2	1	0
Public/Civic/Government/School	1	0	2	1	0	1	0	2	1	0	2	1	0
Recreation/Open Space	1	0	2	1	0	1	0	2	1	0	2	1	0
Residential	1	0	2	1	0	1	0	2	1	0	2	1	0
Applies to all zones/districts	1	0	2	1	0	1	0	2	1	0	2	1	0

Use Allowed=Permitted Use, Conditional Use, or Accessory Use; Prohibit=Prohibited Use; No=Use not specified
 *Do not fill in Addressed if category is not present; Do not fill in Types of Uses if Addressed=No

** Categories of Districts/Zones:
Agricultural: Agricultural
Code Reform: New urbanist, transect, TOD, SmartCode, Form-based code
Commercial: Commercial, downtown, highway, shopping, primarily commercial PUD or mixed types of PUDs, ped-oriented dev/district
Mixed use: Mixed use
Public/civic/government/school: Public civic, government, or schools
Recreation: Recreation, parks, Open Space
Residential: Residential, TND, primarily residential PUD or mixed types of PUDs

BTG-COMP FOOD CODE/POLICY AUDIT FORM - 2011 Community ID

NOTES

B5. Are fast food restaurants prohibited/restricted within a certain distance of schools?	Proh	Rest	No
	2	1	0

Proh=Prohibited; Rest=Restricted; No=No prohibition or restriction

Menu Labeling	B6. Addressed*		B51. Strength of Marker*		
	Yes	No	Req	Enc	No
Menu labeling provisions	1	0	2	1	0
a. Applies to chain restaurants (>20 outlets)	1	0	2	1	0
b. Applies to non-chain restaurants	1	0	2	1	0
c. Applies to vending machines	1	0	2	1	0
d. Includes calorie labeling	1	0	2	1	0
e. Includes fat content labeling	1	0	2	1	0

*Only code if B5=Yes; Req=Requires; Enc=Encourage/Suggested; No=No prohibition or restriction

C. HEALTHY FOOD ACCESS PROVISIONS

Categories of districts/zones**	District Present [X if yes]	a. Farmer's Markets												b. Green/Fresh F&V Carts											
		C1. Addressed*		C234. Types of uses*						C1. Addressed*		C234. Types of uses*													
		y	n	Perm	Cond	Acc	Prohib	No	y	n	Perm	Cond	Acc	Prohib	No										
Agricultural	1	0	4	3	2	1	0	1	0	4	3	2	1	0											
Code reform	1	0	4	3	2	1	0	1	0	4	3	2	1	0											
Commercial zones	1	0	4	3	2	1	0	1	0	4	3	2	1	0											
Mixed use zones	1	0	4	3	2	1	0	1	0	4	3	2	1	0											
Public/Civic/Government/School	1	0	4	3	2	1	0	1	0	4	3	2	1	0											
Recreation/Open Space	1	0	4	3	2	1	0	1	0	4	3	2	1	0											
Residential	1	0	4	3	2	1	0	1	0	4	3	2	1	0											
Applies to all zones/districts	1	0	4	3	2	1	0	1	0	4	3	2	1	0											

Categories of districts/zones**	District Present [X if yes]	c. Mobile Food Vendors/Carts (other than Green/Fresh F&V carts)												d. Urban Agriculture											
		C1. Addressed*		C234. Types of uses*						C1. Addressed*		C234. Types of uses*													
		y	n	Perm	Cond	Acc	Prohib	No	y	n	Perm	Cond	Acc	Prohib	No										
Agricultural	1	0	4	3	2	1	0	1	0	4	3	2	1	0											
Code reform	1	0	4	3	2	1	0	1	0	4	3	2	1	0											
Commercial zones	1	0	4	3	2	1	0	1	0	4	3	2	1	0											
Mixed use zones	1	0	4	3	2	1	0	1	0	4	3	2	1	0											
Public/Civic/Government/School	1	0	4	3	2	1	0	1	0	4	3	2	1	0											
Recreation/Open Space	1	0	4	3	2	1	0	1	0	4	3	2	1	0											
Residential	1	0	4	3	2	1	0	1	0	4	3	2	1	0											
Applies to all zones/districts	1	0	4	3	2	1	0	1	0	4	3	2	1	0											

Categories of districts/zones**	District Present [X if yes]	e. Produce/Fresh F&V Stands												f. Produce/Fruit Market/Stores											
		C1. Addressed*		C234. Types of uses*						C1. Addressed*		C234. Types of uses*													
		y	n	Perm	Cond	Acc	Prohib	No	y	n	Perm	Cond	Acc	Prohib	No										
Agricultural	1	0	4	3	2	1	0	1	0	4	3	2	1	0											
Code reform	1	0	4	3	2	1	0	1	0	4	3	2	1	0											
Commercial zones	1	0	4	3	2	1	0	1	0	4	3	2	1	0											
Mixed use zones	1	0	4	3	2	1	0	1	0	4	3	2	1	0											
Public/Civic/Government/School	1	0	4	3	2	1	0	1	0	4	3	2	1	0											
Recreation/Open Space	1	0	4	3	2	1	0	1	0	4	3	2	1	0											
Residential	1	0	4	3	2	1	0	1	0	4	3	2	1	0											
Applies to all zones/districts	1	0	4	3	2	1	0	1	0	4	3	2	1	0											

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Recreation: Recreation, parks, Open Space
Residential: Residential, TND, primarily residential PUD or mixed types of PUDs

Types of methods used to measure food environments: Consumer food environment

In store observations and audits

- Glanz K, et al. Nutrition Environment Measures Survey in stores (NEMS-S): development and evaluation. *AJPM*. 2007;32(4):282-9.

Shelf space for healthy versus unhealthy foods

- Rose D., et al. Neighborhood food environments and Body Mass Index: the importance of in-store contents. *AJPM*. 2009 Sep;37(3):214-9.

Checklist or market basket of foods

- Mojtahedi, MC, et al. Environmental barriers to and availability of healthy foods for people with mobility disabilities living in urban and suburban neighborhoods. *Arch Phys Med Rehab*. 2008;89(11):2174-9.

**Nutrition Environment Measures Survey (NEMS)
Measure #1: MILK**

Rater ID:

Store ID: ---

Date: / /

Month Day Year

Grocery Store Convenience Store Other

Marking Instructions

Please use a pencil or blue or black ink.

Correct ●

Incorrect ☑ ☒ ☓ ☔

A. Reference Brand

1. Store brand (preferred) Yes No

2. Alternate Brand Name:

Comments: _____

B. Availability

Comments: _____

1. a. Is low-fat (skim or 1%) available? Yes No _____

b. If not, is 2% available? Yes No NA _____

2. Shelf space: (measure only if low fat milk is available)

Type	Pint	Quart	Half gallon	Gallon
a. Skim	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
b. 1%	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
c. Whole	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>

C. Pricing All items should be same brand

Comments: _____

1. Whole milk, quart = .

2. Whole milk, half-gallon = .

3. Skim or 1% milk, quart = .
(Lowest-fat milk available)

4. Skim or 1% milk, half-gallon = .
(Lowest-fat milk available)

Alternate Items:

5. 2%, quart = . N/A

6. 2%, half-gallon = . N/A

**Nutrition Environment Measures Survey (NEMS)
Measure #2: FRUIT**

Rater ID:

Store ID: ---

Date: / /

Month Day Year

Grocery Store Convenience Store Other

Availability and Price

Produce Item	Available		Price	Unit # pc lb	Quality		Comments
	Yes	No			A	UA	
1. Bananas	<input type="radio"/>	<input type="radio"/>	= <input type="text"/> . <input type="text"/>	<input type="text"/>	<input type="radio"/>	<input type="radio"/>	_____
2. Apples	<input type="radio"/>	<input type="radio"/>	= <input type="text"/> . <input type="text"/>	<input type="text"/>	<input type="radio"/>	<input type="radio"/>	_____
	<input type="radio"/> Red delicious						
	<input type="radio"/> _____						
3. Oranges	<input type="radio"/>	<input type="radio"/>	= <input type="text"/> . <input type="text"/>	<input type="text"/>	<input type="radio"/>	<input type="radio"/>	_____
	<input type="radio"/> Navel						
	<input type="radio"/> _____						
4. Grapes	<input type="radio"/>	<input type="radio"/>	= <input type="text"/> . <input type="text"/>	<input type="text"/>	<input type="radio"/>	<input type="radio"/>	_____
	<input type="radio"/> Red seedless						
	<input type="radio"/> _____						
5. Cantaloupe	<input type="radio"/>	<input type="radio"/>	= <input type="text"/> . <input type="text"/>	<input type="text"/>	<input type="radio"/>	<input type="radio"/>	_____
6. Peaches	<input type="radio"/>	<input type="radio"/>	= <input type="text"/> . <input type="text"/>	<input type="text"/>	<input type="radio"/>	<input type="radio"/>	_____
7. Strawberries	<input type="radio"/>	<input type="radio"/>	= <input type="text"/> . <input type="text"/>	<input type="text"/>	<input type="radio"/>	<input type="radio"/>	_____
8. Honeydew Melon	<input type="radio"/>	<input type="radio"/>	= <input type="text"/> . <input type="text"/>	<input type="text"/>	<input type="radio"/>	<input type="radio"/>	_____
9. Watermelon	<input type="radio"/>	<input type="radio"/>	= <input type="text"/> . <input type="text"/>	<input type="text"/>	<input type="radio"/>	<input type="radio"/>	_____
	<input type="radio"/> Seedless						
	<input type="radio"/> _____						
10. Pears	<input type="radio"/>	<input type="radio"/>	= <input type="text"/> . <input type="text"/>	<input type="text"/>	<input type="radio"/>	<input type="radio"/>	_____
	<input type="radio"/> Anjou						
	<input type="radio"/> _____						
11. Total Types: (Count # of yes responses)				<input type="text"/>			

Types of methods used to measure food environments: Consumer food environment

- Nutrition Environment Measures Survey-Stores, restaurants, corner stores, beverages
 - <http://www.med.upenn.edu/nems/measures.shtml>
- Jilcott Pitts et al. A community assessment to inform a multi-level intervention to reduce CVD risk and risk disparities in a rural community. *Fam Community Health*. . 2013 ; 36(2): 135–146. <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4155752/>
 - In general, small grocery (n = 6, scores ranged from 8 – 34) and convenience stores (n = 10, scores ranged from 4 – 14) had the lowest NEMS-S-Rev scores.
 - Dollar stores were next; (n = 2, scores ranged from 19 – 23).
 - Supermarkets had the highest scores (n = 5, scores ranged from 34 – 47), mainly due to higher availability and quality sub-scores.

Nutrition Environment Measures Survey for Beverages (NEMS-B)

The next three slides – come from Dr. Karen Glanz



Rationale for NEMS-B



Public health experts recommend policies to reduce SSB consumption, including changes to marketing, portion size restrictions, and additional taxes.

- In 2012, the New York City Board of Health announced the Portion Cap Rule, which would have required food service establishments to limit beverage containers for SSBs to 16 ounces or less
 - NEMS-B was originally developed to evaluate the impact of the NYC Portion Cap Rule on store and restaurant beverage environments.
- In 2016, the Philadelphia City Council announced its beverage tax of 1.5 cents/oz on sugary and diet beverages.
 - NEMS-BPP was developed to evaluate prices and marketing of beverages before and after the 2017 tax implementation.

The measures have 2 main sections:

Product Availability, Size, and Price

- Fountain beverages
- Single-serving beverages available in bottles, cans, or cartons
- Blended beverages
- Coffee and hot beverages



Promotional Signage

- Beverage portion rule
- Location/content/size of signage within the store or restaurant
- Beverage price promotions (e.g., unlimited refills)

Single Serving Beverages
Measure 1: Soda - Healthy Items

Store ID:

Rater ID:

Date: / /

Does this location sell single serving sodas? Yes No If no, move on to the next measure. If yes, continue.

Comments:

Availability & Price - Healthier Options

		Availability			Price	Tax Shown?			Added Tax*	Sale?		Sale Type	Sale Price for 1 drink	Comment
		YES	NO	NA		No	Yes, Included	Yes, Separate*		YES	NO			
1. Diet Coke	12 oz.	<input type="radio"/>	<input type="radio"/>		\$ <input type="text"/> . <input type="text"/> <input type="text"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	\$ <input type="text"/> . <input type="text"/> <input type="text"/>	<input type="radio"/>	<input type="radio"/>	<input type="text"/> <input type="text"/>	\$ <input type="text"/> . <input type="text"/> <input type="text"/>	<input type="text"/>
	20 oz.	<input type="radio"/>	<input type="radio"/>		\$ <input type="text"/> . <input type="text"/> <input type="text"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	\$ <input type="text"/> . <input type="text"/> <input type="text"/>	<input type="radio"/>	<input type="radio"/>	<input type="text"/> <input type="text"/>	\$ <input type="text"/> . <input type="text"/> <input type="text"/>	<input type="text"/>
	<input type="text"/> . <input type="text"/> oz.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	\$ <input type="text"/> . <input type="text"/> <input type="text"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	\$ <input type="text"/> . <input type="text"/> <input type="text"/>	<input type="radio"/>	<input type="radio"/>	<input type="text"/> <input type="text"/>	\$ <input type="text"/> . <input type="text"/> <input type="text"/>	<input type="text"/>
2. Diet Pepsi	12 oz.	<input type="radio"/>	<input type="radio"/>		\$ <input type="text"/> . <input type="text"/> <input type="text"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	\$ <input type="text"/> . <input type="text"/> <input type="text"/>	<input type="radio"/>	<input type="radio"/>	<input type="text"/> <input type="text"/>	\$ <input type="text"/> . <input type="text"/> <input type="text"/>	<input type="text"/>
	20 oz.	<input type="radio"/>	<input type="radio"/>		\$ <input type="text"/> . <input type="text"/> <input type="text"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	\$ <input type="text"/> . <input type="text"/> <input type="text"/>	<input type="radio"/>	<input type="radio"/>	<input type="text"/> <input type="text"/>	\$ <input type="text"/> . <input type="text"/> <input type="text"/>	<input type="text"/>
	<input type="text"/> . <input type="text"/> oz.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	\$ <input type="text"/> . <input type="text"/> <input type="text"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	\$ <input type="text"/> . <input type="text"/> <input type="text"/>	<input type="radio"/>	<input type="radio"/>	<input type="text"/> <input type="text"/>	\$ <input type="text"/> . <input type="text"/> <input type="text"/>	<input type="text"/>
3. Alternate Brand Diet Soda	12 oz.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	\$ <input type="text"/> . <input type="text"/> <input type="text"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	\$ <input type="text"/> . <input type="text"/> <input type="text"/>	<input type="radio"/>	<input type="radio"/>	<input type="text"/> <input type="text"/>	\$ <input type="text"/> . <input type="text"/> <input type="text"/>	<input type="text"/>
	20 oz.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	\$ <input type="text"/> . <input type="text"/> <input type="text"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	\$ <input type="text"/> . <input type="text"/> <input type="text"/>	<input type="radio"/>	<input type="radio"/>	<input type="text"/> <input type="text"/>	\$ <input type="text"/> . <input type="text"/> <input type="text"/>	<input type="text"/>
	<input type="text"/> . <input type="text"/> oz.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	\$ <input type="text"/> . <input type="text"/> <input type="text"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	\$ <input type="text"/> . <input type="text"/> <input type="text"/>	<input type="radio"/>	<input type="radio"/>	<input type="text"/> <input type="text"/>	\$ <input type="text"/> . <input type="text"/> <input type="text"/>	<input type="text"/>

Item Name:

Calories:

Serving Size: . oz.

Comments:

Sale Type Codes
 RP: Reduced Price
 RQ: Reduced Price for Quantity
 BO: BOGO
 OT: Other Sale (comment)

*Yes, Included: Sign/label indicates that soda tax increased the cost of this item (not beverages generally) and this increase is already included in the price. Yes, Separate: Sign/label indicates that the soda tax increased the cost of this item and the added tax is NOT included in the price—tax will be added at the register. Added tax: If tax shown is "yes, included" or "separate," enter the amount of tax added/included for that item. If specific tax amount is not provided, leave "added tax" blank and explain in comment.

Types of methods used to measure food environments – consumer food environment

- Farmers' market audit tool: impact of improvements
 - Shopping frequency
 - Fruit and vegetable (FV) consumption
 - Audits of farmers' market amenities
 - Signage
 - Payment types accepted (SNAP & EBT)
 - Availability and quality of food and beverage products, with a focus on fruits and vegetables

FM Inventory, v.08

1. **Farmers' Market (FM) Name** (repeat from cover sheet)

Farmers' Market Address (or nearest intersection, e.g. Main St & Cross Ave)

FM City

FM Zip

FM County

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Part 1: Interview

2. **Is this a "producer-only" Farmers' Market?**

Yes No

3. **Is there a Market layout plan available?**

Yes No

4. **Seasonality and business hours of market**

Months	Days	Hours
	<input type="radio"/> Mon <input type="radio"/> Tues <input type="radio"/> Wed <input type="radio"/> Thurs <input type="radio"/> Fri <input type="radio"/> Sat <input type="radio"/> Sun	
	<input type="radio"/> Mon <input type="radio"/> Tues <input type="radio"/> Wed <input type="radio"/> Thurs <input type="radio"/> Fri <input type="radio"/> Sat <input type="radio"/> Sun	
	<input type="radio"/> Mon <input type="radio"/> Tues <input type="radio"/> Wed <input type="radio"/> Thurs <input type="radio"/> Fri <input type="radio"/> Sat <input type="radio"/> Sun	

5. **Does the Farmers' Market receive national, state, or local funding to support the FM?**

National support State support Local funding None

List funders: _____

6. **If yes, is funding partner advertised via signage (or other way) at the Farmers' Market?**

Yes No

7. **Is SNAP/EBT accepted at market?**

Yes, at market manager booth (central point of purchase) Yes, individual vendors No

8. **What forms of payment are accepted at this Farmers' Market?**

Cash Check Credit/debit SNAP WIC

9. **Are the following national incentive programs distributed and/or accepted at this market?**

WIC CVV WIC FMNP Senior FMNP Other _____ N/A

10. **Are there any other local or state-based incentive programs accepted at this market?**

No Yes: Name/s & Amount: _____

11. **Number and type of educational materials distributed by Farmers' Market manager monthly**

# Educational Materials/ Monthly	Type
	<input type="radio"/> Gen. Nutrition <input type="radio"/> Healthy Recipes <input type="radio"/> Incentives <input type="radio"/> Food Safety <input type="radio"/> Other: _____
	<input type="radio"/> Gen. Nutrition <input type="radio"/> Healthy Recipes <input type="radio"/> Incentives <input type="radio"/> Food Safety <input type="radio"/> Other: _____
	<input type="radio"/> Gen. Nutrition <input type="radio"/> Healthy Recipes <input type="radio"/> Incentives <input type="radio"/> Food Safety <input type="radio"/> Other: _____

12. **Number of food education events held, including cooking demonstrations**

_____ /Per month

13. **Do food vendors exclusively sell items at advertised price or do they negotiate deals?**

Advertised price exclusively Advertised price mostly Half/Half
 Negotiate mostly All negotiation Don't know

Types of methods used to measure food environments: Consumer food environment

- ***Bridging the Gap Community Measures Project***

- **In store observation form**

- Jilcott Pitts SB et al. Preferred Healthy Food Nudges, Food Store Environments, and Customer Dietary Practices in 2 Low-Income Southern Communities. J of Nutr Educ and Behav. 2016; 48 (10); 735-742.
- → Take home: Significant association between the primary food store and consumption of fruits and vegetables ($P = .005$) and sugary beverages ($P = .02$).

BTG-COMP - FOOD STORE OBSERVATION FORM - 2012			BUSINESS ID: <u>14-12-</u>	
BUSINESS ID:			CORRESPONDING SEGMENT UNIT ID: _____	
BUSINESS: [REDACTED]			COMPLETION CODE	
ADDRESS: [REDACTED]			COMPLETED	<input type="checkbox"/> 01
DATE: <u>01-18-2017</u> STAFF 1 _____ STAFF 2 _____			PARTIALLY COMPLETED - CODE DISPOSITION	<input type="checkbox"/> 02
START TIME: <u>12:15</u> AM/PM END TIME: <u>1:10</u> AM/PM			NOT STARTED - CODE DISPOSITION	<input type="checkbox"/> 03
LITTERED CIGARETTE PACKS No Cellophane With Cellophane			NOT ELIGIBLE - CODE DISPOSITION	<input type="checkbox"/> 06
Number of bags used: _____			DISPOSITION CODE	
BUSINESS SAMPLE ATTRIBUTES			Temporarily not accessible / Outside business hours	<input type="checkbox"/> 1
Business is within 1/4 mile of index school	<input type="checkbox"/> 0	<input type="checkbox"/> 1	Not safe	<input type="checkbox"/> 2
Business replaces a primary sample observation	<input type="checkbox"/> 0	<input type="checkbox"/> 1	Asked to leave / Observation not allowed by staff	<input type="checkbox"/> 3
NOTES			Address not found	<input type="checkbox"/> 5
			Does not meet study criteria - DESCRIBE IN NOTES	<input type="checkbox"/> 7
			Permanently closed / Does not exist	<input type="checkbox"/> 8
			Other (SPECIFY):	<input type="checkbox"/> 6
A. GENERAL AND CHECK-OUT				
A1. TYPE OF STORE			A4. Does the store have a plexiglass or other divider at the cash register?	
Supermarket (Jewel-Osco, Kroger, Safeway)	<input type="checkbox"/> 1		NO	YES
Grocery (Aldi, Trader Joe's, "mom & pop")	<input checked="" type="checkbox"/> 2		<input checked="" type="checkbox"/> 0	<input type="checkbox"/> 1
Limited Service CODE A1a	<input type="checkbox"/> 3		A5. Number of cash registers (IF 10+, CODE 10)	
A1a. TYPE OF LIMITED SERVICE - CODE ONLY IF A1=3			0.7	
Convenience Store (7-11, White Hen, amp)	<input type="checkbox"/> 1		A6. Fast food or other individual, ready-to eat items available?	
Small Discount Store (Dollar General, 99¢ Store)	<input type="checkbox"/> 2		NO	YES
Drug Store/Pharmacy (CVS, Rite Aid, Walgreens)	<input type="checkbox"/> 3		a. Salads/salad bar	<input checked="" type="checkbox"/> 0 <input type="checkbox"/> 1
Liquor Store (Ryan's Liquor and Mini Mart)	<input type="checkbox"/> 5		b. Sandwiches (cold)	<input checked="" type="checkbox"/> 0 <input type="checkbox"/> 1
Other, SPECIFY:	<input type="checkbox"/> 4		c. Pizza	<input checked="" type="checkbox"/> 0 <input type="checkbox"/> 1
A2. Are these available at CHECK-OUT?			d. Hot dogs/corn dogs/hamburgers	<input checked="" type="checkbox"/> 0 <input type="checkbox"/> 1
a. Candy	<input type="checkbox"/> 0	<input checked="" type="checkbox"/> 1	e. Mexican (tacos, burritos, taquitos, etc.)	<input checked="" type="checkbox"/> 0 <input type="checkbox"/> 1
e. Fresh fruits or vegetables	<input checked="" type="checkbox"/> 0	<input type="checkbox"/> 1	A7. Is 50% or more of the store's inventory beer, wine, and/or liquor?	
c. Bottled water	<input type="checkbox"/> 0	<input checked="" type="checkbox"/> 1	NO	YES
d. Sweetened beverages (soda, etc.)	<input type="checkbox"/> 0	<input checked="" type="checkbox"/> 1	<input checked="" type="checkbox"/> 0	<input type="checkbox"/> 1
A3. Does the store have a...?			J1. Does the store sell any over-the-counter Nicotine Replacement Products?	
a. Bank	<input checked="" type="checkbox"/> 0	<input type="checkbox"/> 1	e.g., Nicorette gum, Commit lozenges, Nicoderm	
b. Pharmacy	<input checked="" type="checkbox"/> 0	<input type="checkbox"/> 1	<input checked="" type="checkbox"/> 0 <input type="checkbox"/> 1	
c. Butcher or fresh meat service counter	<input type="checkbox"/> 0	<input checked="" type="checkbox"/> 1	J2. Does the store sell any tobacco products?	
d. Deli counter	<input checked="" type="checkbox"/> 0	<input type="checkbox"/> 1	IF YES, ATTACH TOBACCO SUPPLEMENT	
e. Bakery	<input checked="" type="checkbox"/> 0	<input type="checkbox"/> 1	<input type="checkbox"/> 0 <input checked="" type="checkbox"/> 1	
NOTES				

B. FRESH PRODUCE												
MARK "X" IF NONE AVAILABLE AND SKIP SECTION B												
BUSINESS ID: <u>14-12-</u>												
IF B1=NO, SKIP B2-B7	B1. AVAILABLE		B2. TYPE		B3. QUALITY		B4. QTY	B5. UNIT	B6. CURRENT PRICE	B7. PRICE TYPE		
	NO	YES	IF None, SKIP B3-B7		POOR*	OK				IF 77.77 (DK), SKIP B7	REG	SPECIAL
a. Apples	<input type="checkbox"/> 0	<input checked="" type="checkbox"/> 1	Red Delicious	<input checked="" type="checkbox"/> 1	<input type="checkbox"/> 1	<input checked="" type="checkbox"/> 2	1	Pound	<input checked="" type="checkbox"/> 1	\$ <u>1.49</u>	<input checked="" type="checkbox"/> 1	<input type="checkbox"/> 2
			Granny Smith	<input type="checkbox"/> 2				Piece	<input type="checkbox"/> 2			
			None of above	<input type="checkbox"/> 8				None of above	<input type="checkbox"/> 8	Loose? <input type="checkbox"/> N <input checked="" type="checkbox"/> Y		
b. Bananas	<input type="checkbox"/> 0	<input checked="" type="checkbox"/> 1	Regular yellow	<input checked="" type="checkbox"/> 1	<input type="checkbox"/> 1	<input checked="" type="checkbox"/> 2	1	Pound	<input checked="" type="checkbox"/> 1	\$ <u>.59</u>	<input checked="" type="checkbox"/> 1	<input type="checkbox"/> 2
			None of above	<input type="checkbox"/> 8				Piece	<input type="checkbox"/> 2			
			None of above	<input type="checkbox"/> 8				None of above	<input type="checkbox"/> 8	Loose? <input type="checkbox"/> N <input checked="" type="checkbox"/> Y		
c. Oranges	<input type="checkbox"/> 0	<input checked="" type="checkbox"/> 1	Navel	<input checked="" type="checkbox"/> 1	<input type="checkbox"/> 1	<input checked="" type="checkbox"/> 2	1	Pound	<input type="checkbox"/> 1	\$ <u>.49</u>	<input checked="" type="checkbox"/> 1	<input type="checkbox"/> 2
			Valencia	<input type="checkbox"/> 2				Piece	<input checked="" type="checkbox"/> 2			
			None of above	<input type="checkbox"/> 8				None of above	<input type="checkbox"/> 8	Loose? <input type="checkbox"/> N <input checked="" type="checkbox"/> Y		
d. Grapes	<input type="checkbox"/> 0	<input checked="" type="checkbox"/> 1	Red Seedless	<input checked="" type="checkbox"/> 1	<input type="checkbox"/> 1	<input checked="" type="checkbox"/> 2	1	Pound	<input checked="" type="checkbox"/> 1	\$ <u>2.69</u>	<input checked="" type="checkbox"/> 1	<input type="checkbox"/> 2
			Green	<input type="checkbox"/> 2				Bunch	<input type="checkbox"/> 2			
			None of above	<input type="checkbox"/> 8				None of above	<input type="checkbox"/> 8	Loose? <input type="checkbox"/> N <input type="checkbox"/> Y		
e. Carrots	<input type="checkbox"/> 0	<input checked="" type="checkbox"/> 1	Full-sized	<input checked="" type="checkbox"/> 1	<input type="checkbox"/> 1	<input checked="" type="checkbox"/> 2	1	Pound	<input checked="" type="checkbox"/> 1	\$ <u>.89</u>	<input checked="" type="checkbox"/> 1	<input type="checkbox"/> 2
			Baby-sized	<input type="checkbox"/> 2				Bunch	<input type="checkbox"/> 2			
			None of above	<input type="checkbox"/> 8				None of above	<input type="checkbox"/> 8	Loose? <input checked="" type="checkbox"/> N <input type="checkbox"/> Y		
f. Tomatoes	<input type="checkbox"/> 0	<input checked="" type="checkbox"/> 1	Regular slicing	<input checked="" type="checkbox"/> 1	<input type="checkbox"/> 1	<input checked="" type="checkbox"/> 2	1	Pound	<input checked="" type="checkbox"/> 1	\$ <u>.99</u>	<input checked="" type="checkbox"/> 1	<input type="checkbox"/> 2
			Roma	<input type="checkbox"/> 2				Piece	<input type="checkbox"/> 2			
			None of above	<input type="checkbox"/> 8				None of above	<input type="checkbox"/> 8	Loose? <input checked="" type="checkbox"/> N <input checked="" type="checkbox"/> Y		
g. Broccoli	<input type="checkbox"/> 0	<input checked="" type="checkbox"/> 1	Bunch	<input type="checkbox"/> 1	<input type="checkbox"/> 1	<input checked="" type="checkbox"/> 2	1	Pound	<input checked="" type="checkbox"/> 1	\$ <u>1.99</u>	<input checked="" type="checkbox"/> 1	<input type="checkbox"/> 2
			Crown	<input checked="" type="checkbox"/> 2				Bunch	<input type="checkbox"/> 2			
			None of above	<input type="checkbox"/> 8				None of above	<input type="checkbox"/> 8	Loose? <input checked="" type="checkbox"/> N <input type="checkbox"/> Y		
h. Lettuce	<input type="checkbox"/> 0	<input checked="" type="checkbox"/> 1	Iceberg	<input checked="" type="checkbox"/> 1	<input type="checkbox"/> 1	<input checked="" type="checkbox"/> 2	1	Pound	<input type="checkbox"/> 1	\$ <u>1.69</u>	<input checked="" type="checkbox"/> 1	<input type="checkbox"/> 2
			Romaine	<input type="checkbox"/> 2				Head	<input checked="" type="checkbox"/> 2			
			None of above	<input type="checkbox"/> 8				None of above	<input type="checkbox"/> 8	Loose? <input checked="" type="checkbox"/> N <input type="checkbox"/> Y		
B8. Total number of Fresh Fruit options							20 (IF 20+, CODE 20)					
B9. Total number of Fresh Vegetable options							20 (IF 20+, CODE 20)					
NOTES												
Each broccoli price per pound is different.												

* ≥ 25% of product batch is poor quality

Limitations: Community food environment measures

- Most tools are geography based and do not account for features of the consumer food environment.
 - Need to combine consumer and community food environments.
- Inaccuracy of secondary data sources for finding food venues.
 - Especially in rural areas.
- Transience of food venues.
- Defining 'healthy' versus 'unhealthy' food venues.
- Difficult to determine what a "neighborhood" is.
- Proximity not always equal to use.

Limitations: Consumer food environment measures

- Some tools measure mostly healthy foods.
- Few tools assess food environment features related to impulse purchases.
- Most tools take a long time to complete!
- Validity of some tools may not be firmly established.

Roles of geography and rurality in producing food environments that promote obesity

- Rural food environment—Rural food deserts and food insecurity.
- Food access issues—Lack of geographic access can promote purchase of calorically dense items with longer shelf-lives.
- Long commute times—Increase exposure to fast, convenient food; less time for cooking;
- Rural “food culture”

Food Deserts – More prevalent in low-income rural areas

Table 2-3

Household vehicle access and supermarket access

Geographic area	Total households ¹	Households without access to a vehicle			
		Between 1/2 to 1 mile from a supermarket		More than 1 mile from a supermarket	
		Number	Percent	Number	Percent
	<i>Millions</i>	<i>Millions</i>		<i>Millions</i>	
Total U.S.	104.9	3.4	3.2	2.4	2.3
Low-income areas	25.1	1.6	6.4	0.9	3.8
Urban areas	69.9	2.9	4.1	1.1	1.5
Low-income areas	15.6	1.3	8.3	0.4	2.5
Urban clusters	9.7	0.4	4.1	0.2	2.5
Low-income areas	3.6	0.2	5.6	0.1	3.3
Rural areas	25.3	0.2	0.8	1.1	4.4
Low-income areas	5.9	0.1	1.7	0.4	7.4



¹ This column shows the total number of households regardless of vehicle access.

Source: USDA, ERS analysis based on data from Census of Population, 2000 and the ERS-compiled supermarket directory for the contiguous U.S. in 2006.

Food Insecurity in the U.S.

In 2012, 14.5 percent (17.6 million households) were food insecure.

- Food-insecure households (those with low and very low food security) had difficulty at some time during the year providing enough food for all their members due to a lack of resources.
- **Food insecurity was more common in large cities and rural areas than in suburban areas and exurban areas around large cities.**
- <http://www.ers.usda.gov/media/1183208/err-155.pdf>

Rural obesity, food deserts, and food insecurity

- Higher prevalence of obesity in rural vs urban areas.
- Complex interplay between lower access to healthy foods and food insecurity.

Regardless, the greater distances and greater amounts of time rural dwellers must spend to procure healthy food in general is an impediment to access. For instance, we know that increased travel time is associated with decreased grocery-shopping frequency in some rural communities.⁴ To maximize shopping efficiency and minimize the time spent driving, rural residents often make large-volume shopping trips once monthly to supercenters,⁵

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LETTER TO THE EDITOR

The Concept of “Rural Food Deserts” Is Still Meaningful

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