Measuring the Food Environment in Minority Communities: Approaches, Challenges and Application

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To explore conceptual frameworks for understanding the food environment
- Not centering on schools or homes
- To understand some of the challenges in characterizing the food environment in different ethnic minority settings
- To provide case studies describing the food environment in different minority communities
- To consider how to apply this information to measure the food environment
- To consider the application of this information for interventions to change the food environment

Access to supermarkets linked to healthy food consumption, overall dietary quality
- Fewer supermarkets on AI reservations
  - Often do not carry a wide range of foods
- Most AIs are dependent on gas station stores
  - Primarily stock unhealthy foods (e.g., sodas, chips, candy)
  - Availability of produce is low
- Accessing affordable, high quality healthy foods often requires travel 30+ miles off reservation
  - (Gittelsohn 2002, 2009)

Food environment in American Indian communities
- Few supermarkets on AI reservations
  - Often do not carry a wide range of foods
- Most AIs are dependent on gas station stores
  - Primarily stock unhealthy foods (e.g., sodas, chips, candy)
  - Availability of produce is low
- Accessing affordable, high quality healthy foods often requires travel 30+ miles off reservation
  - (Gittelsohn 2002, 2009)

Food Environment Research in African Americans
- Access to supermarkets linked to healthy food consumption, overall dietary quality
- Less access to supermarkets and diverse food outlets in low-income and African American communities
- Lower availability of healthful options in low-income and African American communities
- Limited understanding of the pathways that contribute to the association between food environments and diet

Sources: (Cheadle, 1991; Morland, Wing and Diez Roux, 2002; Morland et al., 2002; Laraia et al., 2004; Blair et al, 2005; Zenk et al, 2005; Franco et al 2008, 2009)

Food Environment and Obesity
- Fewer supermarkets = more obesity (Morland et al 2006)
- Greater distance to grocery store = more obesity (Inagami et al 2006)
- More conveniences stores = more overweight (Morland et al 2006)
- More fast-food outlets = more obesity (Maddock, 2004; Sturm and Datar 2005)

Model of the Food Environment
(modified from Glanz, Sallis, Saelens, & Frank 2005)

- Policy Variables
- Environmental Variables
- Individual and Household Variables
- Behavior
- Government and Industry Policy
- Community Nutrition Environments
  - Type & Location of Food Outlets
  - Accessibility
- Organizational Nutrition Environments
  - Home
  - Work
  - School
  - Other
- Consumer Nutrition Environment
  - Available healthy options
  - Price, promotion, placement
  - Nutrition Information
- Food Supply
  - Producers, Manufacturers, Wholesalers, Distributors
- Information Environment
  - Media, Advertising
- Chronic Disease
- Psychosocial Factors
- Sociodemographic
Challenges
- Variation and complexity
  - How to define access? Is it only availability and cost? Are there other relevant components?
  - Deciding on which parts of that complexity to document: Components of access
  - Other aspects of the environment (besides the physical environment)
  - Actual diet (i.e., behavior)
  - Relevance for developing and evaluating intervention programs
  - What solutions make the most sense for documenting the food environment in the most meaningful, and yet parsimonious manner?

Case Settings
- Baltimore City
- American Indians
- First Nations
- Marshall Islands

Increasing remoteness

Case: Baltimore City
- Setting: low income East and West Baltimore
- Group 1: African American store customers
- Group 2: Korean American corner store owners

Food Environment in Baltimore City
- Food source use (%) in Baltimore in past 30 days
  - Supermarket 100%
  - Fast-Food 73%
  - Carry-out 74%
  - Corner stores 65%
- 1000-2000 Korean-American merchants in Baltimore City
  - 550-600 KA merchants have grocery stores or food service areas
Average Monthly Expenditures by Food Sources in Baltimore

Prepared food sources: $268

Palmer et al 2007

Healthy Foods Availability, n=176 Baltimore stores (Franco et al 2008)

<table>
<thead>
<tr>
<th>Type of food stores (n=176)</th>
<th>Healthy Food Availability Index, mean (range 0-27)</th>
<th>Skim Milk, %</th>
<th>Fruit, %</th>
<th>Vegetables, %</th>
<th>Whole Wheat Bread, %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Supermarkets (16)</td>
<td>19.0</td>
<td>100</td>
<td>25</td>
<td>13</td>
<td>100</td>
</tr>
<tr>
<td>Grocery/ corner Stores (107)</td>
<td>4.4</td>
<td>25</td>
<td>43</td>
<td>57</td>
<td>8</td>
</tr>
<tr>
<td>“Behind the glass” stores (26)</td>
<td>2.0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Convenience stores (33)</td>
<td>3.8</td>
<td>36</td>
<td>33</td>
<td>21</td>
<td>24</td>
</tr>
</tbody>
</table>

Carryouts

Case: American Indian reservations

› Setting: Navajo Nation
Cornell-Radimer scale used

Eabamet Lake
Bearskin Lake

Food insecurity in Navajo households

![Food Store](image)

Case: First Nations reserves

![Map of NW Ontario](image)
Case: Pacific Islands
- Republic of the Marshall Islands
Methods Used to Assess/Understand the Food Environment

- Food source checklists
- In-depth interviews with food source owners/managers, community members
- Direct observation
- Community workshops

Components of the Community Food Environment

- Physical
- Consumer
- Social

- Glanz K et al 2005

Measuring the Food Environment in Diverse Settings: Physical Aspects

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>Low income Baltimore City</th>
<th>American Indian reservations</th>
<th>First Nations reserves</th>
<th>Marshall Islands</th>
</tr>
</thead>
<tbody>
<tr>
<td>Types of retail food outlets</td>
<td>Great diversity of food outlets, with a preponderance of small corner stores in inner city areas</td>
<td>Few supermarkets, many gas station stores</td>
<td>Few supermarkets, usually have 1-2 chain supermarkets, 1-2 smaller stores</td>
<td>Few supermarkets, many small stores, kiosks</td>
</tr>
<tr>
<td>Preprepared food sources</td>
<td>Carryout restaurants widely available. Fast food and gas station stores, delis; fast food restaurants limited availability, except in nearby towns.</td>
<td>Limited availability.</td>
<td>Limited availability.</td>
<td></td>
</tr>
</tbody>
</table>
Measuring the Food Environment in Diverse Settings: Physical Aspects

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<th>Marshall Islands</th>
</tr>
</thead>
<tbody>
<tr>
<td>Availability of</td>
<td>None to very little (farmers</td>
<td>Low (seasonal local vendors)</td>
<td>Moderate</td>
<td>All food stores open, except small kiosks</td>
</tr>
<tr>
<td>locally gathered/</td>
<td>markets, community gardens)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Accessibility of food (store layout)

- **Great variation in openness of stores.** Many opened only for regular customers.
- **Varies, depending on store size**

Baltimore City: Importance of store layout (“closedness”)

- **Very open:** like most supermarkets
- **Mostly open:** Store managers in a glass compartment, rest of store open
- **Mostly closed:** customers kept in an anteroom, only 1-2 regular customers let in at a time
- **Completely closed:** Customers never allowed to physically touch the food before purchasing

Level of closedness influences the level of social engagement possible with store owners

What other aspects of the physical environment may be relevant in specific settings?
### Measuring the Food Environment in Diverse Settings: Consumer Aspects

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<tbody>
<tr>
<td>Availability of fresh produce</td>
<td>Low, Limited to a few foods in smaller stores</td>
<td>Moderate. Depends on distance to supermarkets.</td>
<td>Low.</td>
<td>Low, though some local produce available</td>
</tr>
<tr>
<td>Food Supply (quantity)</td>
<td>Sufficient</td>
<td>Sufficient</td>
<td>Low levels of perishable foods and produce much of the year</td>
<td>Seasonal variation in the availability of produce</td>
</tr>
</tbody>
</table>

### Produce availability

- **Baltimore corner stores:** Common
- **First Nations supermarkets:** Limited selection/availability

### Measuring the Food Environment in Diverse Settings: Consumer Aspects

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</tr>
</thead>
<tbody>
<tr>
<td>Acceptance of food stamps, WIC</td>
<td>High</td>
<td>Moderate (FS in 2 stores, WIC in none), FDPIR</td>
<td>Not available</td>
<td>High. Most foods imported, and participate in US food assistance programs</td>
</tr>
<tr>
<td>Presence of health signage</td>
<td>Low</td>
<td>Moderate</td>
<td>Low</td>
<td>Low</td>
</tr>
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### Measuring the Food Environment in Diverse Settings: Consumer Aspects

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<tr>
<td>Presence of health signage</td>
<td>Low</td>
<td>Moderate</td>
<td>Low</td>
<td>Not available</td>
</tr>
<tr>
<td>Pricing, Costs</td>
<td>Moderate, High fat, high sugar foods tend to be inexpensive</td>
<td>Moderate</td>
<td>High for perishable foods (flown in remote reserves), increasing for hunting/fishing</td>
<td>High for imported foods</td>
</tr>
</tbody>
</table>
Food dumping
- Marketing unwanted high-fat animal by-products
- Examples: Turkey tails/necks, Mutton flaps

Price changes (gouging)

Cleanliness

In prepared food sources:
- Cooking methods used
- Condiments available
- Quality of signage

What other aspects of the consumer food environment?

Measuring the Food Environment in Diverse Settings: Social Aspects

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Low income</th>
<th>American</th>
<th>First Nations</th>
<th>Marshall Islands</th>
</tr>
</thead>
<tbody>
<tr>
<td>Food quality concerns</td>
<td>High</td>
<td>Moderate</td>
<td>Moderate</td>
<td>Moderate</td>
</tr>
<tr>
<td></td>
<td>Perceived</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>high levels of expired, poor quality foods</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Interhousehold food sharing</td>
<td>Rare</td>
<td>Rare, except in times of community events</td>
<td>Common in more remote reserves for local foods</td>
<td>Common in extended family compounds for local foods</td>
</tr>
<tr>
<td>Perceived safety around stores</td>
<td>Low-Moderate</td>
<td>High</td>
<td>High</td>
<td>High</td>
</tr>
<tr>
<td>Language and cultural factors</td>
<td>High</td>
<td>Moderate</td>
<td>Moderate</td>
<td>Moderate</td>
</tr>
<tr>
<td></td>
<td>Asian</td>
<td>Most smaller stores owned and operated locally</td>
<td>Most smaller stores owned and operated locally</td>
<td>Many stores owned and operated by Marshallese, but some now owned by recent Asian immigrants</td>
</tr>
<tr>
<td></td>
<td>American</td>
<td>Managers of supermarkets usually not local</td>
<td>Managers of supermarkets usually not local</td>
<td></td>
</tr>
</tbody>
</table>

Korean American owners expressed negative experiences with AA low-income customers such as moosi (disrespect, look down on)

“They don’t have any etiquette. You know that we (Koreans) don’t like when people throw money at registers in Korea. It is very rude thing in our culture. But they always throw money into the revolving counter. And if I ask something twice, they raise their voice and curse at you…”

- Korean female carryout owner

Customers expressed that some Korean American owners are rude and disengaged from the community.

“They don’t say hi to you, they are like robots…they don’t live here, just come in and all they care about is making money, and then leave. They don’t care about the community…”

- AA female customer

Healthier foods generally cost more (e.g. turkey vs. chicken) and this means more expense for owner

Owner doesn’t recoup the extra cost or make profit because of low demand for these healthy items

Short shelf-life of healthy foods limits owners to stock healthy foods

“We used to have chicken salad on the menu, but no one buys them and lettuce goes bad very quickly. We can’t afford that cost. So we don’t have it anymore.”

- Korean female carryout owner

Economic Barriers perceived by Carryout Owners
Other aspects of the social environment?

Expanding Our Instruments
- Add relevant Components of the Food Environment
  - Community (physical) food environment
    - Types and locations of food outlets
    - Accessibility (hours, openness, drive through)
  - Consumer food environment
    - Availability, pricing, promotion, placement of foods
    - Store layout
    - Information availability
  - Social aspects of the food environment
    - Need to understand the different populations in your study setting
    - Why things are the way they are

Expanding Our Instruments
- Add items that reflect what you hope will be changed after your intervention is completed
  - Foods you intend to have stocked
  - Presence of new FV display
  - Food preparation methods used
  - Layout of the store
  - Etc.

Focusing Our Instruments

Level of detail needed to assess food environment depends on:
- Formative research results
- Community engagement and felt needs
- Purpose or goal of research
  - Monitoring or tracking interventions? versus Descriptive; trying to determine associations
- If goal is evaluation, perhaps only specific program impacts need be assessed

Formative Research for Intervention
- To determine the salient features of the food environment (from local perspective), including aspects of the physical, consumer and social environments
- To identify those foods to intervene on (to promote or to try to reduce consumption)
- To determine what resonates with community members
Formative Research – 1

- Information gathering that precedes structured data collection and implementation of interventions
- Used to develop culturally appropriate interventions
- Used to design data collection instruments
- Especially useful when there is a human behavioral element
- Tends to be most relevant to local settings

Formative Research – 2

- May involve a variety of qualitative and quantitative approaches
- Usually multi-stage and iterative:
  - Stage 1: Exploratory; what do people think about x, y and z?
  - Stage 2: Exploration of intervention approaches
  - Stage 3: Testing of specific intervention materials

Community Engagement

- Where do we learn most of the NEW things about the food environment?
- Where do we learn the most relevant aspects of CONTEXT?
- Some sort of community process is crucial

Community Process

- Workshops an effective community process tool
  - Builds support and anticipation for the work
- Who should be present:
  - Key stakeholders, community members
- Duration: 1-2 days
- Process: Document everything, no judgment

Gittelsohn et al, AJHB, 2010

Brainstorming a list of problem foods

- Only measure what you need to measure - - what you think or hope will change
- Cover physical, consumer and social aspects of access to healthy foods -- if these are part of your evaluation strategies
- Focus only on key promoted and demarketed foods and behaviors

So how can we make our program evaluation tools simpler?
Examples

- Baltimore
  - Retail food stores
  - Prepared food sources
- Navajo

Characteristics of retail food sources within 1/4 mile of Baltimore City Schools

<table>
<thead>
<tr>
<th>School</th>
<th>Food sources completed</th>
<th>Supermarket</th>
<th>Large/medium/mkt.</th>
<th>Food</th>
<th>Convenience</th>
<th>Carryout</th>
<th>Milk (&lt;=2%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>West Baltimore</td>
<td>3</td>
<td>1</td>
<td>3 (3 surveys)</td>
<td>1</td>
<td>6</td>
<td>5</td>
<td>3</td>
</tr>
<tr>
<td>Harford Heights Ele</td>
<td>11</td>
<td>11</td>
<td>6</td>
<td>1</td>
<td>6</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>East Baltimore</td>
<td>11</td>
<td>8</td>
<td>3</td>
<td>0</td>
<td>9</td>
<td>3</td>
<td>13</td>
</tr>
<tr>
<td>Lombard Middle</td>
<td>14</td>
<td>7</td>
<td>3</td>
<td>1</td>
<td>2</td>
<td>2</td>
<td>6</td>
</tr>
</tbody>
</table>

*excludes restaurant and carryout stores or those closed upon visit

Carryout Definition
- Takeout only carry out: A restaurant that does not have tables and/or chairs and sells ready to eat foods; the patron orders and pays before eating
- Carryout with table: A restaurant with tables and chairs; food services are given after patrons order and pay

Corner store Definition
- Corner store with a deli: A retail food store that sells ready to eat prepackaged foods, such as deli meats and cheeses, and/or other menu items that do not require a hot stove top
- Corner store with takeout: A retail food store that sells foods requiring hot food equipment, such as fryers or food warmers
- Fast food chain restaurant: A corporation-operated "brand name" fast food business; the customer orders and pays before eating
- Sit down restaurant: An establishment with tables and servers; a patron orders food and is served while seated, and then pays after eating (does not include fast food chain restaurants)

Assessing the prepared food environment in Baltimore

- Prepared food sources checklist
  - Type of prepared food source
  - Availability of 44 key healthy foods by category (14 entrees; 12 side dishes; 7 breakfast foods; 3 desserts; 11 drinks)
  - Features of the food source (e.g., health information posted, diet fountain drink options, salad bar presence)
  - Types of healthy foods offered (e.g., whole wheat bread, low fat, low calorie condiments)
  - The cost of the most and least expensive entree
13

**Prepared Food Sources in Baltimore**

- A total of 144 Prepared Food Sources (PFSs) were observed (ground-truthing method) in low-income neighborhoods of Baltimore
  - 70% Carry-out (n=89)
  - 15% corner stores with deli/take-out
  - 10% Fast food restaurants
  - 5% Sit-down restaurants


---

**Healthy features of PFSs in low income neighborhoods in Baltimore City, n=92**

<table>
<thead>
<tr>
<th>Healthy choice offered</th>
<th>Total</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low fat meat offered for subs or sandwiches</td>
<td>77</td>
<td>83.7%</td>
</tr>
<tr>
<td>Vegetable toppings offered for sandwiches (e.g. tomato, lettuce, onions)</td>
<td>38</td>
<td>41.3%</td>
</tr>
<tr>
<td>Reduced size portions offered</td>
<td>37</td>
<td>40.2%</td>
</tr>
<tr>
<td>Choice of healthy sides (cooked veggies, salads, baked chips)</td>
<td>22</td>
<td>23.9%</td>
</tr>
<tr>
<td>Whole wheat bread available for sandwiches</td>
<td>10</td>
<td>10.9%</td>
</tr>
<tr>
<td>Promotion/ advertisement of healthy foods</td>
<td>5</td>
<td>5.4%</td>
</tr>
<tr>
<td>Health related signs (nutrition or not)</td>
<td>5</td>
<td>5.4%</td>
</tr>
<tr>
<td>Calorie or other nutrition information for foods on menu</td>
<td>4</td>
<td>4.3%</td>
</tr>
</tbody>
</table>

**Interior of Carryouts**

**Availability of healthy foods by food source type in the Baltimore (N=92)**

<table>
<thead>
<tr>
<th>Type of formative research</th>
<th># completed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Food source checklist</td>
<td>151</td>
</tr>
<tr>
<td>Dietary recalls</td>
<td>79</td>
</tr>
<tr>
<td>IDIs community members</td>
<td>18</td>
</tr>
<tr>
<td>IDIs health staff</td>
<td>8</td>
</tr>
<tr>
<td>IDIs store management/staff</td>
<td>6</td>
</tr>
<tr>
<td>Materials review</td>
<td>41</td>
</tr>
</tbody>
</table>
No price assessment

### Type of Food Source by Location

<table>
<thead>
<tr>
<th>Food Source</th>
<th>On Navajo Nation</th>
<th>Off Navajo Nation, Commonly Used</th>
<th>Total (N)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Convenience/ Gas Station</td>
<td>42</td>
<td>12</td>
<td>54</td>
</tr>
<tr>
<td>Small Store</td>
<td>18</td>
<td>5</td>
<td>23</td>
</tr>
<tr>
<td>Trading Post</td>
<td>16</td>
<td>11</td>
<td>27</td>
</tr>
<tr>
<td>Supermarket</td>
<td>12</td>
<td>20</td>
<td>32</td>
</tr>
<tr>
<td>Medium Store</td>
<td>9</td>
<td>0</td>
<td>9</td>
</tr>
<tr>
<td>Flea Market</td>
<td>4</td>
<td>0</td>
<td>4</td>
</tr>
<tr>
<td>Farmer’s Market</td>
<td>0</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>USDA/Tribal Commodity Food Distribution</td>
<td>0</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>101</td>
<td>50</td>
<td>151</td>
</tr>
</tbody>
</table>

### Availability of Different Types of Healthier Foods on Navajo Nation (1)

<table>
<thead>
<tr>
<th>Food Items</th>
<th>N</th>
<th>% of Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bottled Water</td>
<td>100</td>
<td>99.0</td>
</tr>
<tr>
<td>Diet Soda</td>
<td>96</td>
<td>95.1</td>
</tr>
<tr>
<td>Fruit Juice</td>
<td>92</td>
<td>91.1</td>
</tr>
<tr>
<td>Canned Fruits</td>
<td>83</td>
<td>82.2</td>
</tr>
<tr>
<td>Fresh Fruits</td>
<td>80</td>
<td>79.2</td>
</tr>
<tr>
<td>Canned Vegetables</td>
<td>75</td>
<td>74.3</td>
</tr>
<tr>
<td>Pretzels</td>
<td>75</td>
<td>74.3</td>
</tr>
<tr>
<td>Baked Chips/tortilla chips/baked cheetos</td>
<td>73</td>
<td>72.3</td>
</tr>
<tr>
<td>Low Sugar Cereals</td>
<td>69</td>
<td>68.3</td>
</tr>
<tr>
<td>High Fiber Cereals</td>
<td>68</td>
<td>67.3</td>
</tr>
</tbody>
</table>

### Availability of Different Types of Healthier Foods on Navajo Nation (2)

<table>
<thead>
<tr>
<th>Food Items</th>
<th>N</th>
<th>% of Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Liquid Oils</td>
<td>66</td>
<td>65.4</td>
</tr>
<tr>
<td>Artificial Sweetener</td>
<td>64</td>
<td>63.4</td>
</tr>
<tr>
<td>Whole Wheat Bread</td>
<td>56</td>
<td>55.5</td>
</tr>
<tr>
<td>Low Fat Milk</td>
<td>49</td>
<td>48.5</td>
</tr>
<tr>
<td>Frozen Vegetables</td>
<td>47</td>
<td>46.5</td>
</tr>
<tr>
<td>Cooking Spray</td>
<td>45</td>
<td>44.8</td>
</tr>
<tr>
<td>Salt Substitute</td>
<td>33</td>
<td>32.7</td>
</tr>
<tr>
<td>Fresh Vegetables*</td>
<td>29</td>
<td>28.7</td>
</tr>
<tr>
<td>Lean or extra lean ground meat</td>
<td>19</td>
<td>18.8</td>
</tr>
<tr>
<td>Low Fat Creamer</td>
<td>9</td>
<td>8.9</td>
</tr>
</tbody>
</table>

* More than two types of fresh vegetables

### Current Picture: Number of Healthy Foods Available Now in Navajo Nation Stores

- **Mean = 12.5, SD=4.6**

- **Number of Healthy Food Options**

- **Healthy Food Options**

- **Navajo Nation Map**
Summary

- Data collection on the food environment would be enhanced by including aspects of the physical, consumer and social factors.
- Many of these factors are critically important in certain minority settings.
- How much data do we really need? Importance of focus for environmental assessment.
- If purpose is intervention, instruments can be simplified to assess key evaluation dimensions.

Ways to Change the Food Environment

1. Changing access to foods within retail food stores & prepared food sources by:
   - Decreasing availability of less healthy foods
   - Increasing availability of healthy foods in small stores
   - Changing the physical location of foods (e.g., store layout)
   - Store renovations (e.g., adding refrigeration units for produce)
   - Manipulating price

2. Changing access to foods within neighborhoods by:
   - Building new supermarkets
   - Developing farmer’s markets
   - Improving transportation
   - Changing setting for provision of information (e.g., POP promotions)

3. Changing setting for provision of information (e.g., POP promotions)

4. Other approaches:
   - Improving food networks (distributors, producers, retailers)
   - Improving local production (producers)
   - Increasing nutrient content of foods (manufacturers)
   - Changing packaging of foods (manufacturers)

Policy

- Setting small store criteria/standards
- Menu labeling
- Rezoning
- Taxes (E.g., SSB tax)

Work in multiple settings/ institutions at the same time

- Integrating interventions in food stores, restaurants, schools, worksites, etc.
Some questions

- Which approach most effective?
- Which combination of approaches are needed?
- How to develop/select approaches?
- Which approaches are more cost-effective – for all stakeholders?
- How to enhance sustainability?

Healthy Store program components

- Common elements
  - Increasing healthy food availability
  - Small store owner incentives
  - Signage (shelf labels, posters)
  - Interactive sessions (giveaways, taste tests)

- Differing elements
  - Korean American materials (BHS, BHEZ)
  - Recreation center training/component (BHEZ)
  - School curriculum (ZA, OPREVENT)
  - Physical activity (ZA, HBHS, OPREVENT)
  - Work with producers (HFH)
  - Work with wholesalers (BHRR, BHCK)

New directions in the healthy stores work

- Modifying the prepared food source environment
- Price manipulation
- Changing policy

Summary of Healthy Stores Environmental Interventions: Results of Completed Trials

<table>
<thead>
<tr>
<th>Program</th>
<th>Population</th>
<th>Reduced Significant Impacts Observed</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Consumer psychosocial</td>
</tr>
<tr>
<td>Marshall Islands Healthy Stores</td>
<td>Pacific Islander adults</td>
<td>Knowledge</td>
</tr>
<tr>
<td>Apache Healthy Stores</td>
<td>American Indian adults</td>
<td>Knowledge</td>
</tr>
<tr>
<td>Zinna-panewin Niimogeann (Hawaii)</td>
<td>First Nations adults</td>
<td>Knowledge</td>
</tr>
<tr>
<td>Healthy Foods</td>
<td>Pacific Islander adults and children</td>
<td>Caregiver knowledge</td>
</tr>
<tr>
<td>Navajo Healthy Stores</td>
<td>American Indian adults</td>
<td>Self-efficacy</td>
</tr>
<tr>
<td>Baltimore Healthy Stores</td>
<td>African American adults</td>
<td>Intentions</td>
</tr>
<tr>
<td>Baltimore Healthy Eating Zones</td>
<td>African American youth</td>
<td>Intentions, self-efficacy</td>
</tr>
</tbody>
</table>

Changing the prepared food source environment: Baltimore Healthy Carryouts
Background: Prepared Food Consumption Patterns

- Americans spend nearly half of their food dollars eating out (USDA 2011)
- One-third of daily caloric intake comes from foods purchased and/or eaten away from home (Guthrie et al 2002)
- A large proportion (76.8%) of foods eaten away from home consists of prepared foods purchased at fast food restaurants and carryouts (USDA 2011)
- Prepared foods are typically calorically dense and higher in fat and are associated with increased BMI and weight gain (Pereira et al 2005, Duffey et al 2007, Beydoun et al 2011)

Baltimore Healthy Carryout Aims

- To develop, implement and evaluate a culturally appropriate multi-component carryout intervention to reduce risk factors for diet-related chronic diseases in a low income urban setting
  - Conduct formative research on the availability, pricing and consumption of carryout foods
  - Develop and test interventions
  - Develop and pilot instruments to assess the efficacy of environmental interventions in carryouts

Study Design: BHC Pilot Trial

- Intervention group
  - 1st generation Korean American owned carryouts (N=2)
  - African American owned carryouts (N=2)
- Comparison group
  - 1st generation Korean American owned carryouts (N=2)
  - African American owned carryouts (N=2)

Intervention Phases

- Phase 1: Modified Menu Boards & Menu Labeling
- Phase 2: Healthy Sides & Beverages
- Phase 3: Affordable Healthy Combo Meals

Phase 1: Modified Menu Boards & Menu Labeling

- Owners were reluctant/concerned about changing what they sell
- Many do not have resources to change menu boards
- Allowed us to build rapport/trust with owners

Before
Healthier options were highlighted with a leaf logo

Healthier menu options were also promoted with photos
Menu Analysis: Definition of Healthy Items

- Two Registered Dietitians reviewed the menu recipes & observed cooking methods at baseline
- Calculated total calories and fat (g) using USDA National Nutrient Database (db.nal.usda.gov)
  - Healthy Entrée: <600kcal and <20g of fat
  - Healthy Side dish: <200kcal
- Total of 47 healthy items & Total of 119 less-healthy items
- Grilled chicken sandwich (350kcal, 15g fat) vs. Four fried chicken wings (780kcal, 52g fat)

Phase 2: Healthy Sides & Healthy Beverages

- Promoted currently available healthy sides & beverages
  - Collard greens, corn, salads, soups, water, diet soda, 100% fruit juice
- Introduced new healthy sides
  - Yogurt, fresh fruits, fruit cups, baked chips
- Provided initial stocks of healthy sides

Phase 3. Affordable Healthy Combo Meals

- Improving food preparation methods
  - Provide an indoor grill to implement grilled chicken
- Healthy combo meal promotion with price reduction
  - Owners agreed to reduce up to $2.50 per healthy combo meal without compensation
  - Combo meal with free baked chips

Point-of-purchase posters

Evaluation Method

- Weekly sales receipt collection (February – September 2011, 32 weeks)
  - Trained data collectors visited carryouts every week
  - A total of 186,654 units of sales were collected
- One intervention carryout did not follow the protocol – excluded from the analysis

Aggregate Variables

<table>
<thead>
<tr>
<th>Healthy Items (H_item)</th>
<th>Less-healthy Items (LH_item)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low-fat sandwiches</td>
<td>High-fat sandwiches</td>
</tr>
<tr>
<td>Grilled chicken</td>
<td>Chicken fillet (deep-fried)</td>
</tr>
<tr>
<td>Turkey</td>
<td>Cheese fish fillet</td>
</tr>
<tr>
<td>Sides</td>
<td>Sides</td>
</tr>
<tr>
<td>Fresh fruits</td>
<td>French fries</td>
</tr>
<tr>
<td>Salads</td>
<td>Western fries....</td>
</tr>
<tr>
<td>Cooked greens</td>
<td></td>
</tr>
</tbody>
</table>

Ext. listed beverages because often owners did not write down beverage-only sales to the receipts
Changes in percentage of healthy food sales from baseline by intervention phases

Changes in the ratio of healthy to less-healthy items sales from baseline

**Strengths & Significance**

- First prepared food source intervention in low-income urban setting using quasi-experimental design with comparison group
- One of the first studies to look at sales patterns of non-franchise fast food restaurants
- Future analyses: investigate sales in terms of gross revenue & customer outcomes such as changes in food purchasing habits

**Multi-institutional Approaches**

**Baltimore Healthy Eating Zones Pilot**
- Creation of “healthy eating zones” in and around 6 Baltimore recreation centers (with 6 comparison)
- Worked with corner stores and some carryouts
- Increasing availability of healthy foods
- Point of purchase signage
- Interactive sessions
- Peer educators
- Cooking classes for kids in recreation centers
- Recreation center staff training

**Policy**

**Youth materials developed by Kids On The Hill**

Funded by RWJ HER, Round 2
Interactive activities in recreation centers

Early findings

- Intervention youth had greater exposure to the intervention than comparison youth.
- Intervention youth significantly improved food-related outcome expectancies ($p=0.02$) and knowledge ($p<0.001$).

Early Findings: Impact on Obesity

<table>
<thead>
<tr>
<th></th>
<th>By Direct Exposure</th>
<th>By Intervention</th>
</tr>
</thead>
<tbody>
<tr>
<td>Changes in obesity</td>
<td>Low</td>
<td>Med</td>
</tr>
<tr>
<td>BMI Percentile (entire sample)</td>
<td>-1.74</td>
<td>1.44</td>
</tr>
<tr>
<td>BMI Percentile (Baseline BMI&gt;85)</td>
<td>-1.2</td>
<td>-2.85</td>
</tr>
<tr>
<td>BMI Percentile (Baseline BMI&gt;85, Girls only)</td>
<td>-1.1</td>
<td>N/A</td>
</tr>
</tbody>
</table>

Baltimore Food Policy Advisory Committee (Food PAC)

- Early 2009: Baltimore City Food Policy Task Force develops report with recommendations
- Late 2009: Holly Freishtat, MS, CN, named Baltimore City Food Policy Director
- Early 2010: Baltimore Food PAC forms, begins to implement recommendations of the task force

Policy: Baltimore Cornerstore Criteria Program

- Phase 1: Pilot
  - Work with 2–3 stores
  - Star system for healthy stores
  - Produce display or small store structural incentive (≤$300)
  - Promotional signage for healthy foods
  - Monitored by BHCK study staff
- Phase 2: Optional criteria
  - Same Phase 1, for up to 100 stores
  - Monitored by City Health Department
- Phase 3: Legislation
  - Same as Phase 1 and 2, for all small stores
  - Increased fees for non-compliance
  - Monitored by City Health Department

Price manipulation strategies

- Lowering price of selected healthy foods (with varying % decrease)
- Coupons, two-for-one promotions, incentive cards
- Increasing availability of low cost healthy food options
- Increasing prices of unhealthy foods to subsidize cost of lowering price of healthy foods
- These vary in terms of potential sustainability by stores
Other studies of pricing interventions (1)

- Vending machine sales of healthy foods increased in proportion to discount (French et al, 2001)
  - No loss in profits

- Review of food price changes in terms of school children’s intakes (Jaime and Lock 2008):
  - Lowered prices increased intake FV in 8 studies

- Revenue–neutral strategy in school cafeterias (Hannah et al 2002)
  - Raised prices of 3 high fat foods 10%
  - Reduced prices of 4 healthy foods 25%

Other pricing interventions (2)

- Harvard cafeteria (Michels 2008)
  - 20% price decrease associated with 6% increase in healthy food consumption and 2% decrease in unhealthy food consumption. After subsidy finished, consumption of healthy foods increased to 17%

- Delicatessen–type restaurant intervention (Horgen and Brownell 2002)
  - Price decreases were associated with a higher level of increased purchases of some healthy food

Pricing interventions: gaps

- Price manipulation works in controlled settings (cafeterias, restaurants, vending machines, farmers markets)

- Unclear if lowering prices of healthy foods in food stores will achieve similar improvements in diet

Summary

- Trials to improve availability coupled with POP promotions have shown success in large and small food stores

- Trials needed on price manipulation in food sources as a means of increasing healthy food consumption, and to examine the impact of policy interventions

- Trials needed on how best to change the prepared food source environment in different settings

- Additional tools needed to evaluate impact of these programs on multiple levels: wholesaler, retail food store and consumer (including diet and health outcomes)