Increasing healthy food access in communities of low income and low access: Evaluating a community-initiated food hub

Patricia A. Sharpe, PhD, MPH
Prevention Research Center
Arnold School of Public Health
University of South Carolina
Columbia, South Carolina 29208

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What is a food hub?

- Facilitates "the aggregation, storage, processing, distribution, and/or marketing of locally or regionally produced food products"\(^1\)
- Usually supports small to midsized local producers and has local food security as a goal\(^2\)
- Usually includes a farmers' market
- May include food retail space, on-site gardens, commercial kitchen, community education and job training
- Review (2012) found a small amount of data suggesting public health and economic benefits, but rigorous evaluation has not been conducted.\(^3\)
Background

- Community partners' funding
  Healthy Food Finance Initiative (HFFI) grant and loan
  local grants
  local government funds
- Researchers' funding
  National Cancer Institute
  PAR 12–257 *Time-Sensitive Obesity Policy and Program Evaluation (R01)*
  Rapid-response funding
Setting: Food hub intervention community

- Four census tracts named as primary service area for HFFI grant

- HFFI grant awardee: Non-profit focused on housing and job training

- Other key partners: Farmers' market, community development corporation, city government
Proposed food hub service area of four census tracts
Study sites

1. Intervention
2. University
3. Control
### Characteristics of intervention and matched comparison communities

<table>
<thead>
<tr>
<th></th>
<th>Intervention site 4 census tracts</th>
<th>Matched comparison site 3 census tracts $^b$</th>
<th>South Carolina</th>
</tr>
</thead>
<tbody>
<tr>
<td>n households (hh)</td>
<td>2318</td>
<td>4141</td>
<td></td>
</tr>
<tr>
<td>By census tract</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>% African American</td>
<td>43 $^a$ 96 $^b$ 99 $^c$ 99 $^d$</td>
<td>94 $^x$ 100 $^y$ 88 $^z$</td>
<td>28</td>
</tr>
<tr>
<td>% HHs &lt; FPL</td>
<td>28 $^a$ 57 $^b$ 58 $^c$ 62 $^d$</td>
<td>38 $^x$ 31 $^y$ 47 $^z$</td>
<td>16</td>
</tr>
<tr>
<td>% hh without car</td>
<td>29 $^a$ 37 $^b$ 52 $^c$ 59 $^d$</td>
<td>24 $^x$ 33 $^y$ 43 $^z$</td>
<td>7</td>
</tr>
<tr>
<td>% low food access</td>
<td>54 $^a$ 100 $^b$ 33 na $^c$</td>
<td>53 $^x$ 78 $^y$ 100 $^z$</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>Intervention county</th>
<th>Comparison county</th>
</tr>
</thead>
<tbody>
<tr>
<td>% overwt. &amp; obese</td>
<td>58</td>
<td>68</td>
</tr>
<tr>
<td>% eat ≥5 F&amp;V /day</td>
<td>13 $^a$ 14 $^b$</td>
<td>9 $^c$</td>
</tr>
</tbody>
</table>

$^a$ USDA food desert designation
HHs=households FPL=federal poverty level income na=not applicable
F&V=servings of fruits & vegetables
Sources: US Census  American Community Survey; USDA food desert locator; SC Dept. of Health & Environmental Control/CDC data
Harvest Park food hub

- Complex centrally located in “food desert” census tracts

Proposed components

- Small grocery store
- Local farmers’ market
- Urban farm on-site: produce, chickens, bees, hoop houses
- Mobile produce market
- Double SNAP incentive
- Community education
- Classroom
- Demonstration garden
- Culinary arts job training with commercial kitchen
- Café
- Local jobs creation

Mobile market truck
Food hub site

- Greenhouse
- Grocery, cafe & culinary arts program
- Part of farmers' market area
- Culinary arts students
- Crop
- Farmers' market vendor
Research Aims

**Primary aim:** Evaluate the impact of a food hub intervention on primary food shoppers' a) **daily fruit and vegetable intake** and b) **diet quality** compared to the matched comparison community.

**Secondary aims:**

1. Evaluate the impact of a food hub intervention on primary food shoppers' **body weight, energy intake, perceived community food environment and food shopping behaviors** compared to the matched comparison community.

2. Conduct a process and context evaluation: Assess intervention reach, dose, implementation fidelity, compatibility in the community, and community context (e.g., confounders, food environment)
**Mixed Methods Quasi-experiment with Matched Comparison Site**

<table>
<thead>
<tr>
<th></th>
<th>Food hub Year 1</th>
<th>Food hub Year 2</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Intervention</strong></td>
<td>( O_1 ) ( \times ) ( O_2 ) ( \times ) ( O_3 )</td>
<td></td>
</tr>
<tr>
<td><strong>Comparison</strong></td>
<td>( O_1 ) ( O_2 ) ( O_3 )</td>
<td></td>
</tr>
</tbody>
</table>

**Process and context evaluation**

\( O^{1,2,3} = \) in-person interviews and 24 h. dietary recall
Sample size and enrollment goal

Minimum \( n \) per group at Time 3 = 200
Assumes small effect size (Cohen's \( d = .30 \))
(.75 serving increase in F&Vs or 1.8 kg weight loss)

Enrollment goal \( n = 280 \) per group (560)
\( (n = 200 + 40\% \text{ more to allow for attrition}) \)

94\% of enrollment goal achieved \( n = 527 \)
Methods and measures

- Recruitment  Nov 2013–April 2014
  - Three mailings to residential addresses
  - Community outreach recruiters
  - Multiple recruitment venues and strategies

- Data collection with family food shoppers
  - In–person interview (30–45 minutes) in field offices or at community centers.
  - Telephone–based 24–hr. dietary recall (Minnesota NDSR protocols)
Methods and measures (cont.)

- **Process and context evaluation**
  - Qualitative interviews (leaders' and residents impressions)
  - SNAP sales and SNAP incentives data (time series analysis)
  - Farmers’ market shopper intercept survey
  - Food cost comparison (food hub grocery vs. top 5 stores)
  - Tracking of implementation fidelity

- **Community food environment assessment**
  (context and change over time)
  - GPS groundtruthing and geocoding of stores and restaurants
  - GIS analysis: distance, density, type of outlet, etc. relative to residence addresses
<table>
<thead>
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</thead>
<tbody>
<tr>
<td>T1 to T2</td>
<td></td>
<td>83.3%</td>
<td></td>
</tr>
<tr>
<td>T2 to T3</td>
<td></td>
<td></td>
<td>92.9%</td>
</tr>
<tr>
<td>T1 to T3</td>
<td></td>
<td></td>
<td>77.4%</td>
</tr>
</tbody>
</table>

| Dietary recall completion | 88.6% | 95.0% | 96.1% |

1Retention goal of n=200 per group was met.
2Percentage of n interviewed at each time point who also completed 24–hour dietary recall.
Comparability of participants in the intervention and matched comparison communities at baseline
<table>
<thead>
<tr>
<th>Characteristics of main food shoppers or their households</th>
<th>Intervention n=265</th>
<th>Comparison n=262</th>
<th>p'</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Age</strong> mean years (SD)</td>
<td>51 (15)</td>
<td>54 (14)</td>
<td>&lt;.01</td>
</tr>
<tr>
<td><strong>Race</strong> % African American</td>
<td>89</td>
<td>96</td>
<td>&lt;.01</td>
</tr>
<tr>
<td><strong>Gender</strong> % Women</td>
<td>77</td>
<td>82</td>
<td>.15</td>
</tr>
<tr>
<td><strong>Education</strong> % &lt;high school</td>
<td>34</td>
<td>28</td>
<td>.19</td>
</tr>
<tr>
<td>high school</td>
<td>38</td>
<td>38</td>
<td></td>
</tr>
<tr>
<td>≥1 year of college</td>
<td>28</td>
<td>34</td>
<td></td>
</tr>
<tr>
<td><strong>BMI category: overweight or obese %</strong></td>
<td>78</td>
<td>82</td>
<td>.18</td>
</tr>
<tr>
<td><strong>BMI</strong> mean (SD)</td>
<td>32 (9)</td>
<td>32 (9)</td>
<td>.91</td>
</tr>
<tr>
<td><strong>Household income</strong> %</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt;$10,000</td>
<td>47</td>
<td>46</td>
<td></td>
</tr>
<tr>
<td>$10,000–19,999</td>
<td>35</td>
<td>28</td>
<td></td>
</tr>
<tr>
<td>$20,000–29,999</td>
<td>11</td>
<td>13</td>
<td></td>
</tr>
<tr>
<td>≥$30,000</td>
<td>7</td>
<td>12</td>
<td></td>
</tr>
<tr>
<td><strong>Children in household (%) (≥1)</strong></td>
<td>38</td>
<td>28</td>
<td>.02</td>
</tr>
</tbody>
</table>

BMI=Body mass index (weight in kg/height in m^2)

1 t test of means; chi-squared or Fisher’s exact test of categorical data

2 Annual, self-reported, all sources of income and benefits

Note. Some categories were collapsed for table; not all categories shown.
### Characteristics of family food shoppers at Time 1, n=527

<table>
<thead>
<tr>
<th>Characteristics of main food shoppers or their households</th>
<th>Intervention n=265</th>
<th>Comparison n=262</th>
<th>( p )</th>
</tr>
</thead>
<tbody>
<tr>
<td>Household received <strong>SNAP</strong> (past yr) %</td>
<td>64</td>
<td>67</td>
<td>.48</td>
</tr>
<tr>
<td>Transport to main food store – other than own car %</td>
<td>59</td>
<td>51</td>
<td>&lt;.01</td>
</tr>
<tr>
<td><strong>Food security</strong> (during past year)(^2)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Entire household % low/very low high/marginal</td>
<td>64</td>
<td>61</td>
<td>.27</td>
</tr>
<tr>
<td></td>
<td>36</td>
<td>39</td>
<td></td>
</tr>
<tr>
<td>Households with children</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Child food security % low/very low high/marginal</td>
<td>33</td>
<td>38</td>
<td>.26</td>
</tr>
<tr>
<td></td>
<td>67</td>
<td>62</td>
<td></td>
</tr>
</tbody>
</table>

**SNAP**=Supplemental Nutrition Assistance Program

\(^1\) \( t \) test of means, chi-squared or Fisher’s exact test of categorical data


*Note. Some categories collapsed. Not all categories shown.*
## Main dietary variables at baseline, n=470

<table>
<thead>
<tr>
<th>Dietary intake of food shoppers</th>
<th>Intervention n=241 mean SD</th>
<th>Comparison n=229 mean SD</th>
<th>$t$</th>
<th>$p$</th>
</tr>
</thead>
<tbody>
<tr>
<td>24-hour energy intake (kcals)</td>
<td>1851 (999)</td>
<td>1766 (874)</td>
<td>.98</td>
<td>.33</td>
</tr>
<tr>
<td>24-hour HEI–2010 score</td>
<td>47.7 (12.7)</td>
<td>49.7 (13.5)</td>
<td>-1.65</td>
<td>.10</td>
</tr>
<tr>
<td>24-hour fruit+veg servings</td>
<td>3.7 (3.3)</td>
<td>3.8 (2.9)</td>
<td>-.39</td>
<td>.70</td>
</tr>
<tr>
<td>24-hour fruit+veg cup equivalents/1000 kcals</td>
<td>1.1 (1.2)</td>
<td>1.2 (.99)</td>
<td>-.89</td>
<td>.38</td>
</tr>
</tbody>
</table>

1Participants with complete dietary recall data.
Discussion

Challenges and successes

Questions and discussion
Thanks to investigators, staff, students

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Soulfully Fit Committee
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References

