Leveraging GIS to Understand and Improve Flint’s Food Landscape

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Ecological/Community Psychology Brown Bag
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Who Am I?

- Local
- Geographer
- Health-focused
- Advocate
- Pro-Urban
What are food deserts?

Socio-economically disadvantaged areas with poor access to affordable, healthy food
Why does food access matter?

Behavior-health link
- ↑ Junk food consumption → ↑ Risk of diabetes, hypertension, heart disease, etc.

Environment-behavior link?
- ↑ supermarket access associated with healthier diets (↑ F&V)
- ↑ convenience stores & fast food near home are linked to poorer diets (↓ F&V), ↑BMI, especially for children
- Fast-food more prevalent & grocery stores more scarce in poor areas
This is part of a nationwide problem

- 37% of adults and 17% of children are obese
- A healthy diet can reduce risk of obesity and chronic diseases, e.g., type 2 diabetes, heart disease, certain types of cancer
Why do we have food deserts?

“Over the past five decades, supermarkets have abandoned the inner city for suburban locations, which offer more land for parking, easier loading and unloading for trucks, convenient access to highways, and a development context for much larger stores.”

-Kami Pothukuchi, 2005
How did this happen?

- Globalization of food system
- Retail restructuring (neighborhood stores to big boxes)
- Disinvestment in poorer areas
- Increase in social inequalities
How do we think about these problems? (Theory)

- **Macro-level environments (sectors)**
  - Food & agriculture policies
  - Gov’t structures & policies
  - Economic systems

- **Physical environments (settings)**
  - Food & beverage industry
  - Food assistance programs

- **Social environments (networks)**
  - Home
  - Worksites
  - Neighborhoods

- **Individual factors (personal)**
  - Skills
  - Behaviours
  - Lifestyle
  - Demographics
  - Attitudes
  - Knowledge
  - Values

- **Cost**
  - Food production & distribution systems
  - Restaurants
  - Convenience stores
  - Grocery stores
  - Farmers markets

- **Reach**
  - Friends
  - Peers
  - Family
  - Neighbors
  - Schools

- **Opportunities**
  - Availability
  - Accessibility

- **Barriers**
  - Social norms
  - Social support
  - Role modelling

- **Motivations**
  - Self-efficacy
  - Behavioural capability

- **Practices**
  - Legislative, regulatory or policy actions
10+ Years of Food Work in Flint

- Witherbee’s Market (2008-2011)
- Edible Flint (2011-present)
- Food Store Assessment (2012)
- City of Flint Master Plan (2012-2013)
- Flint Farmers’ Market (2011, 2015)
- Flint Food Store Survey (2016-present)
- Flint Eats mobile app (2016-present)
- Refresh MI Store (2017-2019)
- FFAR Leverage Points Grant (2018-present)
Flint’s Historical Context
Flint’s Contemporary Food System

- Lack of healthy food sources
- Unhealthy diets amplified by context
- Land paradox: ample available land, many without access
- Problems have generated numerous proposals to bring more healthy food back to the city
Witherbee’s Market: ‘Re-storing’ a Food Desert

- No systematic inequalities in healthy food accessibility (difficult everywhere)
- New store improved access for some of the most distressed

High-Distress Neighborhoods by Percent within Walking Distance to a Grocery Store, Flint, MI

Average Distance (meters) to Grocery Stores by Socioeconomic Distress Level, Pre- and Post-Intervention
Improving Affordability

Cost of Groceries at Grocery Stores according to Neighborhood Distress Score, 2009-2011

Cost by Access to Public Transit, by Type of Store, and by Grocery Stores vs. Food Desert, 2009-2011
Changing Diet & Food Security

- Case-control experiment of grocery store opening

Percent of population in census block group belonging to a minority group

Level of socioeconomic distress by census block group (2000/2010 US Census)
**Relationship between Access and Diet**

- No relationship between proximity to a grocery store and dietary habits

*Improving health must go beyond retail-led interventions*
Edible Flint: Reconnecting People with the Land

- Gardening classes
- Growing co-op
- Outreach activities
- Policy advocacy
Healthy Food Assessment

- Collaboration between MSU Food Science & Nutrition and edible flint

- A complete landscape of healthy food availability

- Inform future studies on connection between access and diet
5-Year Evaluation

- Focus groups with community stakeholders
- Key informant interviews to corroborate community themes
- Goal: to learn how edible flint can be a part of the solution to improving access to and consumption of healthy food
City of Flint: Policy to Support Local Food

- How can we use evidence on the food environment to influence food policy priorities?
- Spatial analysis informs healthy/sustainable land use decisions
Vacant or Available Land?

- Opportunities for gardening are virtually everywhere
- Land as an asset, city government recognition
- Remaining question: how to get land into the hands of good stewards
Community Consultation on Land Uses

- Informed support for gardening, small-scale ag, food processing & distribution, ‘food hubs’

<table>
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<tr>
<th>Green Use</th>
<th>Definition</th>
<th>Proposed Districts</th>
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<tbody>
<tr>
<td>Hoophouse</td>
<td>A temporary or permanent unheated structure typically made of piping covered with plastic, constructed in a “half-round” shape, for the purposes of growing plants. Hoophouses larger than 1,000 square feet shall be considered greenhouses.</td>
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<td>Chickens</td>
<td>The care of domesticated poultry, of up to four birds, for non-commercial and non-processing purposes.</td>
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Table 50.3.08. Uses: Residential Zone Districts

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<th>GN-2</th>
<th>TN-1</th>
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Master Plan Zoning

Proposed Zoning Districts

- Residential
- Commercial
- Employment
- Institutional
- Others

Map of proposed zoning districts.
Flint Farmers’ Market: Bringing Food to People

- Making the local food system more visible, attractive to diverse shoppers
Bringing New Shoppers to the Core

- Significantly more shoppers:
  - From low income neighborhoods
  - With food access issues
  - Using food assistance

- Profile is consistent with:
  - Regional demographic characteristics (i.e. all are served at the market)
MTA’s ‘Ride for Groceries’ Routes

- Additional response to store closures
- Evaluation after re-opening of independent grocer in east side
Fair Food Network’s Double-Up Food Bucks

- Outside support for healthy eating in the city
- Started with farmers’ market, expanded to other stores
- Requirements for retailers to stock more healthy foods
- Another alternative to new stores: make healthy food more affordable and available
Flint Food Store Survey

- Building on earlier assessments (2011, 2012)
- Using the validated Nutrition Environment Measures Survey for retail stores
- Targeting availability and price of healthy foods
- Completed full store audits for 265 stores in Flint area
- Built a surface of accessibility to all healthy foods
Flint Food Store Survey

- Overlaid food store scores with socioeconomic characteristics
- Looking for inequalities by neighborhood type
- Can calculate density, # of food stores near any point
Flint Food Store Survey

- Inequalities by SES

<table>
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<tr>
<th>Variable</th>
<th>Low/Average Distress (n=106)</th>
<th>High/VH/EH Distress (n=159)</th>
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<td>0.033*</td>
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<td>Dairy</td>
<td>4.98</td>
<td>3.67</td>
<td>0.012*</td>
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<td>Meat</td>
<td>5.81</td>
<td>5.25</td>
<td>0.116</td>
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<td>Fruit Score</td>
<td>4.54</td>
<td>3.12</td>
<td>0.028*</td>
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<tr>
<td>Veg Score</td>
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<td># Fruits &amp; Vegetables</td>
<td>4.20</td>
<td>3.05</td>
<td>0.255</td>
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## Flint Food Store Survey

### Inequalities by Race

**Food Store Score Stratified by Race**

<table>
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<tr>
<th>Variable</th>
<th>&lt;60% AA (n=193)</th>
<th>≥60% AA (n=72)</th>
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<tr>
<td>Total Score</td>
<td>29.69</td>
<td>24.06</td>
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<tr>
<td>Dairy</td>
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<td>3.15</td>
<td>0.005*</td>
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<tr>
<td>Meat</td>
<td>5.58</td>
<td>5.19</td>
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<tr>
<td>Fruit Score</td>
<td>4.073</td>
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<td>Veg Score</td>
<td>2.36</td>
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<td># Fruits &amp; Vegetables</td>
<td>3.9</td>
<td>2.46</td>
<td>0.110</td>
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Mobile Markets: Small, nimble, adaptive

Why?
- Importance of access to healthy foods in underserved neighborhoods
- Ability of a mobile market to work around limitations of traditional retail

How?
- Participatory mapping exercise with community leaders
Mapping exercise further aids in planning

- Experts inform weight assignment for 3 exercises
- Average suitability score shown in yellow-brown
- Direct mapping shown in blue outlines/shading
- Overlap in key sites
- Typically co-located with community facilities
Refresh MI Store

- Healthy corner store pilot
- MSU Extension
- Targeted stores in underserved neighborhoods
- Encourage increased freezer/shelf space for nutritious items
- Display nutrition information
‘Flint Eats’ App

- Working with Communication Arts & Sciences, MSU Extension to develop local food app

- Incorporate healthy eating tips with GPS in phones to drive people to local food sources

- Updates could be crowd-sourced (food assessment, mobile market)
SmartAPPetite: a prototype

1. Customized Tips
2. Healthy Recipes
3. Nearby Vendors
4. Quick Directions
5. Let us Know

6. Save Your Favourites for Later
Potential strengths

- Grow the local food economy – a part of a local food promotion campaign
- Connect local food networks with interactive local food map
- Increase food literacy, awareness of healthy food
FFAR Grant: Identifying Leverage Points

- How can all of these interventions (and more) work together to make change in the food system?
- Workshops, focus groups → modeling the food system
- PI: Steven Gray, MSU CSUS
- Partners: Community Foundation (Regional Food System Navigator), Community Consultative Panel
Next steps for researchers/practitioners

- Improving methods for exposure estimation
- Linking objectively measured food environment to diabetes adherence, dietary habits, perceived access to healthy foods
- Continuing to advocate for full-scale retail, small-scale interventions, additional investment
- Working with local food growers to establish a co-op
- Partnering with Regional Food System Navigator, Flint Fresh activities (food hub, mobile market)
Exposure Estimation
Improving estimates of exposure

- GIS offers improved tools for defining exposure
- Goal is to use improved metrics to study consumption habits/activity spaces of residents → informing future intervention and decision-making
Looking Forward

- Do more with less – area stores continue to close
- Focus on community – keep residents engaged
- Acknowledge challenges in other sectors (education, water, violence)
- Leverage past knowledge – Community Foundation now active in food system work
- Capitalize on partnerships – Double-Up Food Bucks now available at grocery stores
Resources (Shareable on Google Drive)

**Flint General**

**Flint Food**

**Other Food**
How to Find Me

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- IRL: