Social and Environmental Determinants of Child Obesity: The role of Fast Food Environments

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Overview

- Background

- Research: fast food environment near schools
  - Research questions
  - Methods
  - results

- Summary

- Q & A
Background
Overall research question

What are the roles of policies and environments in the etiology of child health and racial/ethnic health disparities?
Conceptual framework

Policies to promote child and youth development and education, infancy through college

Policies to promote economic development, reduce poverty, and end racial segregation

Policies to promote healthier homes, neighborhoods, schools and workplaces

- Economic & Social Opportunities and Resources
- Living & Working Conditions in Homes and Communities
- Medical Care
- Personal Behavior

Robert Wood Johnson Foundation Commission to Build a Healthier America www.commissiononhealth.org

CENTER ON SOCIAL DISPARITIES IN HEALTH
University of California San Francisco
Schools: national focal point for obesity prevention*

*IOM Report Accelerating Progress in Obesity Prevention (2012)*
Nutrition policies for schools

- Nutrition policies e.g., regulate junk foods & sugary beverages in schools
- Reduce sugar and fat; restrict availability
School Nutrition policies *slowed* childhood obesity epidemic in California

Sanchez-Vaznaugh et al
*Health Affairs* (2010)
Food outside of schools: fast food environment
Fast food restaurants near schools

% schools near a Fast Food Restaurant (California)

California Schools

Source: Sanchez, B, et al AJE 2012
Majority minority schools more likely to be near fast food restaurants

% schools near a Fast Food Restaurant (California)

- African American: 58
- Latino: 50
- White: 32

Racial/ethnic majority in schools

*Source*: Sanchez, B, et al AJE 2012
Fast food restaurant availability near schools associated with higher overweight/obesity*

*Sánchez, B et al 2012 AJE
Fast food near schools

- More fast food outlets in low income school neighborhoods and less in high income school neighborhoods (negative income gradient)

- Where do we intervene?

- Is this because Latino and African Americans tend to be more concentrated in lower income neighborhoods?

****Zenk and Powell 2008; Kestens & Daniel 2010; Neckerman, Bader et al 2010; Day and Pearce 2011
Research gaps

- Consider both racial/ethnic composition of schools and school neighborhood income.

- Changes in fast food availability near schools over time.

- Do changes in FFR density vary by racial or ethnic composition of schools, and neighborhood income?
Fast food environment near schools
True or False?

Among majority African American and Latino schools and majority White schools, FFR are evenly distributed regardless of the income of neighborhoods in which those schools are located.
Methods
Data Sources

- Schools
- School Neighborhoods
- Fast food outlets

Analytical Dataset
Data Sources

- Schools: California Department of Education
- Schools’ neighborhoods: US Census
- Fast food outlets: NETS (National Establishment Time Series data – Dunn and Bradstreet)
- Other data -- Nielsen
School data: California Department of Education

- Databases available online
- Enrollment overall, by race/ethnicity for all public schools in California
- School addresses
  - Geocoded
School’s neighborhoods: 2000 US Census

- Data on income residents within schools’ neighborhoods
- Census track of the schools
- Merged data using shape files for census and geocodes for schools
Commercial data source converts Dun and Bradstreet (D&B) archival establishment data into a time-series database of establishment information.

- Standard Industry Classification (SIC) codes
  - SIC codes, for chain and non-chain fast food restaurants

- Includes
  - Location (street address)
  - Geocodes, latitude and longitude
  - Franchise, sales, other
Urbanicity data: Nielsen

- **Urban** (high density neighborhoods and are employment centers)
- **Suburban** (moderately densely populated and connected to urban, second city, or other suburban areas)
- Town city, country or **rural areas** (low population density)
- **2nd City** (moderately densely populated, like suburbs, but differ in that they are the primary population center of the surrounding area)
Data exclusions

- Schools that were closed during study years.
- Schools with missing data e.g., missing geocodes.
- Schools with small sample sizes e.g., majority Asian students, and majority other race/ethnic group.
Measures

- **Fast food restaurant density**: # of FFR within each school’s service area (network buffers), for each year (2000 and 2010)—GIS
  - A service area includes all the area that can be accessed travelling along a road network for the specified distance from the school location starting point.
  - A three-quarter mile service area was created for each school using a network analysis.
Measures

Racial or ethnic composition of students in schools: based on majority ethnic student group present in schools (if >50% of student enrollment fell into one of the following groups):

- Majority African American
- Majority Asian
- Majority Latino
- Majority White
- No majority
Measures

Income of neighborhoods in which schools were located:

- Resident’s annual household income
- Used income tertiles
Analyses

- Calculated mean FFR counts within 3/4 mile network buffers for all schools
- By student racial/ethnic composition; neighborhood income, and time.
- Negative binomial regression models -- estimate the mean FFR counts by school neighborhood income.
- Cross-product term timeXschool neighborhood income to estimate time changes in FFR availability.
  - Stratified by school racial/ethnic composition
Results

- **Urban: n = 3,089**
  - Majority African American (n = 106)
  - Majority Latino (n = 1,564)
  - Majority White (n = 503)
  - No majority (n = 916)

- **Non-Urban: n = 4,470**
  - Majority African American (n = 14)
  - Majority Latino (n = 1041)
  - Majority White (n = 2,649)
  - No majority (n = 766)
FFR density similar in poor and middle income neighborhoods

<table>
<thead>
<tr>
<th>Income</th>
<th>2000</th>
<th>2010</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lowest</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Middle</td>
<td>1.04</td>
<td>1.11</td>
</tr>
<tr>
<td>Highest</td>
<td>0.46*</td>
<td>0.48</td>
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</tbody>
</table>
Poorer school neighborhood, greater FFR density

<table>
<thead>
<tr>
<th>Income</th>
<th>Majority 2000</th>
<th>Latino 2000</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lowest</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Middle</td>
<td>0.79***</td>
<td>0.75***</td>
</tr>
<tr>
<td>Highest</td>
<td>0.63***</td>
<td>0.57***</td>
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</table>
Poorer school neighborhoods, greater FFR density

<table>
<thead>
<tr>
<th>Income</th>
<th>Majority 2000</th>
<th>Majority 2010</th>
<th>White 2010</th>
<th>White 2010</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lowest</td>
<td>1</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Middle</td>
<td>0.75</td>
<td>0.73</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Highest</td>
<td>0.58***</td>
<td>0.52***</td>
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</tbody>
</table>
Greater FFR density in middle income neighborhoods

<table>
<thead>
<tr>
<th></th>
<th>No racial/ethnic majority</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Income</strong></td>
<td>2000 2010</td>
</tr>
<tr>
<td><strong>Lowest</strong></td>
<td>1 1</td>
</tr>
<tr>
<td><strong>Middle</strong></td>
<td>0.86 0.87</td>
</tr>
<tr>
<td><strong>Highest</strong></td>
<td>0.65*** 0.66***</td>
</tr>
</tbody>
</table>
Urban schools

- FFR density near schools unequally distributed by school neighborhood income:
  - majority Latino student enrollment (YES)
  - majority White student enrollment (YES)
  - majority African American student enrollment (no income gradient, but fewer FFR in highest income neighborhoods)
True or False?

Overall, FFR density near schools has not changed over time (2010 vs 2000).

FFR density near majority Latino and African American schools has not changed over time.

FFR density near majority White student schools has not changed over time.
Uneven changes in FFR density near schools

<table>
<thead>
<tr>
<th></th>
<th>Latino</th>
<th>African American</th>
<th>White</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lowest</td>
<td>1.12***</td>
<td>1.19***</td>
<td>1.05</td>
</tr>
<tr>
<td>Middle</td>
<td>1.07***</td>
<td>1.27***</td>
<td>1.03</td>
</tr>
<tr>
<td>Highest</td>
<td>1.01</td>
<td>1.24</td>
<td>0.94*</td>
</tr>
</tbody>
</table>

* p <0.05; ** p <0.01; *** p <0.001
Between 2000 and 2010 FFR density:

- **Increased**
  - Majority African American schools in *poor and middle income* neighborhoods
  - Majority Latino schools in *poor and middle income* neighborhoods

- **Did not change:**
  - Majority white schools in low and middle income neighborhoods

- **Decreased:** majority white schools in high income neighborhoods
True or False?

There are more FFR near schools in rural compared with urban areas.
Summary: urban areas

- Except for majority African American schools, poorer school neighborhoods have greater FFR density in both 2000 and 2010.

- From 2000 to 2010, little to no changes in FFR availability near schools.

- But, changes in FFR density varied by both neighborhood income and racial/ethnic composition of schools:
  - more FFR in poor and middle income neighborhoods where majority African American and Latino schools are located.
Summary: non-urban areas

- **Fewer** fast food restaurants near schools relative to schools in urban areas
- **No neighborhood income gradient** in fast food restaurant density near schools
- **Little to no changes** in FFR between 2000 and 2010
Conclusions

- Understanding the fast food environment near schools requires
  - simultaneous consideration of income of neighborhoods where schools are located and urbanicity.
  - Monitoring changes in fast food restaurant availability near schools over time
- Future population growth is expected to increase particularly in urban areas
- Urban planning, population health
Limitations

- Accuracy of fast food outlet data
  - Underestimates of FFR in low income neighborhoods
  - Our estimates for low income neighborhoods may be conservative

- More updated data are needed
  - Commercial data can be expensive
  - Challenges to compile data from multiple sources
THANK YOU!

Q & A
Future studies

- Environmental etiology of racial/ethnic childhood obesity disparities
- Underlying environmental factors that could explain persisting racial/ethnic disparities
- Which environments foster or mitigate disparities?
Research questions

1. Among majority African American and Latino schools and majority White schools, is there a negative neighborhood income gradient in FFR density near schools?

2. Has FFR density near schools changed over time (increased, remained the same, or decreased)?

3. Where is FFR density changing the most? the least?

4. Are there more FFR in urban or rural areas?
Why child health

- Opportunity for promoting health and preventing disease

- Different demographic patterns: the most culturally and ethnically diverse segment of society
  - Prevent, address, eliminate health disparities early in life

- Children’s characteristics differ from those in adults*
  - Children spend lots of time in and around schools

*AHQR
Lower income, greater density of FFR; steeper gradient in 2010
Probability of overweight 5th & 7th grade children

Fitnessgram

Sanchez-Vaznaugh et al
Health Affairs (2010)
Black and Hispanic/Latino children disproportionately affected

Data Source: NHANES 2009-10, Children 2-19 years old. Ogden, et al 2012, JAMA