Association between the Fast-Food Environment and Obesity in Canada: A Cross-sectional Analysis

Simon Hollands

Co-authors: Dr Sisira Sarma, Dr M. Karen Campbell, Dr Jason Gilliland

CAHSPR, May 2013
Outline:

- Background
- Research question
- Theoretical motivation
- Data and design
- Results
- Conclusion
Background

• Obesity is now considered an epidemic, both in Canada and internationally

• Conventional determinants cannot explain the dramatic increase

• Current interest in the influence of the built environment, especially growth in fast food outlets, as an important cause of obesity
Does density of fast food restaurants, measured as the number of outlets per 10,000 people in one's neighborhood adversely affect BMI across Canada?
Theoretical framework

- Fast Food Availability
  - Convenience

- Consumption of Fast Food

- BMI
Data

2007-2008 Canadian Community Health Survey (CCHS)

- **Inclusion**: Adults (ages 18-65), provinces
- **Exclusion**: Missing or extreme BMI, breastfeeding women, pregnant women

- **Full Sample**: $n=72,660$

**Canadian Census (2006):**
- Neighborhood level confounders (Dissemination Area)

**Restaurant data (2008):**
- Source: Info Canada®, CFM leads
- Categorization based on 2008 Restaurant directory:
  - Fast food restaurants: Food is ordered and paid for before eating/take out
  - Full service restaurants: Customers are served food and pay after eating
  - Non-chain: Independent restaurants specific to a local area
Implementation

1) Ordinary Least Squares Regression

\[ \text{BMI} = a + B_0 + B_1 \text{Density} + B_2 \text{Individual}^2 + B_3 \text{Neighborhood}^3 + e \]

-\text{Density}= Number of outlets within respondents 3 digit postal code (FSA) per 10,000

Subgroup Analysis: Sex, Central Metropolitan Area (CMA)

2) Spatial Econometric Regression

- Accounts for spatial heterogeneity of BMI
Results: OLS Weighted Regression

Associated between BMI and Food Service Density

<table>
<thead>
<tr>
<th>Variables</th>
<th>β (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fast food restaurant density</td>
<td>0.031 (0.017 to 0.045)</td>
</tr>
<tr>
<td>Full service restaurant density</td>
<td>-0.061 (-0.11 to -0.013)</td>
</tr>
<tr>
<td>Non-chain restaurant density</td>
<td>-0.014 (-0.019 to -0.008)</td>
</tr>
</tbody>
</table>

Robust SE adjusted for clustering used

*Models controlled for:*
- Individual level demographic, socio-economic, behavioral factors and geography
- Neighborhood level socio demographic factors
## Results: OLS Weighted Regression

An increase in 5 fast food outlets per 10,000 people corresponds to a higher weight of:

- ~1 Lbs. for someone 5’5"
- 1.1 Lbs. for someone 6”

Models controlled for:
- Individual level demographic, socio-economic, behavioral factors and geography
- Neighborhood level socio demographic factors

<table>
<thead>
<tr>
<th>Variables</th>
<th>β (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fast food restaurant density</td>
<td>0.031 (0.017 to 0.045)</td>
</tr>
<tr>
<td>Full service restaurant density</td>
<td>-0.061 (-0.11 to -0.013)</td>
</tr>
<tr>
<td>Non-chain restaurant density</td>
<td>-0.014 (-0.019 to -0.008)</td>
</tr>
</tbody>
</table>
## Results: Subgroup Analysis

### Central Metropolitan Area: Interaction by Sex

<table>
<thead>
<tr>
<th>Variables</th>
<th>β (95% CI)</th>
<th>Males</th>
<th>Females</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fast food restaurant density</td>
<td>0.032 (0.001 to 0.063)</td>
<td>0.041 (0.01 to 0.072)</td>
<td></td>
</tr>
<tr>
<td>Full service restaurant density</td>
<td>-0.1 (-0.19 to -0.002)</td>
<td>-0.008 (-0.1 to 0.08)</td>
<td></td>
</tr>
<tr>
<td>Non-chain restaurant density</td>
<td>-0.01 (-0.018 to -0.001)</td>
<td>-0.024 (-0.034 to -0.014)</td>
<td></td>
</tr>
</tbody>
</table>

Robust SE adjusted for clustering used

**Models controlled for:**
- Individual level demographic, socio-economic, behavioral factors and geography
- Neighborhood level socio demographic factors
## Results: Aggregate (FSA) Analysis

### Spatial Regression

<table>
<thead>
<tr>
<th>Variables</th>
<th>OLS</th>
<th>Model</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fast food restaurant density</td>
<td>0.023 (0.006 - 0.039)</td>
<td>0.022 (0.006 to 0.038)</td>
</tr>
<tr>
<td>Full service restaurant density</td>
<td>-0.024 (-0.079 to 0.030)</td>
<td>-0.024 (-0.078 to 0.03)</td>
</tr>
<tr>
<td>Non-chain restaurant density</td>
<td>-0.013 (-0.018 to -0.007)</td>
<td>-0.013 (-0.017 to -0.008)</td>
</tr>
<tr>
<td>Rho</td>
<td></td>
<td>0.11** (0.025 - 0.196)</td>
</tr>
</tbody>
</table>

Robust SE adjusted for clustering used

**Models controlled for:**
- Individual level demographic, socio-economic, behavioral factors and geography
Key Messages

Availability of fast food is associated with BMI in a nationally representative sample of Canadians

The effect appears to be much stronger for females, and in urban areas

Availability of full service and non-chain restaurant density is inversely associated with obesity

Observed effects are robust to spatial heterogeneity
Conclusions

Fast food availability is a (somewhat) modifiable neighborhood level risk factor

Policy Actions in Canada to some extent are underway

More can be done, can take some examples from the south
Acknowledgements:
Research Funding: CIHR, WGRS
Travel: Institute of Clinical Evaluative Sciences (ICES)