Interactive mapping of environmental health assessment of communities across Canada: Contextual factors study of the Canadian Alliance for Healthy Hearts and Minds
March 19 2019

MEETING START: 9:00AM PACIFIC | 12:00 noon EASTERN

FOR AUDIO – PLEASE CALL: 1-855-494-5988
Interactive mapping of environmental health assessment of communities across Canada:
*Contextual factors study of the Canadian Alliance for Healthy Hearts and Minds*

March 19 2019

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chat...
Russell de Souza is an Assistant Professor in the Department of Health Research Methods, Evidence, and Impact at McMaster University. He is a registered dietitian, and his research focuses on dietary patterns, health, and how the food environment shapes food choice and risk of cardiovascular disease.
Interactive mapping of environmental health assessment of communities across Canada: Contextual factors study of the Canadian Alliance for Healthy Hearts and Minds

Dr. Russell J. de Souza, RD, ScD
Assistant Professor
McMaster University
Department of Health Research Methods, Evidence, and Impact
March 19, 2010

@DrRussRD
Objectives of the CVCD Alliance

I. To understand the role of socio-environmental contextual factors on individual risk factors, subclinical disease, and events.

II. To identify unique patterns of contextual factors, risk, health service utilization and clinical outcomes in high risk groups including Aboriginal people, Asian, Afro-Canadians.

III. To identify markers of early subclinical dysfunction of the brain and the heart and describe their relationship to individual/contextual risk, and outcome.
Background

Contextual factors assessment
Why assess “contextual” factors?

• We call these the “causes of the causes”
  • Environmental factors that contribute to the development of risk factors
Definition of Community

- The FSA (forward sortation area) was the community unit
  - Low representation of cohort participants from census tracts in rural areas and eastern provinces
  - FSA reported by census respondents for their place of residence
  - Can link aggregate age, sex, marital status, housing costs to FSA
Definition of Community

https://www.businesssellcanada.com/sale/cpc/056.gif

https://www.businesssellcanada.com/sale/cpc/064.gif
Limitation of Definition

• One value per FSA does not represent large or densely-populated FSA with income discrepancies

• If income IQR: Median > 0.5: surveyed 2 postal codes at random from those in the top 25\textsuperscript{th} and bottom 25\textsuperscript{th} percentile of family income

<table>
<thead>
<tr>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>F</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Ontario Community ID</td>
<td>Total Urban/Rural Status</td>
<td>156</td>
<td>Community ID Postal Codes</td>
</tr>
<tr>
<td>1</td>
<td>112 L1R</td>
<td>Urban</td>
<td></td>
<td>597 M1J3J5</td>
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<tr>
<td>2</td>
<td>113 L1S</td>
<td>Urban</td>
<td></td>
<td>598 M1J1J4</td>
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</table>
27 auditors physically visited 2,074 communities

• Before leaving:
  • Selected the community center, a tobacco store, a grocery store, an alcohol retail outlet and a restaurant

• At the community center:
  • Photograph any advertisements
  • Fill out the EPOCH-1 assessment tool

• After completion:
  • questionnaires scanned and sent to data repository at Population Health Research Institute (Hamilton, ON)
Community Centre

- an area in FSA with the highest number of grocery stores and restaurants
- Established prior to the audit by searching for restaurants and grocery stores using Google Maps
EPOCH
Environmental Profile of a Community’s Health

• physical environment audit tool

• Four sections :
  • Community demographics
  • Assessment of a tobacco retail outlet
  • Assessment of a grocery store
  • Assessment of a restaurant
What were we auditing for each community?

**Demographic characteristics**

- Population size (# of postal codes)
- Cost per unit of residential land (difficult!)
- Average house cost (difficult!)
- Nearest city/major urban centre (google maps)
- Nearest provincial highway (google maps)
- Connectivity by bus/train (bus stops, subways, train stations)
## Selecting retail locations

<table>
<thead>
<tr>
<th>Type of store</th>
<th>Procedure</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tobacco outlet</td>
<td>Any store or outlet that sells cigarettes in the community center and note down the location</td>
</tr>
<tr>
<td>Alcohol outlet</td>
<td>Any store or outlet that sells beer and/or wine in the community center and note down the location</td>
</tr>
<tr>
<td>Grocery store</td>
<td>The chain grocery store (Loblaws, Sobeys, or Metro) located in the community centre of the FSA that offers the lowest prices for the compared items.</td>
</tr>
<tr>
<td>Restaurant</td>
<td>Family restaurant with table service and children’s menu that provides an appetizer, soft drink, main course, and dessert for $30, scaled to the average income of the FSA</td>
</tr>
</tbody>
</table>
What were we auditing for each community?

Tobacco store

- In-store signage (age, no smoking, warnings)
- In-store advertisement of products
- Open displays of cigarettes
- Point-of-sale tobacco advertisements
- Smoking cessation age
- Number of brands sold
- Sizes of packages
- Prices
Community subgroups

<table>
<thead>
<tr>
<th>Northern – Southern</th>
<th>Urban – Rural</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Northern</strong>: higher than median latitude</td>
<td><strong>Urban</strong>: 21% or more postal codes within its FSA fell within a CMA/CA</td>
</tr>
<tr>
<td><strong>Southern</strong>: lower than median latitude</td>
<td><strong>Rural</strong>: &lt;21% fell within a CMA/CA</td>
</tr>
</tbody>
</table>

**CMA/CA**: one or more adjacent municipalities centred on a population centre (known as the core). A CMA must have a total population of at least 100,000 of which 50,000 or more must live in the core.
## Community subgroups

<table>
<thead>
<tr>
<th>Province</th>
<th>Cut-off</th>
<th>Closest location to cutoff</th>
<th>Northern Location</th>
<th>Southern Location</th>
<th>Distance (km)</th>
<th>Straight-line distance (km)</th>
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</thead>
<tbody>
<tr>
<td>NL</td>
<td>47.7239072</td>
<td>Terrenceville</td>
<td>Miller Town</td>
<td>St. John’s</td>
<td>318.6</td>
<td>155.6</td>
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<tr>
<td>NS</td>
<td>45.0108247</td>
<td>Lochaber Mines</td>
<td>Eskasoni</td>
<td>Dartmouth</td>
<td>279.5</td>
<td>144.0</td>
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<td>PE</td>
<td>46.2732890</td>
<td>Warren Grove</td>
<td>North Milton</td>
<td>Fullerton’s Creek</td>
<td>18.3</td>
<td>13.6</td>
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<td>NB</td>
<td>46.0561587</td>
<td>New Zion</td>
<td>White Rapids</td>
<td>Quispamis</td>
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<td>152.1</td>
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<td>Quebec City</td>
<td>Montreal</td>
<td>184.3</td>
<td>132.5</td>
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<td>43.7057053</td>
<td>Brampton</td>
<td>Sutton</td>
<td>Oakville</td>
<td>104.6</td>
<td>97.5</td>
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<td>MB</td>
<td>49.9099339</td>
<td>St. Francis Xavier</td>
<td>West St. Paul</td>
<td>Linden Woods</td>
<td>17.7</td>
<td>17.6</td>
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<td>SK</td>
<td>52.0961074</td>
<td>Meacham</td>
<td>Hague</td>
<td>Regina</td>
<td>269.1</td>
<td>234.6</td>
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<td>AB</td>
<td>53.2022632</td>
<td>Leduc</td>
<td>Edmonton</td>
<td>Calgary</td>
<td>280.4</td>
<td>277.8</td>
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<td>BC</td>
<td>49.2666086</td>
<td>Harbor Chines</td>
<td>Squamish</td>
<td>Richmond</td>
<td>57.6</td>
<td>57.0</td>
</tr>
</tbody>
</table>
What were we auditing for each community?

**Grocery store**

- availability of 36 fruits and 45 vegetables
- prices of
  - 7 Fruits (2 organic options)
  - 4 Vegetables
  - Milk
  - Bread
  - Chicken
  - Meat (pork chops)
  - Eggs
  - Cola
  - Chocolate

- Advertisements: junk food, sweet drinks, fruits and vegetables, cigarettes and alcohol

Photographed by our audit team
What were we auditing for each community?

**Alcohol outlet**

- Price of 24 cans of beer (most popular brand)
- Price of bottle (750 ml) white wine (most popular brand)
What were we auditing for each community?

*Family restaurant*

- Healthy menu options (low sodium, low calories, low-fat, other)
- *Health Check*
- salad main dish option
- “super-size” portion size
- All-you-can eat buffet
- Nutritional information availability (on-line or pamphlet)
Results

What did we find?
We audited 2,074 communities in 10 provinces

![Map of Canada](https://en.wikipedia.org/wiki/File:Map_Canada_political-geo.png)

<table>
<thead>
<tr>
<th>Urban</th>
<th>238</th>
<th>197</th>
<th>57</th>
<th>77</th>
<th>696</th>
<th>517</th>
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<td>87.4</td>
<td>80.7</td>
<td>71.9</td>
<td>72.7</td>
<td>92.1</td>
<td>87.0</td>
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<td>Rural</td>
<td>12.6</td>
<td>19.3</td>
<td>28.1</td>
<td>27.3</td>
<td>7.9</td>
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<table>
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<th>50.0</th>
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<td>21.4</td>
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<tr>
<td></td>
<td>9</td>
<td>77.8</td>
<td>22.2</td>
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</table>
Most of Canada is urban (N=2,074)

Adapted from: de Souza et al, Cities and Health, 2017
Most provinces are largely urban: ON, QC most urban; NB, NL the most rural

<table>
<thead>
<tr>
<th></th>
<th>URBAN</th>
<th>RURAL</th>
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<tr>
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<td>30</td>
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<td>AB</td>
<td>159</td>
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<td>SK</td>
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<td>16</td>
</tr>
<tr>
<td>MB</td>
<td>56</td>
<td>21</td>
</tr>
<tr>
<td>ON</td>
<td>641</td>
<td>55</td>
</tr>
<tr>
<td>QC</td>
<td>450</td>
<td>67</td>
</tr>
<tr>
<td>NB</td>
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<td>66</td>
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<tr>
<td>NS</td>
<td>81</td>
<td>22</td>
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<tr>
<td>PEI</td>
<td>2</td>
<td>7</td>
</tr>
<tr>
<td>NL</td>
<td>22</td>
<td>2</td>
</tr>
</tbody>
</table>

N communities

Adapted from: de Souza et al, *Cities and Health*, 2017
Northern communities more likely to be rural
ON north more urban than country average

Adapted from: de Souza et al, Cities and Health, 2017
Urban incomes are higher:
Gap is largest in NL, smallest in PEI

Adapted from: de Souza et al, Cities and Health, 2017
Median household income higher in north vs. south
Ontario flips: higher overall, but higher in north

Adapted from: de Souza et al, Cities and Health, 2017
The distance to the nearest major highway varies: Rural QC, NS, NL most isolated

<table>
<thead>
<tr>
<th>Province</th>
<th>Rural QC</th>
<th>Rural NS</th>
<th>Rural NL</th>
</tr>
</thead>
<tbody>
<tr>
<td>BC</td>
<td>1.3 km</td>
<td>2.4 km</td>
<td>14.2 km</td>
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<tr>
<td>AB</td>
<td>2.2 km</td>
<td>0.5 km</td>
<td>17.3 km</td>
</tr>
<tr>
<td>SK</td>
<td>1.7 km</td>
<td>1.0 km</td>
<td>11.1 km</td>
</tr>
<tr>
<td>MB</td>
<td>5.6 km</td>
<td>4.0 km</td>
<td>2.9 km</td>
</tr>
<tr>
<td>ON</td>
<td>4.8 km</td>
<td>3.5 km</td>
<td>1.0 km</td>
</tr>
<tr>
<td>QC</td>
<td>2.5 km</td>
<td>1.5 km</td>
<td>0.0 km</td>
</tr>
<tr>
<td>NB</td>
<td>1.1 km</td>
<td>2.0 km</td>
<td>21.0 km</td>
</tr>
<tr>
<td>NS</td>
<td>17.3 km</td>
<td>1.7 km</td>
<td>15.3 km</td>
</tr>
<tr>
<td>PEI</td>
<td>1.4 km</td>
<td>0.0 km</td>
<td>14.2 km</td>
</tr>
<tr>
<td>NL</td>
<td>21.0 km</td>
<td>17.3 km</td>
<td>0.0 km</td>
</tr>
</tbody>
</table>

Adapted from: de Souza et al, *Cities and Health*, 2017
Northern and southern communities close to highways
Southern Ontario communities a bit further

Adapted from: de Souza et al, Cities and Health, 2017
Urban communities more likely to have buses: Better service in more distal rural QC, NS, NL

Adapted from: de Souza et al, Cities and Health, 2017
Northern and southern communities have buses
Better coverage in Southern Ontario

Adapted from: de Souza et al, Cities and Health, 2017
Access to train service limited to 4 provinces: Urban BC, AB, ON, QC

12.0% URBAN / 0.0% RURAL

Adapted from: de Souza et al, *Cities and Health*, 2017
Train service more common in Southern communities
Better coverage in Ontario

Adapted from: de Souza et al, Cities and Health, 2017
Cigarette prices vary by $2 per 20-pack. Cheapest in ON, QC… priciest in MB.

$11.21 URBAN / $12.00 RURAL

Adapted from: de Souza et al, *Cities and Health*, 2017
Cigarettes prices similar between north and south Ontario a bit cheaper

Adapted from: de Souza et al, Cities and Health, 2017
Variety of fruits similar across provinces
Urban NB about 50% of the variety

Adapted from: de Souza et al, Cities and Health, 2017
**Fruit choice similar between north and south Ontario consistent with national trend**

Adapted from: de Souza et al, *Cities and Health*, 2017
Variety of vegetables similar across provinces
Urban NB about 65% of the variety

<table>
<thead>
<tr>
<th>Province</th>
<th>URBAN</th>
<th>RURAL</th>
</tr>
</thead>
<tbody>
<tr>
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<td>31</td>
</tr>
<tr>
<td>AB</td>
<td>32</td>
<td>30</td>
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<td>SK</td>
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<td>28</td>
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<tr>
<td>NL</td>
<td>32</td>
<td>34</td>
</tr>
</tbody>
</table>

Adapted from: de Souza et al, *Cities and Health*, 2017
Vegetable choice similar between north and south Ontario consistent with national trend

Adapted from: de Souza et al, Cities and Health, 2017
Common fruits and vegetables were in >90% of stores

Fruits
- **Most Common**
  - Apple
  - Orange
  - Banana
  - Lemon
  - Grapes
- **Least common**
  - Jackfruit
  - Pumpkin
  - Lychee
  - Guava
  - Persimmon

Vegetables
- **Most Common**
  - Carrots
  - Tomato
  - Celery
  - Onion
  - Cucumber
- **Least Common**
  - Mustard Greens
  - Broad (Lima) beans
  - Gourd
  - Winter melon
Price of nutritious food higher in rural communities
Most expensive in NB, most affordable in ON

Nutritious food: 2% milk, eggs, chicken drumsticks, pork loin chops, carrots, lettuce, apples, bananas, grapes, oranges, pears, tomatoes, white bread, white rice, brown rice

Adapted from: de Souza et al, Cities and Health, 2017
Price of nutritious foods higher in northern Canada
Ontario consistent with national trend

Adapted from: de Souza et al, Cities and Health, 2017
Junk food advertisements are common
Least common in SK, MB, PEI, NL

Adapted from: de Souza et al, Cities and Health, 2017
Junk food advertisements are common. Ontario is higher than national averages.

Adapted from: de Souza et al, *Cities and Health*, 2017
Sugary drink advertisements are common. Least common in SK, MB, PEI, NL.

Adapted from: de Souza et al, *Cities and Health*, 2017
Sugary drink advertisements are common. Ontario is higher than national averages, more in the north.

Adapted from: de Souza et al, Cities and Health, 2017
Fruit & vegetable advertisements are less common
Least common in SK, MB, BC

Adapted from: de Souza et al, Cities and Health, 2017
Fruit & vegetable advertisements are less common in Ontario a little better than most places in Canada.

Adapted from: de Souza et al, *Cities and Health*, 2017
Price of beer varies across provinces
Cheapest in QC, NB… most expensive in NL

$34.13 URBAN / $33.26 RURAL

Adapted from: de Souza et al, Cities and Health, 2017
Price of beer varies across provinces
Little more expensive in Ontario; but QC, NB low

Adapted from: de Souza et al, *Cities and Health*, 2017
Nutrition information not available in most restaurants
Large inter-provincial variation

Adapted from: de Souza et al, *Cities and Health*, 2017
Nutritional information unavailable in most restaurants
Slightly less so in Northern Ontario

Adapted from: de Souza et al, *Cities and Health*, 2017
Development of the on-line map: https://cvcdcontextual.mcmaster.ca/

1. Create database of audits for each community
2. Render the map of Canada using tile map service
3. Use Canadian FSA boundary data from Census Canada
4. Use postal boundary data from CanMap Postal Code Suite
5. Link #3 and 4 to EPOCH-1 data for each community
6. Integrate data from study, boundaries, and basemap (leaflet)

deo Souza et al, Cities and Health, 2017
1. Simple database

• .csv format containing the values for each community’s environmental assessment (Microsoft Excel, Microsoft Corporation de Souza et al, Cities and Health, 2017)
<table>
<thead>
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</tbody>
</table>
2. Render the map

- tile map service provided from CARTO (https://carto.com) to render the map of Canada
- CARTO provides stylized maps based on OpenStreetMap data
- OpenStreetMap (https://www.openstreetmap.org) is a collaborative project that offers open map data of the world that is free to download and use for any purpose
3+4. Canadian FSA boundary (Census Canada)

- Display boundaries for regions nearby
- allow the user to view data on a region by selecting anywhere within a region’s boundary
- Canadian FSA boundary data from the Canadian census (Statistics Canada), and the postal boundary data from CanMap Postal Code Suite
- Includes fields for six digit postal codes with and without space
- Includes shapefile for retired postal codes
- Level of accuracy = Ranging from CanMap Streetfiles to Dissemination Area centroid
- Projection = Unprojected Latitude/Longitude

https://library.mcmaster.ca/maps/dmt_plat.htm
<table>
<thead>
<tr>
<th>Attribute Name</th>
<th>Description</th>
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<tbody>
<tr>
<td>MEP_ID</td>
<td>Multiple enhanced postal code point unique identifier</td>
</tr>
<tr>
<td>POSTAL_CODE</td>
<td>Postal Code data with no space between the FSA and LDU</td>
</tr>
<tr>
<td>POST_CODE</td>
<td>Postal Code data with a space between the FSA and LDU</td>
</tr>
<tr>
<td>SLI</td>
<td>Single Link indicator (identifies main postal code record when multiple exist)</td>
</tr>
<tr>
<td>PROV</td>
<td>2 letter alpha abbreviation (Canada Post) according to the first letter of the postal code (i.e. L1R2H2=ON)</td>
</tr>
<tr>
<td>COMM_NAME</td>
<td>Community name</td>
</tr>
<tr>
<td>MAF_ID</td>
<td>Uniquely identifies a municipal amalgamation boundary</td>
</tr>
<tr>
<td>BIRTH_DATE</td>
<td>Data when the postal code became active (YYMMDD)</td>
</tr>
<tr>
<td>RET_DATE</td>
<td>Date when a postal code was retired or no longer in use by Canada Post Corporation (YYYYMMDD format)</td>
</tr>
<tr>
<td>DOM_DELMDE</td>
<td>Dominant Delivery Mode Type identifying the primary type of delivery service for Active Postal Code records only</td>
</tr>
<tr>
<td>TOTAL_POC</td>
<td>Total Points of Call—the total number of points of call (apartments, business, houses and farms) served by the postal code for all delivery mode types for Active Postal Code records only</td>
</tr>
<tr>
<td>POC_APART</td>
<td>Points of Call for Apartments—the total number of apartments served by the postal code for all delivery mode types for Active Postal Code Records only</td>
</tr>
<tr>
<td>POC_BUS</td>
<td>Points of Call for Business—the total number of business served by the postal code for all delivery mode types for Active Postal Code Records only</td>
</tr>
<tr>
<td>POC_FARM</td>
<td>Points of Call for Farms—the total number of farms served by the postal code for all delivery mode types for Active Postal Code Records only</td>
</tr>
<tr>
<td>PC_COUNT</td>
<td>Total number of Postal Code point records associated with each postal code</td>
</tr>
<tr>
<td>POSITION</td>
<td>Representative point flag, this identifies the method used to geographically position the coordinate</td>
</tr>
<tr>
<td>LONGITUDE</td>
<td>Longitude in the decimal degrees</td>
</tr>
<tr>
<td>LATITUDE</td>
<td>Latitude in decimal degrees</td>
</tr>
<tr>
<td>CANMAPID</td>
<td>ID to reference to CanMap street file</td>
</tr>
</tbody>
</table>
5+6. Linkage

- used Leaflet ([https://leafletjs.com/](https://leafletjs.com/))
- open-source library for creating web maps
- integrate audit data, boundary data, and basemap
- create an interactive map that would be accessible via a mobile or desk/laptop browser
- Leaflet handles retrieval and processing of the basemap tiles and displays the FSA and postal boundaries with the study data
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https://leafletjs.com/
Dec 30, 2018 — Leaflet 1.3.0 has been released!

Leaflet is the leading open-source JavaScript library for mobile-friendly interactive maps. Weighting just about 38 KB of JS, it has all the mapping features most developers ever need.

Leaflet is designed with simplicity, performance and usability in mind. It works efficiently across all major desktop and mobile platforms, can be extended with lots of plugins, has a beautiful easy to use and well documented API, and a simple, readable source code that is a joy to contribute to.

Here we create a map in the `map` div, add step of our choice, and then add a marker with some text in a popup.

```javascript
var map = L.map('map').setView([51.393, -0.58], 13);
L.tileLayer('https://{s}.tile.openstreetmap.org/{z}/{x}/{y}.png', {
  attribution: '© OpenStreetMap contributors',
}).addTo(map);
L.marker([51.5, -0.5]).addTo(map);
bindPopup('A pretty CSS popup (br) easily customisable.'),
.openPopup();
```

Learn more with the quick start guide, check out other tutorials, or head straight to the API documentation. If you have any questions, take a look at the FAQ first.
Online Map:
https://cvcdcontextual.mcmaster.ca/

• https://cvcdcontextual.mcmaster.ca/

de Souza et al, Cities and Health, 2017
Implications for policy and practice

• Foster collaboration between public health and built environment professionals, and legislators around the common aim of improving community health

• **Planners**: expertise in the use of strategic environmental assessments, sustainability appraisals, and health impact assessments

• **Public health professionals**: knowledge of the wider determinants of health, health needs assessment, setting objectives for health, and monitoring and interpreting health information

• **Public**: publicly-available data (assessments) can support grassroots campaigns

Pilkington et al, 2008
Implications for policy and practice

• *Policies that reduce and stabilize the prices of fruits and vegetables across rural and urban communities are likely to increase purchase and consumption*

• **Barriers:** Canada requires a multi-factorial solution that addresses several challenges, including the lack of population density (i.e. less demand), and greater isolation, longer distances to travel under poor road conditions, a lack of storage and/or processing facilities

Implications for policy and practice

• Reducing the influence of advertising is an important step in reducing obesity, most specifically, childhood obesity

• Models that work: Strict prohibition of advertisements of tobacco and alcohol could be the model for a federal, enforceable restriction of marketing unhealthy foods to children and vulnerable populations

• Proposals: “Junk food” or sugar taxes represent a complex solution

de Souza et al, Cities and Health, 2017; Raine et al. 2013
Implications for policy and practice

- *Higher prices of cigarettes are likely to be an effective strategy to prevent new smokers and increase cessation in existing smokers.*

  - **Price-sensitivity:** cigarette smokers seek out measures to purchase less expensive cigarettes

  - **Barrier to entry:** younger smokers deterred

Hyland et al., 2005
Implications for policy and practice

- Our data may be linked with population-based data on other exposures (e.g. eating patterns, **air pollution**, access to health services) and outcomes (e.g. disease rates)

deu Souza et al, *Cities and Health*, 2017
Future research directions

• Linkage with cardiovascular and cancer outcomes
• Concordance between individual perceptions and our observations
• Multi-level models parsing the influence of individual and community
Summary of findings

1. Provincial and urban-rural differences exist in availability of fruits and vegetables; advertising differs between provinces more so than between urban and rural communities.

2. Rural communities face higher food prices, are subject to more seasonal variation in fruit and vegetable selection, and generally see less promotion of healthy restaurant options and availability of nutritional information at restaurants than urban communities.

3. In-store advertising for sweet drinks and junk food are more frequent than in-store advertisements for tobacco products.

4. Cigarette prices are lower and the variety of brands is greater in urban than in rural tobacco stores; and are lowest in central Canada, where there is both more in-store advertising for cigarettes and signage prohibiting smoking in-store.

5. Alcohol prices are lowest in Quebec.
Acknowledgement of co-authors

• Dr. Sonia Anand
• Dr. Lise Gauvin
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• Dr. SV Subramanian

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• Rishi Arora
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• Dr. Jeffrey Brook
• Dr. Jack Tu
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- Delia Lin
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- Matthew Madill
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- Gift Madojemu
- Crystal Narten
- Sungpyo Park
- Timothy Park
- Anne-Marie Poirier
- Tayler Poscai
- Emma Price
- Anjali Sergeant
- Geoffrey Thompson
Principal Investigators

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Montreal, QC
Imaging

Sonia Anand
Hamilton, ON
Epidemiology

Jack Tu
Toronto, ON
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• Canadian Institutes of Health Research (CIHR) through the Canadian Urban Environmental Health Research Consortium (CANUE)
Thank you

• @DrRussRD

• desouzrj@mcmaster.ca

• Watch our video:
  https://www.youtube.com/watch?v=PJU4qSkEndM
### General

<table>
<thead>
<tr>
<th>Description</th>
<th>Details</th>
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<tbody>
<tr>
<td>FSA/Postal Code</td>
<td>M5A</td>
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<tr>
<td># of Postal Codes</td>
<td>603</td>
</tr>
<tr>
<td>Average House Price</td>
<td>$1,375,000</td>
</tr>
<tr>
<td>Rural?</td>
<td>No</td>
</tr>
<tr>
<td>Nearest City</td>
<td>Toronto</td>
</tr>
<tr>
<td>Nearest Highway</td>
<td>404</td>
</tr>
<tr>
<td>Bus Frequency</td>
<td>12 per hour</td>
</tr>
<tr>
<td>Subway Frequency</td>
<td>20 per hour</td>
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</tbody>
</table>
Tobacco

Point-of-Sale Advertising: No Data
Openly Displayed Cigarettes: No Data
Signs that Prohibit Smoking: No Data
Signs Showing Harmful Effects: No Data

◦ # Cigarette Brands sold?: 33
◦ # Smokeless Tobacco Brands?: 3
Available Packet Sizes: 20-24/pack, 25-30/pack, >30 or multi-pack carton,

◦ Cheapest Brand Sold: LD @ $6.88 for 20
◦ Marlboro Brand Sold: Rooftop @ $10.27 for 20

◦ # of Health Warning on Cheapest Pack: 2
Smoking Cessation Aids Sold: No

Groceries

Junk Food Advertisement: >=3
Sweet Drink Advertisement: >=3
Fruit and Vegetable Advertisement: 1-2
Cigarette and Tobacco Advertisement: None
Alcohol Advertisement: None

◦ # of Types of Fruit: 23
3+ Fruits Appear to be Damaged: No
3+ Fruits are Specially Packaged: Yes
◦ # of Types of Vegetables: 32
Healthy Food Basket: $62.70
Junk Food Combination: No Data

Restaurants

Salads as Main Dish: Yes
Increase Portion Size Option: No
Buffet Service: No
Health Check Items: No
Nutritional Information Provided: No

Alcohol

Store Sells Alcoholic Beverages?: Yes
Price of a 750-ml Bottle of White Wine?: $10.10
Price of 24-Cans of Beer?: $43.95