USING MAPS TO SUPPORT TOBACCO EVALUATION: An Overview of ArcGIS and Tableau

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Massachusetts Department of Public Health
Overview

- GIS to support evaluation efforts
- Best uses of *Tableau* software and ArcGIS
- Live Tableau Demo
Evaluation activities

- Demonstrating tobacco-related influence in the community
- Mapping geographic disparities
- Prioritization of program resources
- Measuring program impact
- Policy tracking & evaluation
Demonstrating tobacco-related influence in the community
Retailers
- Retailers within 500 ft of a school (315)
- Retailers within 1000 ft of a school (1,361)
- Retailers more than 1000 ft from a school (6,083)

Schools
- Without high school students (PK-9)
- With high school students (PK-12)

Tobacco Retailers

- 856 Retailers
  - 42.4% within 1000 ft of a school
  - 12.3% within 500 ft of a school

- 253 Retailers
  - 23.7% within 1000 ft of a school
  - 4.4% within 500 ft of a school

- 239 Retailers
  - 25.1% within 1000 ft of a school
  - 7.1% within 500 ft of a school
Demonstrating tobacco-related influence in the community

- Retail density near schools
- Comparison to statewide rates

Can be used to educate local policy makers & stakeholders
Demonstrating tobacco-related influence in the community

Lynn: Tobacco Retail Density by Zip Code, 2015

Legend
- Tobacco Retailers
- Tobacco Retailers with illegal sales to youth†

Schools
- Elementary School
- K-8 School
- Middle School
- High School

Tobacco Retail Density by Zip Code
- 0.9
- 1.4
- 1.7
- 2.2
- 12.2

Median Income by Zip Code
- $80,903
- $37,275
- $42,490
- $23,467

0 0.25 0.5 1 Miles
Smoking Rate (2013-2014) in Massachusetts

Smoking Rate (2013-2014)
- Less than 11.8%
- 11.8% to < 15.2%
- 15.2% to < 18.4%
- Greater than 18.4%
- Not Available

Smoking Rate is derived from the Behavioral Risk Factor Surveillance System (2013-2014).
Environmental Justice Block Groups and Retail Density

Exploratory spatial analysis
- Relationship between retail density, % non-white population and low-income populations

Retail Density
243 Tobacco Retailers (97% of retailers) are located in EJ block groups.

<table>
<thead>
<tr>
<th>EJ Region</th>
<th>% of Retailers</th>
<th>Retail Density</th>
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<tbody>
<tr>
<td>I</td>
<td>0</td>
<td>-</td>
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<tr>
<td>M</td>
<td>21.6%</td>
<td>1.98</td>
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<td>M/I</td>
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<td>M/I/E</td>
<td>16.0%</td>
<td>2.84</td>
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</table>

EJ Block Groups
- Income
- Minority or English Isolation
- Minority & Income
- Minority & Income & English Isolation

Legend
- Tobacco Retailers (230)
- Springfield Schools (67)
MTCP has used community-level tobacco related metrics to inform the prioritization of program resources to high-need communities.

Data visualization can help visually identify priority areas.

Prioritization of program resources

<table>
<thead>
<tr>
<th>Town</th>
<th>City/Town</th>
<th>County</th>
<th>Total Pop</th>
<th>Median In</th>
<th>pct. below poverty</th>
<th>smoking</th>
<th>income</th>
<th>Parent R</th>
<th>VFD R</th>
<th>Healthfulness</th>
<th>visits</th>
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Geographic Disparities in Massachusetts, 2016

Geographic Disparities by Tiers

- Tier 1 - High Need (88)
- Tier 2 (88)
- Tier 3 (88)
- Tier 4 - Low Need (87)

*Tier 1 communities, or the highest need communities, are listed by region.

The criteria to determine if a town is a priority community includes: median income, percent below federal poverty level, smoking rate, youth retail density, percent of residents with Medicaid and percent of residents with mental illness.

Median income and percent below federal poverty level is obtained from the 2010 U.S. Census.

Smoking rate and percent of residents with Medicaid or mental illness were calculated using small area estimates based on 2013-2014 BRFSS.
Prioritization of program resources

Identify current funding and make adjustments to better address tobacco inequities.

Legend
- Blue: Funded communities of need (86)
- Light blue: Non-funded communities of need (48)
- Yellow: Funded other communities (100)
- White: Non-funded other communities (117)
Measuring program impact

Using maps & census data to illustrate program reach

Population Reached by Healthy Eating and Physical Activity Sites

- Farmers Markets in Maintenance
- Markets in Conversion
- Farmers Markets in Conversion
- Environmental Justice Block Groups

Worcester

Population Reached by Healthy Eating Sites

<table>
<thead>
<tr>
<th>Percentage</th>
<th>Description</th>
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<tr>
<td>16%</td>
<td>% of total community population reached by sites in maintenance</td>
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<tr>
<td>23%</td>
<td>% of &quot;High Need&quot; population reached by sites in maintenance</td>
</tr>
<tr>
<td>27%</td>
<td>% of additional population reached by sites in conversion</td>
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</table>

Sites in "conversion" are in one of several phases of assessment and planning prior to making a healthy change in operations or being implemented for physical activity. Sites in "maintenance" or "implementation" have changed operations or have implemented a project plan.

Buffers around Mass in Motion sites vary from 1/4 mile to 1 mile depending on the type of site. Population reach is calculated by estimating the population that lives in block groups reached by the buffers. Block groups shaded in purple represent areas of high need based on household income, minority population, or linguistic isolation.

Updated as of June 2016
Policy tracking & evaluation

Display which municipalities have certain priority policies

Municipalities with Regulations Restricting the Sale of Flavored Tobacco Products
Policy tracking & evaluation

Visually show policy progress to date

Priority Policies Passed in Massachusetts Communities, 2017

<table>
<thead>
<tr>
<th>Priority Policies Passed</th>
<th>MTCP Priority Policies</th>
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<tbody>
<tr>
<td>No Priority Policies (175)</td>
<td>Cap on the Number of Retail Licenses (82)</td>
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<tr>
<td>1 Priority Policy (38)</td>
<td>Cigar Packaging and Pricing (139)</td>
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<tr>
<td>2 Priority Policies (41)</td>
<td>Pharmacy Ban (151)</td>
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<td>3 Priority Policies (51)</td>
<td>Restriction on Sale of Flavored Tobacco Products (84)</td>
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<td>4 Priority Policies (46)</td>
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Mapping in Tableau
# Tableau Overview

Tableau is an interactive visualization software for internal or external use:

- *Desktop, Server, Online, Public*

Can use for interactive mapping with the ability to display more information than a GIS map:

- *Can also make charts, tables, graphs*

Users can hover and filter to change the visualization:

Can display multiple metrics at one time:

- *Easier comparison between metrics*

Easily updated
Live Tableau Demo

http://mahb.org/tobaccomaps/
# ArcGIS and Tableau

<table>
<thead>
<tr>
<th>Purpose</th>
<th>ArcGIS</th>
<th>Tableau</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>Desktop mapping of data; Used to create static maps</td>
<td>Desktop &amp; Online visualization of data; can create interactive maps</td>
</tr>
<tr>
<td>Ease of Use</td>
<td>Clean data beforehand; Requires some technical skills</td>
<td>Can manipulate data in program; Interface is mostly drag and drop</td>
</tr>
<tr>
<td>Analysis</td>
<td>Can perform a variety of spatial analyses</td>
<td>More emphasis on visualization; less analysis</td>
</tr>
<tr>
<td>Display</td>
<td>Good for focusing on a particular topic; harder to display multiple relationships at one time</td>
<td>Easier to display multiple relationships at one time</td>
</tr>
<tr>
<td>Updating</td>
<td>May have to re-upload data &amp; create new exports</td>
<td>Make edits to source data and refresh in Tableau</td>
</tr>
</tbody>
</table>
MTCP primarily uses:

**ArcGIS for:**
- Displaying static maps with one primary focus
  - # of municipalities with a particular policy
  - Retail density and zipcode
  - Retail density near schools
- Easily exported/printed & shared with staff

**Tableau for:**
- Interacting with maps to show multiple relationships at once
  - Towns with both cigar or flavor policies
  - Compare smoking rates across a county
- Easily shared & viewed online for public and field staff; harder to print
Mapping is an important tool used in MTCP evaluation efforts for visualizing tobacco-related metrics in Massachusetts communities:

- Retail Density & Retailers near schools
- Geographic disparities (e.g. smoking rates)
- Prioritizing resources & measuring program impact
- Policy progress

Data visualization softwares such as *ArcGIS* and *Tableau* can help inform evaluators, program staff, field staff & the general public about local tobacco data.
THANK YOU

Questions?

E-mail: Lindsay.Kephart@state.ma.us