Geographic Variation in the Delivery of High-Value Public Health Services: Exploring Causes & Consequences

Glen P. Mays
University of Kentucky, glen.mays@uky.edu

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Glen Mays, PhD, MPH
University of Kentucky

glen.mays@uky.edu

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- Data provided by the National Association of County and City Health Officials, National Profile of Local Health Departments
- Findings do not necessarily represent the views of RWJF or NIH
Diffusion of Public Health PBRNs

- First cohort (December 2008 start-up)
- Second cohort (January 2010 start-up)
- Affiliate/Emerging PBRNs (2011-14)
PBRNs as Mechanisms for Learning

Identify Common questions of interest

Translation & application

Engaged practice settings

Research partner

Apply Rigorous research methods

Analysis & interpretation

Data exchange
Multi-Network Practice and Outcome Variation Examination Study (M PROVE)

6 Participating PBRNs

- Identify implementation measures high-value services:
  - Chronic disease prevention
  - Communicable disease control
  - Environmental health protection

- Create registry of measures: consistent across communities

- Profile geographic variation in the delivery of selected public health services across local communities

- Decompose variation into attributable components:
  - need-sensitive or preference-sensitive factors
  - supply-sensitive factors

- Examine associations between service delivery & outcomes
Public Health Delivery and Cost Studies (DACS)

11 Participating PBRNs

- Adapt & apply established cost measurement/estimation methodologies to public health settings
- Identify the costs of implementing selected high-value public health services
- Assess how costs vary across institutional and community settings
- Examine the determinants and consequences of variation in the costs of implementation
  - Economies of scale and scope
  - Efficiency & productivity
  - Equity
## Participating MPROVE networks

<table>
<thead>
<tr>
<th>Network</th>
<th>State Agencies</th>
<th>Local Agencies*</th>
<th>Academic Units</th>
<th>Other</th>
<th>Total</th>
<th>Lead Institution</th>
</tr>
</thead>
<tbody>
<tr>
<td>CO</td>
<td>1</td>
<td>55</td>
<td>2</td>
<td>15</td>
<td>73</td>
<td>Association</td>
</tr>
<tr>
<td>FL</td>
<td>1</td>
<td>67</td>
<td>3</td>
<td>3</td>
<td>74</td>
<td>Local agency</td>
</tr>
<tr>
<td>MN</td>
<td>1</td>
<td>75</td>
<td>1</td>
<td>1</td>
<td>78</td>
<td>State agency</td>
</tr>
<tr>
<td>WA</td>
<td>1</td>
<td>36</td>
<td>2</td>
<td>1</td>
<td>40</td>
<td>Local agency</td>
</tr>
<tr>
<td>NJ</td>
<td>1</td>
<td>100</td>
<td>2</td>
<td>1</td>
<td>104</td>
<td>Academic</td>
</tr>
<tr>
<td>TN</td>
<td>1</td>
<td>2</td>
<td>2</td>
<td>1</td>
<td>20</td>
<td>Academic</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>6</strong></td>
<td><strong>337</strong></td>
<td><strong>12</strong></td>
<td><strong>22</strong></td>
<td><strong>371</strong></td>
<td></td>
</tr>
</tbody>
</table>

*Local Agencies: 1 CO, 3 FL, 1 MN, 1 WA, 1 NJ, 1 TN

Lead Institution:
- Association
- Local agency
- State agency
- Academic
**MPROVE measurement dimensions**

- **Availability/Scope:** specific activities produced
- **Volume/Intensity:** Frequency of producing activity over period of time
- **Capacity:** Labor and capital inputs assigned to an activity
- **Reach:** Proportion of target population reached by activity
- **Quality:** effectiveness, timeliness, equity of activity
- **Efficiency:** resources required to produce given volume of activity
Levels of measurement

- **Community Level**: Includes services/activities regardless of who performs/contributes

- **Agency Level**: Focuses on activities directly contributed by governmental public health agency
Measure selection criteria

- Expected health impact
- Expected economic impact
- Control/influence by local public health agencies and their partners
- Pre-existing evidence of validity and reliability
- Feasibility of obtaining data
Example: Delphi Rating of Measures

Chronic Disease Measures: Feasibility x Health Impact Ratings

Feasibility Rating

Health Impact Rating

Health Impact
Final MPROVE Measures

- **Chronic disease prevention (8 measures)**
  - Tobacco prevention
  - Obesity prevention

- **Communicable disease control (14 measures)**
  - Immunization
  - Enteric disease control
  - STI control
  - Tuberculosis control

- **Environmental health protection (5 measures)**
  - Lead exposure protection
  - Food safety protection
Analytic Methods

- MPROVE data linked with 2013 NACCHO Profile data on agency characteristics, and 2013 ARF data on community characteristics.

- Hierarchical random and fixed effects models estimate patterns and correlates of variation.

- Variance decomposition analyses identify the relative contributions of institutional and community factors in explaining local variation.
Proportion of local settings reporting MPROVE measures
## Local Health Department Resources Allocated to Promoting Physical Activity, Per Capita

<table>
<thead>
<tr>
<th></th>
<th>CO</th>
<th>FL</th>
<th>MN</th>
<th>NJ</th>
<th>TN</th>
<th>WA</th>
<th>6-States</th>
</tr>
</thead>
<tbody>
<tr>
<td>Any</td>
<td>29%</td>
<td>35%</td>
<td>53%</td>
<td>52%</td>
<td>100%</td>
<td>67%</td>
<td>46%</td>
</tr>
<tr>
<td>If &gt;0 Minimum</td>
<td>0.07</td>
<td>0.03</td>
<td>0.00</td>
<td>0.00</td>
<td>0.17</td>
<td>0.10</td>
<td>0.00</td>
</tr>
<tr>
<td>25&lt;sup&gt;th&lt;/sup&gt; pctl</td>
<td>0.10</td>
<td>0.05</td>
<td>0.13</td>
<td>0.04</td>
<td>0.17</td>
<td>0.16</td>
<td>0.08</td>
</tr>
<tr>
<td>50&lt;sup&gt;th&lt;/sup&gt; pctl</td>
<td>0.47</td>
<td>0.24</td>
<td>0.33</td>
<td>0.08</td>
<td>0.17</td>
<td>0.31</td>
<td>0.19</td>
</tr>
<tr>
<td>Mean</td>
<td>5.30</td>
<td>0.80</td>
<td>1.30</td>
<td>0.54</td>
<td>0.17</td>
<td>0.57</td>
<td>1.52</td>
</tr>
<tr>
<td>75&lt;sup&gt;th&lt;/sup&gt; pctl</td>
<td>1.94</td>
<td>0.43</td>
<td>0.95</td>
<td>0.19</td>
<td>0.17</td>
<td>0.62</td>
<td>0.48</td>
</tr>
<tr>
<td>Maximum</td>
<td>47.11</td>
<td>5.29</td>
<td>18.37</td>
<td>8.96</td>
<td>0.17</td>
<td>2.27</td>
<td>47.11</td>
</tr>
</tbody>
</table>
Implementation of community-wide health education campaigns to promote physical activity
Implementation of clean indoor air policy enforcement activities

Bar chart showing the percentage of violations, investigations, citations/fines, and all activities for FL, MN, NJ, TN, WA, and 6-states. The chart compares these activities across the states with varying heights for each category.
## Agency implementation of services/supports to reduce tobacco use and/or exposure

<table>
<thead>
<tr>
<th>Activity</th>
<th>CO</th>
<th>FL</th>
<th>MN</th>
<th>NJ</th>
<th>TN</th>
<th>WA</th>
<th>6-States</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agencies providing tobacco services &amp; supports (%)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1 Educational materials</td>
<td>90%</td>
<td>89%</td>
<td>73%</td>
<td>80%</td>
<td>100%</td>
<td>83%</td>
<td>83%</td>
</tr>
<tr>
<td>2 Educational media</td>
<td>56%</td>
<td>66%</td>
<td>40%</td>
<td>17%</td>
<td>100%</td>
<td>28%</td>
<td>41%</td>
</tr>
<tr>
<td>3 Cultural/linguistic specific materials</td>
<td>60%</td>
<td>62%</td>
<td>25%</td>
<td>41%</td>
<td>0%</td>
<td>31%</td>
<td>44%</td>
</tr>
<tr>
<td>4 Cultural/linguistic specific programs</td>
<td>60%</td>
<td>81%</td>
<td>48%</td>
<td>38%</td>
<td>100%</td>
<td>28%</td>
<td>52%</td>
</tr>
<tr>
<td>5 Educational/training programs</td>
<td>42%</td>
<td>45%</td>
<td>8%</td>
<td>16%</td>
<td>0%</td>
<td>10%</td>
<td>24%</td>
</tr>
<tr>
<td>6 Community development</td>
<td>37%</td>
<td>81%</td>
<td>48%</td>
<td>41%</td>
<td>100%</td>
<td>52%</td>
<td>51%</td>
</tr>
<tr>
<td>7 Policy development</td>
<td>44%</td>
<td>79%</td>
<td>56%</td>
<td>46%</td>
<td>50%</td>
<td>41%</td>
<td>53%</td>
</tr>
<tr>
<td>8 Policy implementation</td>
<td>44%</td>
<td>30%</td>
<td>--</td>
<td>45%</td>
<td>100%</td>
<td>41%</td>
<td>41%</td>
</tr>
<tr>
<td>9 Tobacco cessation programs</td>
<td>--</td>
<td>32%</td>
<td>--</td>
<td>9%</td>
<td>50%</td>
<td>17%</td>
<td>18%</td>
</tr>
<tr>
<td>10 Adult tobacco use surveillance</td>
<td>--</td>
<td>57%</td>
<td>--</td>
<td>13%</td>
<td>50%</td>
<td>28%</td>
<td>31%</td>
</tr>
<tr>
<td>11 Youth tobacco use surveillance</td>
<td>--</td>
<td>--</td>
<td>79%</td>
<td>12%</td>
<td>--</td>
<td>--</td>
<td>40%</td>
</tr>
<tr>
<td>Agencies providing all services/supports (%)</td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
<td>1%</td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
</tr>
<tr>
<td>Agencies providing any of the services/supports (%)</td>
<td>94%</td>
<td>96%</td>
<td>96%</td>
<td>87%</td>
<td>100%</td>
<td>90%</td>
<td>92%</td>
</tr>
<tr>
<td>Average number of services/supports offered (mean)</td>
<td>4.33</td>
<td>6.21</td>
<td>3.77</td>
<td>3.57</td>
<td>6.50</td>
<td>3.59</td>
<td>4.29</td>
</tr>
</tbody>
</table>
Average FTE staffing for communicable disease intervention specialists per 100,000 population
Average completion time for enteric disease investigations

Completion time (days)

CO  FL  MN  NJ  TN  WA  6 states
Overall Patterns of Variation in Local Public Health Implementation

Estimates from random effects regression models
Correlates of Variation in Local Public Health Implementation

Estimates from state fixed-effects regression models

*p<0.05
Preliminary Conclusions

- Wide variation in local availability of public health implementation measures
- Considerable within-state and between-state variation in implementation
- Patterns of variation are specific to domain & activity
- Institutional and community characteristics explain 30-50% of this variation
  - Harmful?
  - Wasteful?
  - Inequitable?
Ongoing cross-state analyses

- Predictive & convergent validity tests
- Refining patterns & determinants of variation
  - Disentangling demand (need) from supply
  - System structure
  - Geospatial
  - Within and across domains of activity: composite measures
- Identifying population health correlates of variation
Acknowledgements

- PBRN partners in CO, NJ, FL, WA, MN, TN, and NC played vital roles in the design and execution of this study.

- Additional data was provided by the National Association of County and City Health Officials, from the National Profile of Local Health Departments.

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For More Information

Glen P. Mays, Ph.D., M.P.H.
glen.mays@uky.edu

Email: publichealthPBRN@uky.edu
Web: www.publichealthissystems.org
Journal: www.FrontiersinPHSSR.org
Archive: works.bepress.com/glen_mays
Blog: publichealtheconomics.org

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