Who Benefits from Public Health Spending and How Long Does it Take: Estimating Community-Specific Spending Effects

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Questions of interest

- Do the effects of public health investments vary across communities based on health needs, vulnerabilities and risks?

- Do the effects of public health investments vary based on the scope and scale of activities supported with these resources?

- Can we achieve larger and more equitable impacts from public health investments through enhanced targeting of resources?
Prior Research: Mortality reductions attributable to local public health spending, 1993-2008

Hierarchical regression estimates with instrumental variables to correct for selection and unmeasured confounding

Mays et al. 2011
Prior Research: Medical cost offsets attributable to local public health spending 1993-2008

Offset elasticity = −0.088

Mays et al. 2009
Variation in Local Public Health Spending

Gini = 0.485

Mays et al. HSR 2009
Changes in Local Public Health Spending
1993-2008

Mays et al. HSR 2009

62% growth

38% decline
Value of an additional dollar in public health

A. Under-spending
B. Equipoise spending
C. Over-spending
Analytic Approach

- Use the technique of local instrumental variables (LIV) estimation to estimate community-specific effects of public health spending.

- Compare the health & economic impact of increases public health spending between:
  - Low-income vs. higher-income communities
  - Agencies that deliver broad vs. narrow scope of public health activities


Analytical approach: IV estimation

- Identify exogenous sources of variation in spending that are unrelated to outcomes
  - Governance structures: local boards of health
  - Decision-making authority: agency, board, local, state

- Controls for unmeasured factors that jointly influence spending and outcomes
Data used in empirical work


- Residual state and federal spending estimates from US Census of Governments and Consolidated Federal Funding Report

- Community characteristics obtained from Census and Area Resource File (ARF)

- Community mortality data obtained from CDC’s Compressed Mortality File

- Medical care spending data from CMS and Dartmouth Atlas (Medicare claims data, HSA-level)
Data used in empirical work

National Longitudinal Survey of Public Health Systems

- Cohort of 360 communities with at least 100,000 residents
- Measures reported by local public health officials:
  - **Scope**: availability of 20 recommended PH activities
  - **Intensive Margin**: effort contributed by the local PH agency
  - **Extensive Margin**: other organizations contributing to PH
  - **Quality**: perceived effectiveness of each activity
- Linked with secondary data on agency and community characteristics
Determineants of Local Public Health Spending Levels: IVs

<table>
<thead>
<tr>
<th>Governance/Decision Authority</th>
<th>Coefficient</th>
<th>95% CI</th>
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<tbody>
<tr>
<td>Governed by local board of health</td>
<td>0.131**</td>
<td>(0.061, 0.201)</td>
</tr>
<tr>
<td>State hires local PH agency head†</td>
<td>-0.151*</td>
<td>(-0.318, 0.018)</td>
</tr>
<tr>
<td>Local board approves local PH budget</td>
<td>0.388***</td>
<td>(0.576, 0.200)</td>
</tr>
<tr>
<td>State approves local PH budget†</td>
<td>-0.308**</td>
<td>(-0.162, -0.454)</td>
</tr>
<tr>
<td>Local govt sets local PH fees</td>
<td>0.217**</td>
<td>(0.101, 0.334)</td>
</tr>
<tr>
<td>Local govt imposes local PH taxes</td>
<td>0.190**</td>
<td>(0.044, 0.337)</td>
</tr>
<tr>
<td>Local board can request local PH levy</td>
<td>0.120**</td>
<td>(0.246, 0.007)</td>
</tr>
</tbody>
</table>

F=16.4  p<0.001

log regression estimates controlling for community-level and state-level characteristics.  *p<0.10  **p<0.05  ***p<0.01
†As compared to the local board of health having the authority.

Mays et al. HSR 2009
Community-specific estimates of public health spending on heart disease mortality

Impact of 10% Increase in Public Health Spending/Capita Based on Income Per Capita in Communities

Log IV regression estimates controlling for community-level and state-level characteristics

Mays et al. forthcoming 2013
Community-specific estimates of public health spending on heart disease mortality

Impact of 10% Increase in Public Health Spending/Capita Based on Scope of Public Health Services Delivered

Log IV regression estimates controlling for community-level and state-level characteristics

Mays et al. forthcoming 2013
How long does it take:
Cumulative effects of public health spending

Changes in Mortality and Medical Care Spending Attributable to 10% Increase in Public Health Spending /Capita

Log IV regression estimates controlling for community-level and state-level characteristics

Mays et al. forthcoming 2013
Conclusions

- Sizable health & economic gains are attributable to local public health expenditures.
- Gains are 21-44% larger in low-income communities.
- Gains are 17-38% larger for communities that invest in a broad range of activities.
- Cumulative effects over 10 years are nearly twice as large as short-term effects.
- No evidence of over-spending.
Implications for policy & practice

Increase the value of public health investments through:

- **Enhanced targeting**: low-resource, high-need communities

- **Enhanced infrastructure**: broad scope of core public health activities
  - Accreditation standards
  - Minimum package of services
For More Information

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