Multi-Sector Contributions to Public Health Delivery Systems: Economic, Institutional & Policy Determinants

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systemsforaction.org

APHA Annual Meeting • Denver, CO • 31 October 2016
How do we support effective population health improvement strategies?

- Target **large-scale** health improvement: neighborhood, city/county, region

- Address **fundamental** and often **multiple** determinants of health

- Mobilize the **collective actions** of multiple stakeholders in government & private sector
  - Infrastructure
  - Information
  - Incentives

Kindig 1997
Challenge: overcoming collective action problems across systems & sectors

- Incentive compatibility → public goods
- Concentrated costs & diffuse benefits
- Time lags: costs vs. improvements
- Uncertainties about what works
- Asymmetry in information
- Difficulties measuring progress
- Weak and variable institutions & infrastructure
- Imbalance: resources vs. needs
- Stability & sustainability of funding

Ostrom E. 1994
ACA creates new incentives & infrastructure for population health work

- Health insurance coverage expansion: ability to redeploy charity-care resources
- Hospital community benefit requirements
- Insurer and employer incentives
- Value-based payment models
- CMS Innovation Center demonstrations
- Prevention & Public Health Fund
- National public health accreditation standards
Questions of interest

- Which organizations contribute to the implementation of population health activities in local communities?
- How do these contributions evolve under ACA implementation?
- What are the health and economic effects attributable to population health activities?
National Longitudinal Survey of Public Health Systems

- Cohort of 360 communities with at least 100,000 residents
- Local public health officials report:
  - **Scope**: availability of 20 recommended population health activities
  - **Network**: organizations contributing to each activity
  - **Centrality of effort**: contributed by governmental public health agency
  - **Quality**: perceived effectiveness of each activity

** Additional sample of 500 non-metro communities added in 2014 wave
Measures of population health activities

Foundational Capabilities

- Engage stakeholders
- Assess needs & risks
- Recommend actions
- Develop plans & policies
- Mobilize multi-sector implementation
- Monitor, evaluate, feed back

Data linkages

- **Area Health Resource File**: health resources, demographics, socioeconomic status, insurance coverage
- **NACCHO Profile data**: public health agency institutional and financial characteristics
- **PHAB**: public health agency accreditation status
- **CMS Impact File & Cost Report**: hospital ownership, market share, uncompensated care
- **Dartmouth Atlas**: Area-level medical spending (Medicare)
- **CDC Compressed Mortality File**: Cause-specific death rates by county
- **Equality of Opportunity Project (Chetty)**: local estimates of life expectancy by income
Estimating changes associated with ACA implementation

Dependent variables:

- **Scope**: Percent of population activities performed
- **Organizational centrality**: relative influence of organizations and sectors in supporting population health activities
- **System capital**: composite measure of multi-sector contributions to population health activities

Independent Variables/Comparators:

- Pre-post ACA time trend
- Medicaid expansion vs. Non-expansion states (DD)
- Post-expansion coverage gains
- Public health accreditation status (DD)
Estimating ACA effects on multi-sector population health activities & systems

- Panel regression estimation with random effects to account for repeated measures and clustering of public health jurisdictions within states
- Difference-in-difference specification to estimate ACA expansion and public health agency accreditation effects on system:
  \[ E(\text{Scope/Centrality/System}_{ijt}) = f(\text{ACA, ACA*Post, Accred, Accred*Post, Agency, Community})_{ijt} + \text{State}_j + \text{Year}_t + \varepsilon_{ijt} \]
- Two-stage IV model to estimate long-run effect of system changes on population health
  \[ \text{Prob} (\text{System}_{ijt} = \text{Comprehensive}) = f(\text{Governance, Agency, Community})_{ijt} + \text{State}_j + \text{Year}_t \]
  \[ E(\text{Mortality/LE}_{ijt}) = f(\text{System+resid, Agency, Community})_{ijt} + \text{State}_j + \text{Year}_t + \varepsilon_{ijt} \]

All models control for type of jurisdiction, population size and density, metropolitan area designation, income per capita, unemployment, poverty rate, racial composition, age distribution, physician and hospital availability, insurance coverage, and state and year fixed effects. \( N=1019 \) community-years
Mapping who contributes to population health

Node size = degree centrality
Line size = % activities jointly contributed (tie strength)

Classifying multi-sector delivery systems for population health activities, 1998-2014

<table>
<thead>
<tr>
<th></th>
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</tr>
</thead>
<tbody>
<tr>
<td>Cluster 1</td>
<td>Mod</td>
<td>Low</td>
<td>High</td>
<td>Mod</td>
</tr>
<tr>
<td>Cluster 2</td>
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<td>Low</td>
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<td>Mod</td>
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<td>Cluster 3</td>
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<tr>
<td>Cluster 7</td>
<td>Mod</td>
<td>Low</td>
<td>High</td>
<td>Mod</td>
</tr>
</tbody>
</table>

**Scope**
- High
- Mod
- Low

**Centrality**
- High
- Mod
- Low

**Density**
- High
- Mod
- Low

**Comprehensive** (High System Capital)
- Conventional
- Limited
### Organizational contributions to population health activities, 1998-2014

<table>
<thead>
<tr>
<th>Type of Organization</th>
<th>1998</th>
<th>2014</th>
<th>Percent Change</th>
</tr>
</thead>
<tbody>
<tr>
<td>Local public health agencies</td>
<td>60.7%</td>
<td>67.5%</td>
<td>11.1%</td>
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<tr>
<td>Other local government agencies</td>
<td>31.8%</td>
<td>33.2%</td>
<td>4.4%</td>
</tr>
<tr>
<td>State public health agencies</td>
<td>46.0%</td>
<td>34.3%</td>
<td>-25.4%</td>
</tr>
<tr>
<td>Other state government agencies</td>
<td>17.2%</td>
<td>12.3%</td>
<td>-28.8%</td>
</tr>
<tr>
<td>Federal government agencies</td>
<td>7.0%</td>
<td>7.2%</td>
<td>3.7%</td>
</tr>
<tr>
<td>Hospitals</td>
<td>37.3%</td>
<td>46.6%</td>
<td>24.7%</td>
</tr>
<tr>
<td>Physician practices</td>
<td>20.2%</td>
<td>18.0%</td>
<td>-10.6%</td>
</tr>
<tr>
<td>Community health centers</td>
<td>12.4%</td>
<td>29.0%</td>
<td>134.6%</td>
</tr>
<tr>
<td>Health insurers</td>
<td>8.6%</td>
<td>10.6%</td>
<td>23.0%</td>
</tr>
<tr>
<td>Employers/businesses</td>
<td>16.9%</td>
<td>15.3%</td>
<td>-9.6%</td>
</tr>
<tr>
<td>Schools</td>
<td>30.7%</td>
<td>25.2%</td>
<td>-17.9%</td>
</tr>
<tr>
<td>Universities/colleges</td>
<td>15.6%</td>
<td>22.6%</td>
<td>44.7%</td>
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<tr>
<td>Faith-based organizations</td>
<td>19.2%</td>
<td>17.5%</td>
<td>-9.1%</td>
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<tr>
<td>Other nonprofit organizations</td>
<td>31.9%</td>
<td>32.5%</td>
<td>2.0%</td>
</tr>
<tr>
<td>Other</td>
<td>8.5%</td>
<td>5.2%</td>
<td>-38.4%</td>
</tr>
</tbody>
</table>
Changes in organizational centrality for population health activities, 2012-2014

-25% -20% -15% -10% -5% 0% 5% 10% 15% 20% 25%

Local public health
Other local agencies
State agencies
Federal agencies
Physicians
Hospitals
CHCs
Nonprofits
Insurers
Schools
Higher ed
FBOs
Employers
Other

2014 % Change 2012-14

*p<0.05
Changes in organizational centrality by ACA Medicaid expansion status, 2012-2014

- Local public health
- Other local agencies
- State agencies
- Federal agencies
- Physicians
- Hospitals
- CHCs
- Nonprofits
- Insurers
- Schools
- Higher ed
- FBOs
- Employers
- Other

Non-Expansion  Expansion

* p<0.05
Controlling for type of jurisdiction, population size and density, metropolitan area designation, income per capita, unemployment, poverty rate, racial composition, age distribution, physician and hospital availability, state and year fixed effects. Vertical lines are 95% confidence intervals. N=1019 community-years
Long-run health effects attributable to comprehensive systems

IV Estimates on Mortality, 1998-2014

Models also control for racial composition, unemployment, health insurance coverage, educational attainment, age composition, and state and year fixed effects. N=1019 community-years
Long-run health effects attributable to comprehensive systems

Policy and Behavior Outcomes

<table>
<thead>
<tr>
<th>Percent Change in Outcome</th>
<th>Adoption of smoke-free policy</th>
<th>Smoking among low-income adults</th>
<th>Obesity among low-income adults</th>
<th>Physical activity among low-income adults</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>25</td>
<td>-5</td>
<td>-5</td>
<td>5</td>
</tr>
</tbody>
</table>
Long-run health effects attributable to multi-sector systems

IV Estimates of Comprehensive System Capital Effects on Life Expectancy by Income (Chetty), 2001-2014

Models also control for racial composition, unemployment, health insurance coverage, educational attainment, age composition, and state and year fixed effects. N=1019 community-years. Vertical lines are 95% confidence intervals.
Conclusions and Implications

- ACA-related coverage expansions are associated with significant increases in multi-sector contributions to population health activities.
- Public health agency accreditation is associated with even larger gains in multi-sector activities.
- Multi-sector population health activities may reduce preventable mortality and reduce income-related disparities in life expectancy.
- Health gains from population health are additive to the gains attributable to coverage expansion.
Limitations

- Low-resolution measures of population health activities
- Measure extensive margin of population health activities rather than intensive margin
- Do not directly observe incidence of other ACA population health components (e.g. community benefit)
For More Information

Systems for Action
National Coordinating Center
Systems and Services Research to Build a Culture of Health

Supported by The Robert Wood Johnson Foundation

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