Public Health System Capital and its Health & Economic Returns

Glen P. Mays, University of Kentucky

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How do we support effective population health improvement strategies?

- Designed to achieve large-scale health improvement: neighborhood, city/county, region
- Improve the mean and reduce the variance (equity)
- Target fundamental and often multiple determinants of health
- Mobilize the collective actions of multiple stakeholders in government & private sector
  - Infrastructure
  - Information
  - Incentives

Widely recommended activities to support multi-sector initiatives in population health

- Engage stakeholders
- Assess needs & risks
- Identify evidence-based actions
- Develop shared priorities & plans
- Commit shared resources & responsibilities
- Coordinate implementation
- Monitor, evaluate, feed back

Foundational Capabilities

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A useful lens for studying multi-sector work

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

** Expanded sample of 500 communities<100,000 added in 2014 wave
Data linkages expand analytic possibilities

- **Area Health Resource File**: health resources, demographics, socioeconomic status, insurance coverage
- **NACCHO Profile data**: public health agency institutional and financial characteristics
- **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
- **National Health Interview Survey**: individual-level health
- **HCUP**: area-level hospital and ED use, readmissions
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 1998-2014

<table>
<thead>
<tr>
<th>Cluster 1</th>
<th>Cluster 2</th>
<th>Cluster 3</th>
<th>Cluster 4</th>
<th>Cluster 5</th>
<th>Cluster 6</th>
<th>Cluster 7</th>
</tr>
</thead>
<tbody>
<tr>
<td>Scope</td>
<td>High</td>
<td>High</td>
<td>High</td>
<td>Mod</td>
<td>Low</td>
<td>Low</td>
</tr>
<tr>
<td>Centrality</td>
<td>Mod</td>
<td>Low</td>
<td>High</td>
<td>High</td>
<td>Mod</td>
<td>Low</td>
</tr>
<tr>
<td>Density</td>
<td>High</td>
<td>High</td>
<td>Mod</td>
<td>Low</td>
<td>Mod</td>
<td>Mod</td>
</tr>
</tbody>
</table>

Comprehensive (High System Capital)

Conventional

Limited

Network density and scope of activities

Comprehensive Systems

Mays GP et al. *Health Affairs* 2016
Comprehensive Systems
One of RWJF’s Culture of Health National Metrics

- **Broad scope** of population health activities
- **Dense network** of multi-sector relationships
- **Central actors** to coordinate actions

**Access to public health**

47.2% of population served by a comprehensive public health system.

Overall, 47.2 percent of the population is covered by a comprehensive public health system. Individuals are more likely to have access if they are non-White (51.5 percent vs. 45.5 percent White) or live in a metropolitan area (48.7 percent vs. 34.1 percent in nonmetropolitan areas).

Variation and change in comprehensive delivery systems
### Implementation of foundational activities, 1998-2016

<table>
<thead>
<tr>
<th>Activity</th>
<th>1998</th>
<th>2016</th>
<th>% Change</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Conduct periodic assessment of community health status and needs</td>
<td>71.5%</td>
<td>87.1%</td>
<td>21.8%</td>
</tr>
<tr>
<td>2. Survey community for behavioral risk factors</td>
<td>45.8%</td>
<td>71.1%</td>
<td>55.2%</td>
</tr>
<tr>
<td>3. Investigate adverse health events, outbreaks and hazards</td>
<td>98.6%</td>
<td>100.0%</td>
<td>1.4%</td>
</tr>
<tr>
<td>4. Conduct laboratory testing to identify health hazards and risks</td>
<td>96.3%</td>
<td>96.1%</td>
<td>-0.2%</td>
</tr>
<tr>
<td>5. Analyze data on community health status and health determinants</td>
<td>61.3%</td>
<td>72.7%</td>
<td>18.6%</td>
</tr>
<tr>
<td>6. Analyze data on preventive services use</td>
<td>28.4%</td>
<td>39.0%</td>
<td>37.3%</td>
</tr>
<tr>
<td>7. Routinely provide community health information to elected officials</td>
<td>80.9%</td>
<td>84.0%</td>
<td>3.8%</td>
</tr>
<tr>
<td>8. Routinely provide community health information to the public</td>
<td>75.4%</td>
<td>82.3%</td>
<td>9.1%</td>
</tr>
<tr>
<td>9. Routinely provide community health information to the media</td>
<td>75.2%</td>
<td>89.0%</td>
<td>18.3%</td>
</tr>
<tr>
<td>10. Prioritize community health needs</td>
<td>66.1%</td>
<td>83.6%</td>
<td>26.5%</td>
</tr>
<tr>
<td>11. Engage community stakeholders in health improvement planning</td>
<td>41.5%</td>
<td>68.8%</td>
<td>65.7%</td>
</tr>
<tr>
<td>12. Develop a community-wide health improvement plan</td>
<td>81.9%</td>
<td>87.9%</td>
<td>7.3%</td>
</tr>
<tr>
<td>13. Identify and allocate resources based on community health plan</td>
<td>26.2%</td>
<td>41.9%</td>
<td>59.9%</td>
</tr>
<tr>
<td>14. Develop policies to address priorities in community health plan</td>
<td>48.6%</td>
<td>56.8%</td>
<td>16.9%</td>
</tr>
<tr>
<td>15. Maintain a communication network among health-related organizations</td>
<td>78.8%</td>
<td>85.3%</td>
<td>8.2%</td>
</tr>
<tr>
<td>16. Link people to needed health and social services</td>
<td>75.6%</td>
<td>50.0%</td>
<td>-33.8%</td>
</tr>
<tr>
<td>17. Implement legally mandated public health activities</td>
<td>91.4%</td>
<td>92.4%</td>
<td>1.1%</td>
</tr>
<tr>
<td>18. Evaluate health programs and services in the community</td>
<td>34.7%</td>
<td>37.9%</td>
<td>9.4%</td>
</tr>
<tr>
<td>19. Evaluate local public health agency capacity and performance</td>
<td>56.3%</td>
<td>56.1%</td>
<td>-0.3%</td>
</tr>
<tr>
<td>20. Monitor and improve implementation of health programs and policies</td>
<td>47.3%</td>
<td>46.4%</td>
<td>-1.9%</td>
</tr>
</tbody>
</table>

Mean performance of assessment activities (#1-6)                             | 67.0% | 77.7% | 15.9%    |
Mean performance of policy and planning activities (#7-15)                  | 63.9% | 75.5% | 18.3%    |
Mean performance of implementation and assurance activities (#16-20)       | 61.1% | 56.6% | -7.3%    |
Mean performance of all activities                                          | 63.8% | 67.6% | 6.0%     |
## Organizational contributions to foundational activities, 1998-2016

<table>
<thead>
<tr>
<th>Type of Organization</th>
<th>% of Recommended Activities Contributed</th>
<th>1998</th>
<th>2016</th>
<th>Percent Change</th>
</tr>
</thead>
<tbody>
<tr>
<td>Local public health agencies</td>
<td></td>
<td>60.7%</td>
<td>67.5%</td>
<td>11.1%</td>
</tr>
<tr>
<td>Other local government agencies</td>
<td></td>
<td>31.8%</td>
<td>33.2%</td>
<td>4.4%</td>
</tr>
<tr>
<td>State public health agencies</td>
<td></td>
<td>46.0%</td>
<td>34.3%</td>
<td>-25.4%</td>
</tr>
<tr>
<td>Other state government agencies</td>
<td></td>
<td>17.2%</td>
<td>12.3%</td>
<td>-28.8%</td>
</tr>
<tr>
<td>Federal government agencies</td>
<td></td>
<td>7.0%</td>
<td>7.2%</td>
<td>3.7%</td>
</tr>
<tr>
<td>Hospitals</td>
<td></td>
<td>37.3%</td>
<td>46.6%</td>
<td>24.7%</td>
</tr>
<tr>
<td>Physician practices</td>
<td></td>
<td>20.2%</td>
<td>18.0%</td>
<td>-10.6%</td>
</tr>
<tr>
<td>Community health centers</td>
<td></td>
<td>12.4%</td>
<td>29.0%</td>
<td>134.6%</td>
</tr>
<tr>
<td>Health insurers</td>
<td></td>
<td>8.6%</td>
<td>10.6%</td>
<td>23.0%</td>
</tr>
<tr>
<td>Employers/businesses</td>
<td></td>
<td>16.9%</td>
<td>15.3%</td>
<td>-9.6%</td>
</tr>
<tr>
<td>Schools</td>
<td></td>
<td>30.7%</td>
<td>25.2%</td>
<td>-17.9%</td>
</tr>
<tr>
<td>Universities/colleges</td>
<td></td>
<td>15.6%</td>
<td>22.6%</td>
<td>44.7%</td>
</tr>
<tr>
<td>Faith-based organizations</td>
<td></td>
<td>19.2%</td>
<td>17.5%</td>
<td>-9.1%</td>
</tr>
<tr>
<td>Other nonprofit organizations</td>
<td></td>
<td>31.9%</td>
<td>32.5%</td>
<td>2.0%</td>
</tr>
<tr>
<td>Other</td>
<td></td>
<td>8.5%</td>
<td>5.2%</td>
<td>-38.4%</td>
</tr>
</tbody>
</table>
Health effects attributable to multi-sector work

Impact of Comprehensive Systems on Mortality, 1998-2014

Fixed-effects instrumental variables estimates controlling for racial composition, unemployment, health insurance coverage, educational attainment, age composition, and state and year fixed effects. N=1019 community-years

Mays GP et al. Health Affairs 2016
Economic effects attributable to multi-sector work

Impact of Comprehensive Systems on Medical Spending (Medicare) 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. Vertical lines are 95% confidence intervals

Mays GP et al. Health Services Research 2017
Economic effects attributable to multi-sector work

Impact of Comprehensive Systems 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

Mays GP et al. forthcoming 2017
Conclusions and implications

- Large health gains accrue to comprehensive systems
- Health gains are larger for low-income populations and low-income communities
- Dense collaborative networks do more than just plan: prioritize, invest, evaluate, repeat (crowd-sourcing)
- Equity and opportunity: two-thirds of communities currently lack comprehensive systems
- ACA incentives and resources may help:
  - Hospital community benefit
  - Value-based health care payments
  - Insurer and employer incentives
  - Public health agency accreditation
- Sustainability and resiliency are not automatic
For More Information

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

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