Comprehensive Public Health Delivery Systems: Using Foundational Capabilities to Achieve Health Impact and Equity

Glen P. Mays, University of Kentucky
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Using Foundational Capabilities to Achieve Health Impact and Equity

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

- Compare innovative ways to structure local health departments that maximize resources to enhance service delivery to the community.

- Identify ways local health departments can build strategic alliances to implement successful collaborations in the community.
Losing ground in population health

1. Or latest year available.
Source: OECD Health Data 2010.
Losing ground in population health

Case A, Deaton A. Proceedings of the National Academy of Sciences 2015
Losing ground in population health

Premature Deaths per 100,000 Residents

>100% Difference

Commonwealth Fund 2012
Multiple systems & sectors drive health...

Proportional Contribution to Premature Death

- Genetic predisposition: 30%
- Behavioral patterns: 40%
- Social circumstances: 15%
- Environmental exposure: 5%
- Health care: 10%

...But existing systems often fail to connect

Medical Care  Social Services & Supports  Public Health

- Fragmentation
- Duplication
- Variability in practice
- Limited accessibility
- Episodic and reactive care
- Insensitivity to consumer values & preferences
- Limited targeting of resources to community needs

- Fragmentation
- Variability in practice
- Resource constrained
- Limited reach
- Insufficient scale
- Limited public visibility & understanding
- Limited evidence base
- Slow to innovate & adapt

Waste & inefficiency
Inequitable outcomes
Limited population health impact
Fundamental Question: How do we support effective population health improvement strategies?

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

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
What **services and supports** are needed to support collective actions in health?

Need a **chief health strategist** for communities & populations:

- Articulate population health needs & priorities
- Engage community stakeholders
- Plan with clear roles & responsibilities
- Recruit & leverage resources
- Develop and enforce policies
- Ensure coordination across sectors
- Promote equity and target disparities
- Support evidence-based practices
- Monitor and feed back results
- Ensure transparency & accountability: resources, results, ROI
Catalytic functions to support multi-sector actions in health

Foundational Capabilities for Population Health

- Engage stakeholders
- Assess needs & risks
- Identify evidence-based actions
- Develop shared priorities & plans
- Mobilize multi-sector implementation
- Monitor, evaluate, feedback

The Culture of Health Action Framework

1. Making Health a Shared Value
2. Fostering Cross-Sector Collaboration to Improve Well-Being
3. Creating Healthier, More Equitable Communities
4. Strengthening Integration of Health Services and Systems

What do we call systems that deliver a broad scope of foundational capabilities through dense networks of multi-sector relationships?

COMPREHENSIVE
Comprehensive Public Health Systems
One of RWJF’s Culture of Health National Metrics

- Implement a **broad scope** of population health activities
- Through **dense networks** of multi-sector relationships
- Including **central actors** to coordinate actions

Access to public health

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).

What do we know about multi-sector work in population health?

- Which organizations contribute to the implementation of population health activities in local communities?

- How do these contributions develop and change over time? 
  
  Recession  |  Recovery  |  ACA implementation

- What are the health and economic effects attributable to these multi-sector activities?
What do we know about multi-sector work in public health?

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
<table>
<thead>
<tr>
<th>Activity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Conduct periodic assessment of community health status and needs</td>
</tr>
<tr>
<td>Survey community for behavioral risk factors</td>
</tr>
<tr>
<td>Investigate adverse health events, outbreaks and hazards</td>
</tr>
<tr>
<td>Conduct laboratory testing to identify health hazards and risks</td>
</tr>
<tr>
<td>Analyze data on community health status and health determinants</td>
</tr>
<tr>
<td>Analyze data on preventive services use</td>
</tr>
<tr>
<td>Routinely provide community health information to elected officials</td>
</tr>
<tr>
<td>Routinely provide community health information to the public</td>
</tr>
<tr>
<td>Routinely provide community health information to the media</td>
</tr>
<tr>
<td>Prioritize community health needs</td>
</tr>
<tr>
<td>Engage community stakeholders in health improvement planning</td>
</tr>
<tr>
<td>Develop a community-wide health improvement plan</td>
</tr>
<tr>
<td>Identify and allocate resources based on community health plan</td>
</tr>
<tr>
<td>Develop policies to address priorities in community health plan</td>
</tr>
<tr>
<td>Maintain a communication network among health-related organizations</td>
</tr>
<tr>
<td>Link people to needed health services</td>
</tr>
<tr>
<td>Implement legally mandated public health activities</td>
</tr>
<tr>
<td>Evaluate health programs and services in the community</td>
</tr>
<tr>
<td>Evaluate local public health agency capacity and performance</td>
</tr>
<tr>
<td>Monitor and improve implementation of health programs and policies</td>
</tr>
</tbody>
</table>

**Prevalence of population health activities in U.S. metropolitan communities, 1998-2014**

<table>
<thead>
<tr>
<th>Activity</th>
<th>1998</th>
<th>2006</th>
<th>2012</th>
<th>2014</th>
<th>% Chg</th>
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</thead>
<tbody>
<tr>
<td>1</td>
<td>71.5%</td>
<td>77.5%</td>
<td>72.6%</td>
<td>87.1%</td>
<td>21.8%</td>
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<tr>
<td>2</td>
<td>45.8%</td>
<td>70.2%</td>
<td>73.9%</td>
<td>71.1%</td>
<td>55.2%</td>
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<tr>
<td>3</td>
<td>98.6%</td>
<td>97.9%</td>
<td>99.6%</td>
<td>100.0%</td>
<td>1.4%</td>
</tr>
<tr>
<td>4</td>
<td>96.3%</td>
<td>97.0%</td>
<td>99.2%</td>
<td>96.1%</td>
<td>-0.4%</td>
</tr>
<tr>
<td>5</td>
<td>61.3%</td>
<td>73.2%</td>
<td>63.5%</td>
<td>72.7%</td>
<td>18.6%</td>
</tr>
<tr>
<td>6</td>
<td>28.4%</td>
<td>26.1%</td>
<td>33.2%</td>
<td>39.0%</td>
<td>37.3%</td>
</tr>
<tr>
<td>7</td>
<td>80.9%</td>
<td>90.1%</td>
<td>87.1%</td>
<td>84.0%</td>
<td>3.8%</td>
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<tr>
<td>8</td>
<td>75.4%</td>
<td>88.8%</td>
<td>80.9%</td>
<td>82.3%</td>
<td>9.1%</td>
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<tr>
<td>9</td>
<td>75.2%</td>
<td>88.4%</td>
<td>87.1%</td>
<td>89.0%</td>
<td>18.3%</td>
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<td>10</td>
<td>66.1%</td>
<td>71.7%</td>
<td>66.8%</td>
<td>83.6%</td>
<td>26.3%</td>
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<tr>
<td>11</td>
<td>41.5%</td>
<td>50.6%</td>
<td>49.8%</td>
<td>68.8%</td>
<td>65.7%</td>
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<tr>
<td>12</td>
<td>81.9%</td>
<td>86.7%</td>
<td>69.7%</td>
<td>87.9%</td>
<td>7.3%</td>
</tr>
<tr>
<td>13</td>
<td>26.2%</td>
<td>37.3%</td>
<td>27.8%</td>
<td>41.9%</td>
<td>59.9%</td>
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<tr>
<td>14</td>
<td>48.6%</td>
<td>51.9%</td>
<td>49.0%</td>
<td>56.8%</td>
<td>16.9%</td>
</tr>
<tr>
<td>15</td>
<td>78.8%</td>
<td>87.2%</td>
<td>89.6%</td>
<td>85.3%</td>
<td>8.2%</td>
</tr>
<tr>
<td>16</td>
<td>75.6%</td>
<td>68.7%</td>
<td>60.6%</td>
<td>50.0%</td>
<td>-33.8%</td>
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<tr>
<td>17</td>
<td>91.4%</td>
<td>92.3%</td>
<td>89.2%</td>
<td>92.4%</td>
<td>1.1%</td>
</tr>
<tr>
<td>18</td>
<td>34.7%</td>
<td>37.5%</td>
<td>33.2%</td>
<td>37.9%</td>
<td>9.4%</td>
</tr>
<tr>
<td>19</td>
<td>56.3%</td>
<td>56.2%</td>
<td>55.2%</td>
<td>56.1%</td>
<td>-0.3%</td>
</tr>
<tr>
<td>20</td>
<td>47.3%</td>
<td>50.4%</td>
<td>42.7%</td>
<td>46.4%</td>
<td>-1.9%</td>
</tr>
</tbody>
</table>

Mean performance of assessment activities (#1-6) | 67.0% | 73.7% | 73.7% | 77.7% | 15.9% |
Mean performance of policy and planning activities (#7-15) | 63.9% | 72.5% | 67.5% | 75.5% | 18.3% |
Mean performance of implementation and assurance activities (#16-20) | 61.1% | 61.0% | 56.2% | 56.6% | -7.3% |
Mean performance of all activities | 63.8% | 70.2% | 66.9% | 67.6% | 6.0% |
Variation in implementing foundational population health activities

National Longitudinal Survey of Public Health Systems

Percent of U.S. communities

Percent of activities performed
Mapping who contributes to population health activities

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>Scope</th>
<th>Centrality</th>
<th>Density</th>
</tr>
</thead>
<tbody>
<tr>
<td>High</td>
<td>High</td>
<td>High</td>
</tr>
<tr>
<td>Mod</td>
<td>Low</td>
<td>High</td>
</tr>
<tr>
<td>High</td>
<td>High</td>
<td>Mod</td>
</tr>
<tr>
<td>Mod</td>
<td>Low</td>
<td>Mod</td>
</tr>
<tr>
<td>Low</td>
<td>Low</td>
<td>Low</td>
</tr>
<tr>
<td>Low</td>
<td>Low</td>
<td>Mod</td>
</tr>
</tbody>
</table>

Clusters:
- **Comprehensive** (High System Capital)
- **Conventional**
- **Limited**
# Changes in system prevalence and coverage

<table>
<thead>
<tr>
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<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Comprehensive systems</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>% of communities</td>
<td>24.2%</td>
<td>36.9%</td>
<td>31.1%</td>
<td>32.7%</td>
<td>25.7%</td>
</tr>
<tr>
<td>% of population</td>
<td>25.0%</td>
<td>50.8%</td>
<td>47.7%</td>
<td>47.2%</td>
<td>36.6%</td>
</tr>
<tr>
<td><strong>Conventional systems</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>% of communities</td>
<td>50.1%</td>
<td>33.9%</td>
<td>49.0%</td>
<td>40.1%</td>
<td>57.6%</td>
</tr>
<tr>
<td>% of population</td>
<td>46.9%</td>
<td>25.8%</td>
<td>36.3%</td>
<td>32.5%</td>
<td>47.3%</td>
</tr>
<tr>
<td><strong>Limited systems</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>% of communities</td>
<td>25.6%</td>
<td>29.2%</td>
<td>19.9%</td>
<td>20.6%</td>
<td>16.7%</td>
</tr>
<tr>
<td>% of population</td>
<td>28.1%</td>
<td>23.4%</td>
<td>16.0%</td>
<td>19.6%</td>
<td>16.1%</td>
</tr>
</tbody>
</table>

Changes in system capital during the Great Recession

% Change 2006-2012

Scope of Delivery 2012

-50% -30% -10% 10% 30% 50%

- Local health agency
- Other local government
- State health agency
- Other state government
- Hospitals
- Physician practices
- Community health centers
- Health insurers
- Employers/business
- Schools
- CBOs

Equity in population health delivery systems
Delivery of recommended population health activities

## 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>
</tr>
<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>
</tr>
<tr>
<td>Faith-based organizations</td>
<td>19.2%</td>
<td>17.5%</td>
<td>-9.1%</td>
</tr>
<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 by ACA Medicaid expansion status, 2012-2014

* p<0.05
Effects of ACA and accreditation on population health activities

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. \textbf{N=1019 community-years}
Health effects attributable to multi-sector work

Impact of Comprehensive Systems on Mortality, 1998-2014

-7.1%, p=0.08

-24.2%, p<0.01

-22.4%, p<0.05

-14.4%, p=0.07

-35.2%, p<0.05

+4.3%, p=0.55

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
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.
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.
Making the case for equity: larger gains in low-resource communities

Effects of Comprehensive Population Health Systems in Low-Income vs. High-Income Communities

Log IV regression estimates controlling for community-level and state-level characteristics
Comprehensive systems do more with less

- Expenditures per capita
- Recommended activities performed

<table>
<thead>
<tr>
<th>Type of delivery system</th>
<th>Local PH Expenditures per capita ($)</th>
<th>% of recommended activities performed (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Comprehensive</td>
<td>$80</td>
<td>90%</td>
</tr>
<tr>
<td>Conventional</td>
<td>$70</td>
<td>80%</td>
</tr>
<tr>
<td>Limited</td>
<td>$60</td>
<td>70%</td>
</tr>
<tr>
<td>Very limited</td>
<td>$50</td>
<td>60%</td>
</tr>
</tbody>
</table>
New incentives & infrastructure are in play

Next Generation Population Health Improvement

- Hospital community benefit
- Innovation Center Funding
- Funding constraints
- ACOs and PCMHs
- Value-based payment
- Employer wellness incentives
- Health insurance expansions
- CDC PICH
- Public health Accreditation
- Health information exchange
Conclusions: What we know and still need to learn

- Large potential benefits of system integration
- Inequities in integration are real & problematic
- Integration requires support
  - Infrastructure
  - Institutions
  - Incentives
- Sustainability and resiliency are not automatic
Finding the connections

- Act on aligned incentives
- Exploit the disruptive policy environment
- Innovate, prototype, study – then scale
- Pay careful attention to shared governance, decision-making, and financing structures
- Demonstrate value and accountability to the public
For more information

- Defining Comprehensive Public Health Delivery Systems
  https://works.bepress.com/glen_mays/198/

- CPHS methodology: Milbank Quarterly 2010
  http://www.ncbi.nlm.nih.gov/pmc/articles/PMC2888010/

- Health/economic benefits of comprehensive systems: AJPH 2015

- Longitudinal Survey of Public Health Systems
  http://works.bepress.com/glen_mays/38/

- Customized system feedback report
  http://works.bepress.com/glen_mays/67/
References


