Building High-Value Public Health Systems: Research, Policy & Collective Actions

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Building High-Value Public Health Systems: Research, Policy & Collective Actions

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University of Kentucky College of Public Health

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Systems for Action is a National Program Office of the Robert Wood Johnson Foundation and a collaborative effort of the Center for Public Health Systems and Services Research in the College of Public Health, and the Center for Poverty Research in the Gatton College of Business and Economics, administered by the University of Kentucky, Lexington, Ky.

B. Highlight Research on Estimating the Cost of Foundational Public Health Services
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 of outcomes (**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

A Rationale for Investing in Prevention and Public Health: Selected Empirical Evidence

Effective PH interventions & policies leads to a healthier population w/ lower health care spending, less school & workplace absenteeism, increased economic productivity & an improved quality of life. Investing in prevention & treatment of the most common chronic diseases, U.S. could annually decrease treatment costs by $218 billion & reduce economic impact of disease by $1.1 trillion.^[1]

• Improving preventive screening & implementing programs that reduce risk factors, could save $26 billion in lost productivity costs from colorectal cancer deaths by 2020.^[2]

• Every $1 spent on evidence-based programs that increase physical activity, improve nutrition & prevent tobacco use saves $5.60 in health spending w/in 5 yrs & up to $6.20 w/in 10 yrs.^[3]

• For every $1 spent on tobacco cessation programs, average return is $1.26. In 1 year, U.S. could save > $711 million.^[4]

• Every $1 spent on workplace wellness, decreases medical costs by about $3.27 & increases productivity, w/ absenteeism costs decreasing by ~ $2.37.^[5]

Source:  
Preventable disease burden and national health spending

>75% of national health spending is attributable to chronic diseases that are largely preventable

- 80% of cardiovascular disease
- 80% of diabetes
- 60% of lung diseases
- 40% of cancers

(not counting injuries, vaccine-preventable diseases)

<3% of national health spending is allocated to public health and prevention

Source: CDC 2011
<table>
<thead>
<tr>
<th>row</th>
<th>Expenditure / Economic Item</th>
<th>dollar value / number of zeroes</th>
<th>%GDP</th>
<th>Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>(a)</td>
<td>United States GDP in 2016</td>
<td>18.57 trillion</td>
<td>18,570,000,000,000</td>
<td>18.57%</td>
</tr>
<tr>
<td>(b)</td>
<td>US Federal Government Budget in FY 2016</td>
<td>3.85 trillion</td>
<td>3,700,000,000,000</td>
<td>20%</td>
</tr>
<tr>
<td>(c)</td>
<td>Total US National Heath Expenditures (NHE 2016 est.)</td>
<td>3.35 trillion</td>
<td>3,350,000,000,000</td>
<td>18%</td>
</tr>
<tr>
<td>(d)</td>
<td>Total US Population (2016 est.)</td>
<td>323 million</td>
<td>323,100,000</td>
<td></td>
</tr>
<tr>
<td>(e)</td>
<td>Per Capita Health Expenditure (NHE 2016 est.)</td>
<td>10,350</td>
<td>~10,350 $/person</td>
<td></td>
</tr>
<tr>
<td>(f)</td>
<td>Per Capita Public Health Expenditure (2014 est.)</td>
<td>255</td>
<td>~255 $/person</td>
<td></td>
</tr>
<tr>
<td>(g)</td>
<td>Total Public Health Expenditures (2016 est.)</td>
<td>82 billion</td>
<td>82,390,500,000</td>
<td>0.4%</td>
</tr>
<tr>
<td>(h)</td>
<td>(g) ÷ (c) = 82 billion usd / 3.35 trillion = PH expenditures is ~ 2.46 percent of NHE</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note: ~ approximately
Cross-sectional association between PH spending and Medical spending

Quintiles of public health spending/capita

Public health spending/capita

Medicare spending per recipient

Mays et al. 2009
Mortality reductions attributable to local public health spending, 1993-2008

Source: Mays et al. 2011
High value public health systems as determined by system capital

- Positive relationship between public health spending and improved population health outcomes (e.g. Mays and Smith 2010, McCullough and Lieder 2016)

- Beyond using public health spending levels as a determinant of “high value” public health systems, we can also characterize the degree of public health system value or “capital” as a function of the extent and effectiveness of multi-organizational alliances and cross-sectoral engagement in providing and supporting population health activities.

- Growing empirical evidence that system capital as defined by comprehensive public health systems (CPHS) is associated with positive population health outcomes.
A useful lens for studying multi-sector work

- Data for determining *Comprehensive Public Health Systems* (CPHS) derived from the *National Longitudinal Survey of Public Health Systems* (NLSPHS)

- The NLSPHS has followed a cohort of some 500 communities with at least 100,000 residents


Note: ** Expanded sample of ~500 communities<100,000 added in 2014 wave & continued in succeeding waves

- Local public health officials report:
  - **Scope**: availability of 20 recommended population health activities based on Institute of Medicine’s core functions of assessment, policy development, and assurance.
  - **Network**: organizations contributing to each activity
  - **Centrality of effort**: contributed by governmental public health agency
  - **Quality**: perceived effectiveness of each activity
NLSPHS 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

**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

**CMS Impact File & Cost Report**: hospital ownership, market share, uncompensated care
Comprehensive Public Health Systems
One of RWJF’s Culture of Health National Metrics

- **Broad scope** of population health activities
- **Dense network** of multi-sector relationships of contributing organizations
- **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).

47.2% of population served by a comprehensive public health system

<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>
<tr>
<td>Mean performance of assessment activities (#1-6)</td>
<td>67.0%</td>
<td>77.7%</td>
<td>15.9%</td>
</tr>
<tr>
<td>Mean performance of policy and planning activities (#7-15)</td>
<td>63.9%</td>
<td>75.5%</td>
<td>18.3%</td>
</tr>
<tr>
<td>Mean performance of implementation and assurance activities (#16-20)</td>
<td>61.1%</td>
<td>56.6%</td>
<td>-7.3%</td>
</tr>
<tr>
<td>Mean performance of all activities</td>
<td>63.8%</td>
<td>67.6%</td>
<td>6.0%</td>
</tr>
</tbody>
</table>
## Organizational Contribution to Population Health Activities

**% of Recommended Activities Implemented**

<table>
<thead>
<tr>
<th>TYPE OF ORGANIZATION</th>
<th>1998</th>
<th>2016</th>
<th>Percent Change</th>
</tr>
</thead>
<tbody>
<tr>
<td>Local health department</td>
<td>60.7%</td>
<td>68.3%</td>
<td>12.4%</td>
</tr>
<tr>
<td>Other local government agencies</td>
<td>31.8%</td>
<td>34.0%</td>
<td>6.9%</td>
</tr>
<tr>
<td>State public health agencies</td>
<td>46.0%</td>
<td>32.6%</td>
<td>-29.1%</td>
</tr>
<tr>
<td>Other state government agencies</td>
<td>17.2%</td>
<td>11.3%</td>
<td>-34.3%</td>
</tr>
<tr>
<td>Federal government agencies</td>
<td>7.0%</td>
<td>6.9%</td>
<td>-0.9%</td>
</tr>
<tr>
<td><strong>HOSPITALS</strong></td>
<td><strong>37.3%</strong></td>
<td><strong>47.1%</strong></td>
<td><strong>26.2%</strong></td>
</tr>
<tr>
<td>Physician practices</td>
<td>20.2%</td>
<td>18.1%</td>
<td>-10.2%</td>
</tr>
<tr>
<td>Community health centers</td>
<td>12.4%</td>
<td>31.1%</td>
<td>151.9%</td>
</tr>
<tr>
<td>Health insurers</td>
<td>8.6%</td>
<td>12.0%</td>
<td>39.9%</td>
</tr>
<tr>
<td>Employers/business groups</td>
<td>25.5%</td>
<td>15.2%</td>
<td>-40.7%</td>
</tr>
<tr>
<td>Schools (K-12)</td>
<td>30.7%</td>
<td>24.7%</td>
<td>-19.5%</td>
</tr>
<tr>
<td>Colleges / universities</td>
<td>15.6%</td>
<td>23.0%</td>
<td>47.3%</td>
</tr>
<tr>
<td>Faith-based organizations</td>
<td>24.0%</td>
<td>16.2%</td>
<td>-32.5%</td>
</tr>
<tr>
<td>Other nonprofits</td>
<td>36.4%</td>
<td>34.3%</td>
<td>-5.7%</td>
</tr>
<tr>
<td>Other</td>
<td>8.5%</td>
<td>6.1%</td>
<td>-28.8%</td>
</tr>
</tbody>
</table>
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

Scope
- High
- Mod
- Low

Centrality
- High
- Mod
- Low

Density
- High
- Mod
- Low

Comprehensive (High System Capital)

Conventional

Limited

Network density and scope of activities

Mays GP et al. *Health Affairs* 2016
Variation and Change in Comprehensive Delivery Systems

[Graph showing trends in percent of U.S. Communities from 1998 to 2016, with lines for Urban and Rural areas.]
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 from NLSPHS related research

- 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 benefits
  - Value-based health care payments
  - Insurer and employer incentives
  - Public health agency accreditation
- Sustainability and resiliency are not automatic
B. Estimating the Cost of Foundational Public Health Services (FPHS)
Toward a deeper understanding of costs & returns in public health

2012 Institute of Medicine Report* identified two fundamental barriers to improving the nation’s public health system

- (1) lack of agreement on a core set of public health capabilities that should be present in every U.S. community
- (2) lack of knowledge about the resources required to implement these capabilities.

The report concludes that sound policy for improving the nation’s public health system can move forward only when there is sufficient understanding and agreement about what the public health system should be able to do and how much it will cost.

2012 Institute of Medicine Recommendations

- Called for an expert panel process to identify the components of a “minimum package” of public health services and cross-cutting capabilities that should be available in every U.S. community to protect and improve population health.

- Undertake and expand research to estimate the resources required to implement these services and capabilities universally across the U.S.

- Develop and implement a national chart of accounts for tracking spending & flow of funds

Defining What to Cost: The Public Health Package

- Washington State’s **Foundational Public Health Services**
- Ohio’s Public Health Futures Committee: **Minimum Package of Services**
- Colorado’s **Core Public Health Services**

In response to IOM recommendations, RWJF commissioned a national expert panel in 2014 - Public Health Leadership Forum (PHLF)

- PHLF included representatives from federal, state, and local public health agencies, public health professional associations, universities, public health accrediting bodies, and health policy advisory commissions.
- Used available research, practical experience & expert opinion to distinguish two broad types of responsibilities or “actions” within the public health system: (1) categorical programs and policies; and (2) cross-cutting capabilities
FPHS Definitions

- The PHLF National Workgroup developed definitions of foundational public health capabilities, specified in the *Public Health Leadership Forum’s Articulation of Foundational Capabilities & Foundational Areas* (funded by RWJF, facilitated by RESOLVE): [http://www.resolv.org/site-healthleadershipforum/](http://www.resolv.org/site-healthleadershipforum/)

- FPHS Categories articulated and defined (V1)

**Foundational Areas (FA):** substantive areas of expertise or program-specific activities in all state & local health departments essential to protect the community’s health.

**Foundational Capabilities (FC):** Cross-cutting skills that need to be present in state & local health departments everywhere for the health system to work anywhere. Needed to support the foundational areas, & other programs & activities, key to protecting community health & achieving equitable health outcomes.

**Foundational Public Health Services (FPHS):** Suite of skills, programs, & activities that must be available in state & local health departments system-wide; includes foundational capabilities & areas.
The FPHS framework

<table>
<thead>
<tr>
<th>FOUNDATIONAL AREAS (5)</th>
<th>FOUNDATIONAL CAPABILITIES (6)</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1) Communicable Disease Control</td>
<td>1) <strong>Assessment</strong> (including Surveillance; Epidemiology; and Laboratory Capacity)</td>
</tr>
<tr>
<td>(2) Chronic Disease &amp; Injury Prevention</td>
<td>2) <strong>All Hazards Preparedness / Response</strong></td>
</tr>
<tr>
<td>(3) Environmental Public Health</td>
<td>3) <strong>Policy Development / Support</strong></td>
</tr>
<tr>
<td>(4) Maternal, Child &amp; Family Health</td>
<td>4) <strong>Communications</strong></td>
</tr>
<tr>
<td>(5) Access to and Linkage with Clinical Care</td>
<td>5) <strong>Community Partnership Development</strong></td>
</tr>
<tr>
<td></td>
<td>6) <strong>Organizational Competencies</strong> (including Leadership/Governance; Health Equity; Accountability/Performance Management; Quality Improvement; Information Technology; Human Resources; Financial Management; and Legal)</td>
</tr>
</tbody>
</table>

Most of a Health Department's Work is "Above The Line"

**FPHS CE Data-Collection & Research Effort**

- **Workgroup on Foundational Public Health Services (FPHS) Cost Estimation (CE)** convened to develop a methodology for estimating the resources required by governmental public health agencies to implement foundational public health services. Released a report on recommended methodology:

  **Estimating the Costs of Foundational Public Health Capabilities: A Recommended Methodology**


- Pilot-Tested Methodology with KHDA Finance Workgroup comprised of 6 Kentucky Health Departments (June-October 2014)

- Pre-Tested web-based survey questionnaire using FPHS V2 definitions with selected Ohio LHDs from AOHC (February 2015-May 2015).

- Incorporated data from DACS study of Washington PHAST Study Team*

Illustrating the Model Simulation Approach: Current Per Capita Costs

In summary, the FPHS CE Methodology produces three sets of cost estimates: (1) costs currently incurred by an agency to implement each FPHS element (current costs); (2) expected costs that would be incurred by the agency to implement each FPHS at full attainment levels; and (3) unmet resource gap that is calculated as the difference between expected costs and current costs for each FPHS element.

Total Foundational Public Health Services (FPHS) Costs = \( \sum FC + \sum FA \)
Conceptual representation of how the expected costs of full FPHS attainment are derived from a current attainment scale

“Based on your understanding of how each public health foundational capability & foundational area is defined, please provide your global or overall assessment on the following question: For each foundational category, what is the estimated percentage currently being met by your health department? “
Primary Results: Overlay of probability density graphs for current & expected FPHS per capita costs

FPHS CE Results in context…

- If we were to scale per capita resource gap estimates to a national level, results imply full attainment of FPHS recommendations would require an estimated $34.28 per capita or around $10.9 billion in additional resources per year (~318 mil. 2014 US Pop).
- Increase SLG PH activity spending by 16.1% over the levels estimated in the National Health Expenditure Accounts for 2014.
- Alternatively, resource gap could be filled by doubling federal govt spending on PH activities from the $11.0 billion estimated in 2014.
- Consistent with these estimates, the 2012 IOM report recommended a doubling of the federal government’s expenditures for public health activities in order to fund a minimum package of public health services.
- Continued efforts towards collecting data to generate national estimates via alignment/crosswalk strategies with existing or established SLG accounting/reporting systems.
  - Uniform Chart of Accounts initiative (http://phastdata.org/research/chart-of-accounts)
### Uniform Chart of Accounts

#### Uniform Chart of Accounts initiative
(http://phastdata.org/research/chart-of-accounts)

**Challenge**

There is currently no standard way for the over 600 local public health departments (LPHDs) across the nation to account for their revenues and expenditures. This means it is not possible to compare and evaluate spending across agencies and to estimate program and unit costs. Compartmentalization of public health services and to explain how targeted investments affect service costs. The ongoing nature of support to local public health departments (LPHDs) makes it difficult to compare spending in major programs across LPHDs because each agency may define a major program differently, or include different activities within a given major program, making it hard to see where changes are occurring on a relative basis with per capita spending determinations.

**Solution: Standardization**

The Public Health Activities and Services Tracking (PHAST) initiative has started work to standardize reporting on public health spending. Additionally, the Public Health Leadership Institute (PHLI) has developed the Uniform Chart of Accounts (COA), defining which services are essential to community health systems everywhere.

The PHAST initiative, through a grant from the Robert Wood Johnson Foundation, is developing this work by designing the feasibility of implementing a Uniform Chart of Accounts (COA) to track public health expenditure and revenue in local and state health departments. Adopting a standardized health financial data tracking system using a Uniform COA will allow within-and-between-state comparisons over time. For example, department-to-department comparisons can be made to identify areas of inefficiency and potential for improvement. The COA also allows for the tracking of changes in public health spending over time, facilitating the evaluation of program effectiveness and the identification of areas for improvement.

**What We’re Doing**

Together, the PHAST team and these 20 participants have developed a Uniform COA, identifying common categories of major programs and program activities within seven broad areas of public health:

- Communicable Disease
- Chronic Disease
- Injury Prevention
- Environmental Health
- Maternal, Child & Family Health
- Access & Linkage
- All Other Activities

**Use Chart of Accounts**

To implement the Uniform Chart of Accounts in your own agency, use the documents provided;

- The Uniform Chart of Accounts is a list of major programs and program activities within the seven broad areas of public health.
- The Uniform COA Crosswalk is a template for matching your agency’s financial data with the Uniform COA.
- The Effort Estimation Tool is a tool for estimating how FTES, and thereby personnel expenditures, are distributed among program activities within a major program.
- The Guidebook includes instructions and definitions for major programs and program activities.

For more information about the Uniform Chart of Accounts or how you can implement the Uniform COA in your agency, check out our feature in the UW School of Nursing or contact Greg Whitman, Project Manager, at phast@uw.edu.
Thank You