The Health & Economic Returns of Strong Public Health Systems

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Overview

- What is public health and why focus on it now?
- What impact does public health work have on health & economic outcomes?
- Where should new investments be directed to achieve the largest health & economic gains?
1. What is public health and why focus on it now?
Losing ground in population health

Life expectancy at birth, selected OECD countries

84 years
82
80
78
76
74
72
70
68

Australia
France
Canada
Finland
U.K.

U.S. (2016) 78.6

Source: OECD, U.S. Census Bureau
Widening gaps in U.S. life expectancy
Health determinants lie beyond the exclusive domain of medical care

Proportional Contribution to Premature Death

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

Why the U.S. is losing ground in health

>75% of US health spending is attributable to conditions that are largely preventable
  – Cardiovascular disease
  – Diabetes
  – Lung diseases
  – Cancer
  – Injuries
  – Vaccine-preventable diseases and sexually transmitted infections

<5% of US health spending is allocated to prevention and public health

CDC 2008 and CMS 2011
What is public health?

1. Winslow, 1920, “public health is the science and art of preventing disease, prolonging life and promoting health through the organized efforts and informed choices of society, organizations, public and private communities, and individuals.”

2. IOM, 1988, “Public health is what we as a society do collectively to assure conditions in which people can be healthy.”

3. WHO, 1998, “public health is a dynamic state of complete physical, mental, spiritual, and social well-being and not merely the absence of disease or infirmity.”
During the 20th century, the US gained an additional 30 years in life expectancy. Twenty-five of those 30 years are attributed to public health efforts, including the 10 great public health achievements.
The U.S. public health sector

- Federation of 3000 local agencies, 50 states + federal agencies
- Broad scope of activity
- Decentralized authority
- Highly variable capacity

Community health assessment
Health surveillance
Epidemiologic investigation
Environmental health monitoring
Community health planning & priority-setting
Health regulation enforcement
Public education & risk communication
Policy development & assessment
Emergency preparedness & response
Implementation of prevention programs
Consultation for school & worksite health
Direct clinical service delivery

Gini = 0.485
Core Public Health Infrastructure

- **Specialized workforce**: Epidemiologists, disease investigators, data analysts, health educators, planners, intervention specialists, community health workers

- **Data systems**: collection, linkage, analysis, exchange, dissemination

- **Laboratory systems**: connected across federal, state, local, clinical labs

- **Communication systems**: clinical, inter-governmental, and public-facing

- **Legal & regulatory systems**: Food, air, water, healthcare facilities, occupations
Public health agencies connect and lead other community partners in the effort to promote and protect public health and specifically address social determinants of health.
The 10 Essential Public Health Services

Some activities are conducted primarily at the state level and or are state level components that provide the infrastructure - such as the reporting system - that locals will use to conduct their work.

Some of these system activities are conducted in collaboration with system partners.

The 10 Essential Services are system-wide and all-encompassing.
Expectations of a functioning public health system

The Foundational Public Health Services are those services that have been nationally recommended to be provided at the local level.

These are particularly important because the local level is where direct services are most commonly provided to communities.
High value public health interventions

- Socioeconomic Factors
- Changing the Context to Make Individuals’ Default Decisions Healthy
- Long-Lasting Protection Interventions
- Clinical Interventions
- Counseling and Education

Increasing Population Impact

Increasing Individual Effort Needed

Frieden T. American Journal of Public Health | April 2010, Vol 100, No. 4
Cross-cutting capabilities are required to deliver public health interventions.

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

Foundational Public Health Capabilities

Public Health Foundational Capabilities

- Data aggregation: claims, EHR, surveys, mobile
- Data analysis and risk stratification
- Evidence review & synthesis
- Convene population stakeholders
- Performance metrics, scorecards, reports
- Monitor, evaluate, feedback
- Engage stakeholders
- Assess needs & risks
- Identify evidence-based actions
- Coordinate implementation
- Foundational Capabilities
- Commit shared resources & responsibilities
- Develop shared priorities & plans
- Goal elicitation & measurement
- Community engagement
- Interdisciplinary care teams
- Multi-sector partnerships & alliances
- Incentives, shared savings, pay for success
- Navigators, community health workers
- Health homes, ACOs, accountable communities
- Collaborative planning
2. What impact does public health work have on health & economic outcomes?
Widening gaps in U.S. life expectancy
Geographic variation in Medical Spending

Kaiser Family Foundation 2020
Mortality reductions attributable to local public health spending

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

Mays et al. 2011
Factors driving growth in medical spending

Roehrig et al. Health Affairs 2011
Medical cost offsets attributable to public health spending

For every $10 of public health spending, ≈$9 are recovered in lower Medicare spending over 10 years

Strong public health systems are networks, not just government agencies

Public health agencies as catalysts & force multipliers

Classifying public health system strength

Comprehensive

Conventional

Limited

% Capabilities Performed

1998 2018

Public Health System Strength
One of RWJF’s Culture of Health National Metrics

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

Access to Population 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

Variation in implementing public health activities

National Longitudinal Survey of Public Health Systems 2018

Percent of activities performed

Percent of U.S. communities
### Organizational contributions to public health activities

<table>
<thead>
<tr>
<th>Type of Organization</th>
<th>1998</th>
<th>2018</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>
Health effects attributable to system strength

Impact of Comprehensive Systems on Policy & Behavior

Models also control for racial composition, unemployment, health insurance coverage, educational attainment, age composition, and state and year fixed effects. Vertical lines are 95% confidence intervals. Mays GP et al. Health Affairs 2016
Mortality effects attributable to comprehensive public health systems

Mortality, 10-year estimates

- All-cause
- Cardiovascular
- Diabetes
- Cancer
- Influenza
- Infant mortality
- Residual

Deaths per 100,000

Mays GP et al. Health Affairs 2016

Models also control for racial composition, unemployment, health insurance coverage, educational attainment, age composition, and state and year fixed effects. N=1019 community-years
COVID-19 Mortality effects attributable to comprehensive public health systems

Models controlled for COVID-19 risk factors including county population size, population density, percent aged 65 years or older, percent Black, percent Hispanic, percent below poverty level, percent under age 65 without health insurance, number of nursing home residents per capita, and social vulnerability rates measured in the Community Resiliency Index. Models were adjusted for clustering of counties within states.
Economic effects attributable to system strength

Impact of Comprehensive Systems on **Medical Spending**
(Medicare 10-year estimates)

Models also control for racial composition, unemployment, health insurance coverage, educational attainment, age composition, and state and year fixed effects. Vertical lines are 95% confidence intervals.

Mays GP et al. *Health Services Research* 2018
Equity effects attributable to system strength

Impact of Comprehensive Systems on Life Expectancy by Income (10-year estimates)

Models also control for racial composition, unemployment, health insurance coverage, educational attainment, age composition, and state and year fixed effects. Vertical lines are 95% confidence intervals.

Mays GP et al. forthcoming
3. Where should new investments be directed to achieve the largest health & economic gains?
The answer: it depends

Future gains =

- Current capability levels of public health system
  \[ \times \]
- Unmet health and social needs/risks in population
  \[ \times \]
- Ability to target & tailor new resources to unmet needs
<table>
<thead>
<tr>
<th>Activity</th>
<th>Mortality Effect</th>
<th>Cost Effect</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Conduct periodic assessment of community health status and needs</td>
<td>0.8%</td>
<td>0.6%</td>
</tr>
<tr>
<td>2. Survey community for behavioral risk factors</td>
<td>0.6%</td>
<td>0.3%</td>
</tr>
<tr>
<td>3. Investigate adverse health events, outbreaks and hazards</td>
<td>0.3%</td>
<td>0.1%</td>
</tr>
<tr>
<td>4. Conduct laboratory testing to identify health hazards and risks</td>
<td>0.1%</td>
<td>0.2%</td>
</tr>
<tr>
<td>5. Analyze data on community health status and health determinants</td>
<td>1.2%</td>
<td>2.4%</td>
</tr>
<tr>
<td>6. Analyze data on preventive services use</td>
<td>0.1%</td>
<td>2.1%</td>
</tr>
<tr>
<td>7. Routinely provide community health information to elected officials</td>
<td>1.3%</td>
<td>2.2%</td>
</tr>
<tr>
<td>8. Routinely provide community health information to the public</td>
<td>1.8%</td>
<td>0.7%</td>
</tr>
<tr>
<td>9. Routinely provide community health information to the media</td>
<td>2.3%</td>
<td>1.1%</td>
</tr>
<tr>
<td>10. Prioritize community health needs</td>
<td>4.5%</td>
<td>5.3%</td>
</tr>
<tr>
<td>11. Engage community stakeholders in health improvement planning</td>
<td>3.7%</td>
<td>4.6%</td>
</tr>
<tr>
<td>12. Develop a community-wide health improvement plan</td>
<td>1.3%</td>
<td>1.4%</td>
</tr>
<tr>
<td>13. Identify and allocate resources based on community health plan</td>
<td>8.9%</td>
<td>7.9%</td>
</tr>
<tr>
<td>14. Develop policies to address priorities in community health plan</td>
<td>4.2%</td>
<td>3.7%</td>
</tr>
<tr>
<td>15. Maintain a communication network among health-related orgs.</td>
<td>0.7%</td>
<td>1.1%</td>
</tr>
<tr>
<td>16. Link people to needed health and social services</td>
<td>7.3%</td>
<td>8.4%</td>
</tr>
<tr>
<td>17. Implement legally mandated public health activities</td>
<td>0.2%</td>
<td>0.4%</td>
</tr>
<tr>
<td>18. Evaluate health programs and services in the community</td>
<td>1.4%</td>
<td>1.2%</td>
</tr>
<tr>
<td>19. Evaluate local public health agency capacity and performance</td>
<td>0.3%</td>
<td>0.5%</td>
</tr>
<tr>
<td>20. Monitor and improve implementation of health programs and policies</td>
<td>3.9%</td>
<td>2.7%</td>
</tr>
</tbody>
</table>
Evidence shows that when communities invest more in public health, they spend less on health care and live longer.

However, Indiana communities are less likely to be implementing nationally recommended public health activities compared to other states – those Foundational Public Health Services, in particular.

Map shows average proportion of activities competed by LHDs (weighted by population)
## Case Study: Indiana vs. U.S. Public Health System Strength

<table>
<thead>
<tr>
<th>Network Measures</th>
<th>IN</th>
<th>US</th>
<th>Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Network participation (%)</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Local public health agency</td>
<td>19.4%</td>
<td>35.6%</td>
<td>-83.2% **</td>
</tr>
<tr>
<td>State public health agency</td>
<td>18.4%</td>
<td>28.2%</td>
<td>-53.2% **</td>
</tr>
<tr>
<td>Other state agencies</td>
<td>7.0%</td>
<td>11.9%</td>
<td>-70.4% **</td>
</tr>
<tr>
<td>Other local agencies</td>
<td>14.3%</td>
<td>30.1%</td>
<td>-109.8% **</td>
</tr>
<tr>
<td>Federal agencies</td>
<td>4.7%</td>
<td>6.5%</td>
<td>-37.0%</td>
</tr>
<tr>
<td>Physician organizations</td>
<td>14.3%</td>
<td>18.0%</td>
<td>-25.2%</td>
</tr>
<tr>
<td>Hospitals</td>
<td>26.2%</td>
<td>38.9%</td>
<td>-48.3% **</td>
</tr>
<tr>
<td>Community health centers</td>
<td>14.1%</td>
<td>22.9%</td>
<td>-62.7% **</td>
</tr>
<tr>
<td>Faith-based organizations</td>
<td>10.3%</td>
<td>15.0%</td>
<td>-45.6%</td>
</tr>
<tr>
<td>Other nonprofits</td>
<td>15.0%</td>
<td>28.1%</td>
<td>-87.9% **</td>
</tr>
<tr>
<td>Health insurers</td>
<td>4.3%</td>
<td>9.7%</td>
<td>-127.3% **</td>
</tr>
<tr>
<td>Employers/businesses</td>
<td>9.1%</td>
<td>12.4%</td>
<td>-36.2%</td>
</tr>
<tr>
<td>Schools</td>
<td>11.4%</td>
<td>22.2%</td>
<td>-95.6% **</td>
</tr>
<tr>
<td>Higher education institutions</td>
<td>7.6%</td>
<td>15.4%</td>
<td>-102.5% **</td>
</tr>
<tr>
<td>Other organizations</td>
<td>1.3%</td>
<td>3.8%</td>
<td>-181.3% **</td>
</tr>
<tr>
<td><strong>Composite Network Strength (%)</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Comprehensive</td>
<td>10.6%</td>
<td>32.7%</td>
<td>-208.20% **</td>
</tr>
<tr>
<td>Conventional</td>
<td>7.6%</td>
<td>13.5%</td>
<td>-78.40% **</td>
</tr>
<tr>
<td>Limited</td>
<td>81.8%</td>
<td>53.8%</td>
<td>34.30% **</td>
</tr>
</tbody>
</table>
## Case Study of Indiana: Estimated Health & Economic Effects of System Improvement

<table>
<thead>
<tr>
<th>Outcome</th>
<th>Current Value</th>
<th>Estimated Values Attributable to System Improvement</th>
<th>Improve to U.S. Level</th>
<th>Improve to 100% Capability</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Estimate</td>
<td>Std. Error</td>
<td>Estimate</td>
</tr>
<tr>
<td>Age-adjusted mortality rate</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>All-cause</td>
<td>848.6</td>
<td>835.2</td>
<td>6.7</td>
<td>794.5</td>
</tr>
<tr>
<td>Heart disease</td>
<td>183.2</td>
<td>174.8</td>
<td>3.1</td>
<td>149.2</td>
</tr>
<tr>
<td>Diabetes</td>
<td>26.6</td>
<td>25.4</td>
<td>0.6</td>
<td>21.9</td>
</tr>
<tr>
<td>Cancer</td>
<td>170</td>
<td>166.8</td>
<td>1.6</td>
<td>157.1</td>
</tr>
<tr>
<td>Influenza</td>
<td>13.8</td>
<td>12.0</td>
<td>0.7</td>
<td>6.6</td>
</tr>
<tr>
<td>Infant mortality</td>
<td>7.3</td>
<td>7.1</td>
<td>0.1</td>
<td>6.4</td>
</tr>
<tr>
<td>Number of deaths averted per year</td>
<td>--</td>
<td>890.2</td>
<td>447.6</td>
<td>3604.0</td>
</tr>
<tr>
<td>Life Expectancy</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bottom 25% of family income</td>
<td>78.0</td>
<td>78.9</td>
<td>0.2</td>
<td>81.7</td>
</tr>
<tr>
<td>Top 25% of family income</td>
<td>87.6</td>
<td>87.8</td>
<td>0.1</td>
<td>88.4</td>
</tr>
<tr>
<td>Difference</td>
<td>9.5</td>
<td>8.8</td>
<td>0.2</td>
<td>6.7</td>
</tr>
<tr>
<td>Average gain in years of life</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bottom 25% of family income</td>
<td>--</td>
<td>0.9</td>
<td>0.2</td>
<td>3.7</td>
</tr>
<tr>
<td>Top 25% of family income</td>
<td>--</td>
<td>0.2</td>
<td>0.1</td>
<td>0.8</td>
</tr>
<tr>
<td>Change in annual medical spending</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Medicare</td>
<td>$13.4B</td>
<td>-$66.5M</td>
<td>$31.5M</td>
<td>-$269.3M</td>
</tr>
<tr>
<td>Medicaid</td>
<td>$8.9B</td>
<td>-$43.8M</td>
<td>$20.7M</td>
<td>-$177.5M</td>
</tr>
<tr>
<td>Private</td>
<td>$16.9B</td>
<td>-$83.8M</td>
<td>$39.7M</td>
<td>-$339.4M</td>
</tr>
<tr>
<td>Total</td>
<td>$39.3B</td>
<td>-$194.2M</td>
<td>$91.9M</td>
<td>-$786.2M</td>
</tr>
</tbody>
</table>
### Case Study of Indiana: Estimated Net Benefit of System Improvement

<table>
<thead>
<tr>
<th>Estimate</th>
<th>Improve to U.S. Level</th>
<th>Improve to 100% Capability</th>
</tr>
</thead>
<tbody>
<tr>
<td>Additional public health spending required per year ($M)&lt;sup&gt;1&lt;/sup&gt;</td>
<td>81.18</td>
<td>328.45</td>
</tr>
<tr>
<td>Medical spending reductions per year, discounted ($M)</td>
<td>-167.52</td>
<td>-678.18</td>
</tr>
<tr>
<td>Net cost savings ($M)</td>
<td>-86.34</td>
<td>-349.73</td>
</tr>
</tbody>
</table>

1. Estimate based on Mamaril and Mays (2018)
Harvesting the power of public health systems: Toward “rapid-learning systems”

In a learning health care system, research influences practice and practice influences research.

EVALUATE
Collect data and analyze results to show what does and does not work.

IMPLEMENT
Apply the plan in pilot and control settings.

DESIGN
Design care and evaluation based on evidence generated here and elsewhere.

ADJUST
Use evidence to influence continual improvement.

DISSEMINATE
Share results to improve care for everyone.

INTERNAL AND EXTERNAL SCAN
Identify problems and potentially innovative solutions.

INTERNAL

EXTERNAL
Conclusions and implications

- Large health & economic gains attributable to strong public health systems
- Larger gains for low-income populations & communities
- Comprehensive systems do more than just plan: prioritize, invest, implement, evaluate
- Opportunity: most communities currently lack strong PH systems, especially in rural areas
- Policy incentives and resources can help:
  - Public health accreditation
  - Hospital community benefit
  - Value-based health care payments
  - Insurer and employer incentives
- Sustainability and resiliency are not automatic
Implications for policy, practice & research

- Leveraging federal funding
- State & local contributions
- Private sector contributions
  - Shared savings
  - Impact investing

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

http://www.systemsforaction.org