Public Health ROI: Evidence, Experience, and Remaining Questions

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Available at: http://works.bepress.com/glen_mays/85/
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UTMB Public Health Symposium • Galveston, TX • 3 April 2013
Value in the U.S. health system

Average Life Expectancy vs. Per Capita Spending (International Dollars) for various countries, including the United States.
Equity in population health

Source: Commonwealth Fund 2012
Preventable disease burden and national health spending

>75% of national 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 national health spending is allocated to public health and prevention

CDC 2008 and CMS 2011
Public health activities

Organized programs, policies, and laws to prevent disease and injury and promote health on a population-wide basis

- Epidemiologic surveillance & investigation
- Community health assessment & planning
- Communicable disease control
- Chronic disease and injury prevention
- Health education and communication
- Environmental health monitoring and assessment
- Enforcement of health laws and regulations
- Inspection and licensing
- Inform, advise, and assist school-based, worksite-based, and community-based health programming

...and roles in assuring access to medical care
Public health’s share of national health spending

USDHHS National Health Expenditure Accounts

$Billions

%NHE

State and Local

Federal

% of total health spending

USDHHS National Health Expenditure Accounts

Factors driving growth in medical spending

Roehrig et al. Health Affairs 2011
Key questions about value

- Do outcomes achieved by public health strategies justify their costs?
- Where should new investments be directed to achieve their greatest impact?
- How much health can we produce through public health investments?
- Can public health investments help “bend the curve” to contain medical costs?
Key questions about value

- What level of resources are required to deliver a given bundle of public health activities for a given population?

- How do delivery costs vary across communities and population groups?

- Where are the opportunities to realize efficiencies in delivery?
ROI Uncertainty and Controversy

Prevention Efforts Provide No Panacea on Health Costs

By JANET ADAMY

Preventing Chronic Disease: An Important Investment, But Don’t Count On Cost Savings

An overwhelming percentage of preventive interventions add more to medical costs than they save.

by Louise B. Russell

HEALTH AFFAIRS - Volume 28, Number 1

Prevention for a Healthier America:

INVESTMENTS IN DISEASE PREVENTION YIELD SIGNIFICANT SAVINGS, STRONGER COMMUNITIES

Trust for America's Health

www.healthyamericans.org
Challenges in demonstrating ROI in public health

- Time lag between costs and benefits
- Distribution of costs and benefits: concentrated costs but diffuse benefits
- Measurement of costs and benefits requires good information systems
- Attribution of benefits: the counterfactual
ROI Key Ingredients

Investments

- Costs of implementing public health strategies
- Who’s investments?

Returns

- Valuation of the outputs and outcomes attributable to public health strategies
- Who realizes returns?
- Over what time frames?
- Compared to what?
Managing ROI Expectations

Cost savings – a high bar

Cost effectiveness – value for dollars spent
  – Compared to status quo
  – Compared to other possible investments
  – Compared to doing nothing

…Key concept: opportunity costs
Achieving ROI in public health: Key Considerations

- **Economies of scale**: many public health activities can be delivered more efficiently across larger populations.

- **Economies of scope**: efficiencies can be realized by using the same infrastructure to deliver an array of related programs and services.
Estimating ROI in public health: Discrete interventions

- Smoking cessation interventions cost an estimated $2,587 for each life-year gained.
- $1 spent on STD and pregnancy prevention produces $2.65 in medical cost savings.
- $1 spent on preconception care for diabetic women produces $5.19 in medical cost savings.
- $1 spent on childhood immunization produces $6.30 in medical cost savings.

Source: Centers for Disease Control and Prevention 2011
Estimating ROI in public health: Individual Programs

Washington State Comprehensive Tobacco Prevention and Control Program: $5 in health care savings per $1 investment

Source: Dilley et al., AJPH 2011
Emerging evidence: what about aggregate public health ROI?

- How does public health spending vary across communities and change over time?
- What are the health effects attributable to changes in public health spending?
- What are the medical cost effects attributable to changes in public health spending?
- What are the opportunities for improving efficiency in public health delivery?
The problem with public health spending

- Federal & state funding sources often targeted to communities based in part on disease burden, risk, need
- Local funding sources often dependent on local economic conditions that may also influence health
- Public health spending may be correlated with other resources that influence health

Sources of Local Public Health Agency Revenue, 2010

- Local 28%
- State direct 23%
- Federal pass-thru 13%
- Federal direct 7%
- Medicaid 9%
- Medicare 2%
- Fees 6%
- Other 12%

NACCHO 2010
Local variation in public health spending

Gini = 0.485
Changes in local public health spending 1993-2010

- 62% growth
- 38% decline
Determinants of local public health spending levels

- Delivery system size & structure
- Service mix
- Population needs and risks
- Efficiency & uncertainty

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

Infant mortality | Heart disease | Diabetes | Cancer | Influenza | All-cause | Alzheimers

Percent change

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

Mays et al. 2011
Medical Care Offsets Attributable to Local Public Health Spending, 1993-2008

Medical Cost Offset = 0.88%

Quintiles of public health spending/capita

Mays et al. Health Services Research, 2009
### Effects of public health spending on medical care spending 1993-2008

Change in Medical Care Spending Per Capita Attributable to 10% Increase in Public Health Spending Per Capita

<table>
<thead>
<tr>
<th>Model</th>
<th>N</th>
<th>Elasticity</th>
<th>S.E.</th>
</tr>
</thead>
<tbody>
<tr>
<td>One year lag</td>
<td>8532</td>
<td>-0.88</td>
<td>0.13***</td>
</tr>
<tr>
<td>Five year lag</td>
<td>6492</td>
<td>-1.12</td>
<td>0.53**</td>
</tr>
<tr>
<td>Ten year lag</td>
<td>4387</td>
<td>-1.79</td>
<td>1.12</td>
</tr>
</tbody>
</table>

log regression estimates controlling for community-level and state-level characteristics

*p<0.10    **p<0.05    ***p<0.01

Mays et al. forthcoming
# Estimated value of public health spending

10% increase in public health spending in the average U.S. community:

<table>
<thead>
<tr>
<th>Description</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Public health cost</td>
<td>$594,291</td>
</tr>
<tr>
<td>Medical cost offset (Medicare)</td>
<td>-$515,114</td>
</tr>
<tr>
<td>Life years gained</td>
<td>148</td>
</tr>
<tr>
<td>Net cost/life year</td>
<td>$534</td>
</tr>
</tbody>
</table>

Mays et al. forthcoming
2012 Institute of Medicine Recommendations

- Double current federal spending on public health
- Allow greater flexibility in how states and localities use federal public health funds
- Identify components and costs of a minimum package of public health services
- Implement national chart of accounts for tracking spending & funds flow
- Expand research on costs and effects of public health delivery

Learning about ROI through natural experiments

Delivery of recommended public health activities

<table>
<thead>
<tr>
<th>Year</th>
<th>Assurance</th>
<th>Policy</th>
<th>Assessment</th>
</tr>
</thead>
<tbody>
<tr>
<td>1998</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2006</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2012</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

↑ 10%  ↓ 5%

Organizations engaged in local public health delivery

<table>
<thead>
<tr>
<th>% Change 2006-2012</th>
<th>Scope of Delivery 2012</th>
</tr>
</thead>
<tbody>
<tr>
<td>-50%</td>
<td>10%</td>
</tr>
<tr>
<td>-30%</td>
<td>30%</td>
</tr>
<tr>
<td>-10%</td>
<td>50%</td>
</tr>
<tr>
<td>10%</td>
<td></td>
</tr>
<tr>
<td>30%</td>
<td></td>
</tr>
<tr>
<td>50%</td>
<td></td>
</tr>
</tbody>
</table>

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

A typology of public health delivery systems

Diversification  High       High         High          Mod           Mod         Low          Low
Centralization   Mod        Low         High          High           Low         High         Low
Integration        High       High         Low           Mod           Mod         Low          Mod

Source: Mays et al. 2010; 2012

% of communities

Comprehensive

Conventional

Limited

Source: Mays et al. 2010; 2012
Health outcomes and delivery system change

Percent Changes in Preventable Mortality Rates by Delivery System Type

- Infant Deaths/1000 Births
- Cancer deaths/100,000 population
- Heart Disease Deaths/100,000
- Influenza Deaths/100,000
- Infectious Disease Deaths/100,000

Fixed-effects models control for population size, density, age composition, poverty status, racial composition, and physician supply.
What about efficiency in public health delivery?

Source: 2010 NACCHO National Profile of Local Health Departments Survey
Economies of scale and scope in public health

Mays et al. forthcoming
Simulated effects of regionalization in public health delivery

Per Capita Cost
Scope
Quality

Regionalization Thresholds

<25,000  <50,000  <100,000  <150,000

Mays et al. forthcoming
Producing more and better ROI evidence: public health services & systems research

A field of inquiry examining the organization, financing, and delivery of public health services at local, state and national levels, and the impact of these activities on population health

Mays, Halverson, and Scutchfield. 2003
Subtitle D—Support for Prevention and Public Health Innovation

Patient Protection and Affordable Care Act of 2010

SEC. 4301. RESEARCH ON OPTIMIZING THE DELIVERY OF PUBLIC HEALTH SERVICES.

(a) IN GENERAL.—The Secretary of Health and Human Services (referred to in this section as the “Secretary”), acting through the Director of the Centers for Disease Control and Prevention, shall provide funding for research in the area of public health services and systems.

(b) REQUIREMENTS OF RESEARCH.—Research supported under this section shall include—

(1) examining evidence-based practices relating to prevention, with a particular focus on high priority areas as identified by the Secretary in the National Prevention Strategy or Healthy People 2020, and including comparing community-based public health interventions in terms of effectiveness and cost;

(2) analyzing the translation of interventions from academic settings to real world settings; and

(3) identifying effective strategies for organizing, financing, or delivering public health services in real world community settings, including comparing State and local health department structures and systems in terms of effectiveness and cost.
A national research agenda

- Public health system organization and structure
- Public health financing and economics
- Public health workforce
- Public health information and technology
- Cross-cutting elements
  - Quality
  - Law and policy
  - Equity and disparities
  - Metrics and data
  - Analytic methods

http://www.publichealthsystems.org/research-agenda.aspx
What are Public Health PBRNs?

A collection of public health agencies and their partner organizations engaged in an ongoing collaboration with an academic research center to conduct rigorous, applied studies of strategies for organizing, financing, and/or delivering public health services in real-world community settings.
How can PBRNs help?

- Practice partners to help identify the most pressing questions to answer
- Multiple practice settings for analysis and comparison
- Research partners to help design studies that balance rigor, relevance, feasibility
- Collaborative interpretation of results
- Translating results to timely practice and policy actions
## PBRN Performance in Engaging Practice Settings

Local Health Departments Engaged in Research Implementation & Translation Activities During Past 12 months

<table>
<thead>
<tr>
<th>Activity</th>
<th>PBRN Agencies</th>
<th>National Sample</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Percent/Mean</td>
<td>Percent/Mean</td>
</tr>
<tr>
<td>Identifying research topics</td>
<td>94.1%</td>
<td>27.5%</td>
</tr>
<tr>
<td>Planning/designing studies</td>
<td>81.6%</td>
<td>15.8%</td>
</tr>
<tr>
<td>Recruitment, data collection &amp; analysis</td>
<td>79.6%</td>
<td>50.3%</td>
</tr>
<tr>
<td>Disseminating study results</td>
<td>84.5%</td>
<td>36.6%</td>
</tr>
<tr>
<td>Applying findings in own organization</td>
<td>87.4%</td>
<td>32.1%</td>
</tr>
<tr>
<td>Helping others apply findings</td>
<td>76.5%</td>
<td>18.0%</td>
</tr>
<tr>
<td>Research implementation composite</td>
<td>84.04 (27.38)</td>
<td>30.20 (31.38)</td>
</tr>
<tr>
<td>N</td>
<td>209</td>
<td>505</td>
</tr>
</tbody>
</table>
Estimating ROI in public health: National Public Health Improvement Initiative

- **Goal**: Develop ROI approaches to assess value of improvements in public health capacity, infrastructure, administrative processes

- **Near-term**: capture effects on labor costs, time costs, productivity

- **Longer-term**: capture effects on program delivery (reach, effectiveness), population health

- Beta version of ROI tool: [http://works.bepress.com/glen_mays/64/](http://works.bepress.com/glen_mays/64/)
Implications for Policy and Practice

- Mortality reductions achievable through increases in public health spending may equal or exceed the reductions produced by expansions in medical care or insurance coverage.

- Increased public health investments help to reduce geographic disparities in population health and bend the medical cost curve.

- Gains from increased federal investments may be offset by reductions in state and local spending.
Implications: Advancing ROI Analysis in Public Health

- Enhanced tracking of public health expenditures
- Enhanced monitoring of program performance
  - Reach/targeting
  - Effectiveness
  - Efficiency
  - Equity
- Analysis of cross-cutting infrastructure needed to implement/maintain programs
Implications: toward a rapid-learning system in public health

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.

Adjust
Use evidence to influence continual improvement.

Implement
Apply the plan in pilot and control settings.

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

Disseminate
Share results to improve care for everyone.

Internal and External Scan
Identify problems and potentially innovative solutions.

Internal
External
For More Information

Supported by The Robert Wood Johnson Foundation

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