The Economics of Implementing Population Health Strategies: Progress in Public Health Services & Systems Research

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Why economics?

Successful strategies to scale up and spread complex community-level interventions require an understanding of the resources required for implementation, how best to distribute them among supporting institutions, and how resource consumption and distribution varies across settings.
Many evidence-based public health strategies reach less than half of U.S. populations at risk:

- Smoking cessation
- Influenza vaccination
- Hypertension control
- Nutrition & physical activity programs
- HIV prevention
- Family planning
- Substance abuse prevention
- Interpersonal violence prevention
- Maternal and infant home visiting for high-risk populations
What gets implemented in public health?

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

- Communicable disease control
- Chronic disease and injury prevention
- Epidemiologic surveillance & investigation
- Community health assessment & planning
- Public 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
>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 2013
Public health implementation research: PHSSR and Public Health PBRNs

First cohort (December 2008 start-up)
Second cohort (January 2010 start-up)
Affiliate/Emerging PBRNs (2011-14)
Ongoing studies of the economics of implementation in public health

Macro

- National Longitudinal Survey of Public Health Systems
- Multi-network Practice and Outcome Variation Study (MPROVE)
- Public Health Delivery and Cost Studies (DACS)
- Costing Foundational Public Health Capabilities

Micro

National Coordinating Center
1 - National Longitudinal Survey of Public Health Systems

- Cohort of 360 communities with at least 100,000 residents
- Measured from local public health official’s perspective:
  - **Scope**: availability of 20 recommended public health activities
  - **Network**: types of organizations contributing to each activity
  - **Effort**: contributed by designated local public health agency
  - **Quality**: perceived effectiveness of each activity

- Linked with organizational and financial data from NACCHO’s National Profile of Local Health Departments
Delivery of recommended public health activities in U.S. communities

Variation and Change in Delivery

Delivery of recommended public health activities, 2006-12

% of recommended activities performed

Quintiles of communities

Q1  Q2  Q3  Q4  Q5

2012  Δ 2006-12

Patterns of interaction in public health implementation
Seven types of public health delivery systems

Scope

Centralization

Integration

% of communities

0% 5% 10% 15% 20% 25% 30% 35% 40% 45% 50%

Comprehensive  Conventional  Limited

Source: Mays et al. 2010; 2012
Integrated systems do more with less


Expenditures per capita

% of recommended activities performed

Comprehensive  Conventional  Limited  Very limited

Integrated systems achieve better health outcomes

Fixed-effects models control for population size, density, age composition, poverty status, racial composition, and physician supply.
Integrated systems generate larger health & economic gains in low-resource communities

Impact in Low-Income vs. High Income Communities

Log IV regression estimates controlling for community-level and state-level characteristics

Mays et al. forthcoming 2014
Estimated crowd-out in hospital contributions to public health activities

Note: GLLAMM estimates, holding all other variables constant in the model
2 - Multi-Network Practice and Outcome Variation Examination Study (MPROVE)

6 states → 305 community settings

- Identify implementation measures high-value services:
  - Chronic disease prevention
  - Communicable disease control
  - Environmental health protection

- Create registry of measures: consistent across communities

- Profile geographic variation in the delivery of selected public health services across local communities

- Decompose variation into attributable components:
  - need-sensitive or preference-sensitive factors
  - supply-sensitive factors

- Examine associations between service delivery & outcomes
3 - Public Health Delivery and Cost Studies (DACS)

11 states → 250 community settings

- Adapt & apply established cost measurement/estimation methodologies to public health settings
- Identify the costs of implementing selected high-value public health services
- Assess how costs vary across institutional and community settings
- Examine the determinants and consequences of variation in the costs of implementation
  - Economies of scale and scope
  - Efficiency & productivity
  - Equity
MProve measurement dimensions

- **Availability/Scope**: specific activities produced
- **Volume/Intensity**: Frequency of producing activity over period of time
- **Capacity**: Labor and capital inputs assigned to an activity
- **Reach**: Proportion of target population reached by activity
- **Quality**: effectiveness, timeliness, equity of activity
- **Efficiency**: resources required to produce given volume of activity
DACS cost estimation methods

- Retrospective “cost accounting” methods
  - Modeling and decomposition using administrative records
  - Surveys with staff and/or administrators

- Concurrent “actual cost” methods (micro-costing)
  - Time studies with staff
  - Activity logs with staff
  - Direct observation

- Prospective “expected cost” methods
  - Vignettes
  - Surveys with staff and/or administrators
  - Delphi group processes
DACS Example: Returns to Scale in Implementing Disease Investigation in Colorado

Atherly et al. University of Colorado and Colorado Public Health PBRN.
http://www.ucdenver.edu/academics/colleges/PublicHealth/research/centers/RMPRC/projects/Pages/COPHPBRN.aspx
Overall Patterns of Variation in Local Public Health Implementation

Estimates from random effects regression models
Correlates of Variation in Local Public Health Implementation

Estimates from state fixed-effects regression models

*p<0.05
4 – Costing Foundational Capabilities

2012 Institute of Medicine Recommendations

• Identify the components and costs of a minimum package of public health services
  – Foundational capabilities
  – Basic programs

• Implement a national chart of accounts for tracking spending and flow of funds

• Expand research on costs and effects of public health delivery

Estimation of “projected” costs from current implementation ratings

<table>
<thead>
<tr>
<th>Implementation level</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>A.</td>
<td>0%</td>
</tr>
<tr>
<td>B.</td>
<td>100%</td>
</tr>
</tbody>
</table>

A. Cost at current implementation level
B. Projected cost of full implementation

Pilot Estimates: Current and Projected Costs of Foundational Capabilities

Current

Projected

5% = 52.750
Mean = 65.036
95% = 78.323

5% = 76.75
Mean = 101.82
95% = 127.46
Ongoing cross-state analyses

- Predictive & convergent validity tests
- Refining patterns & determinants of variation
  - Disentangling demand (need) from supply
  - System structure
  - Geospatial
  - Within and across domains of activity: composite measures
- Identifying population health correlates of variation
Toward a “rapid-learning system” in population 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.

**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**
More Information

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