

Maximizing ROI: Laboratories and the Value of Next-Generation Public Health

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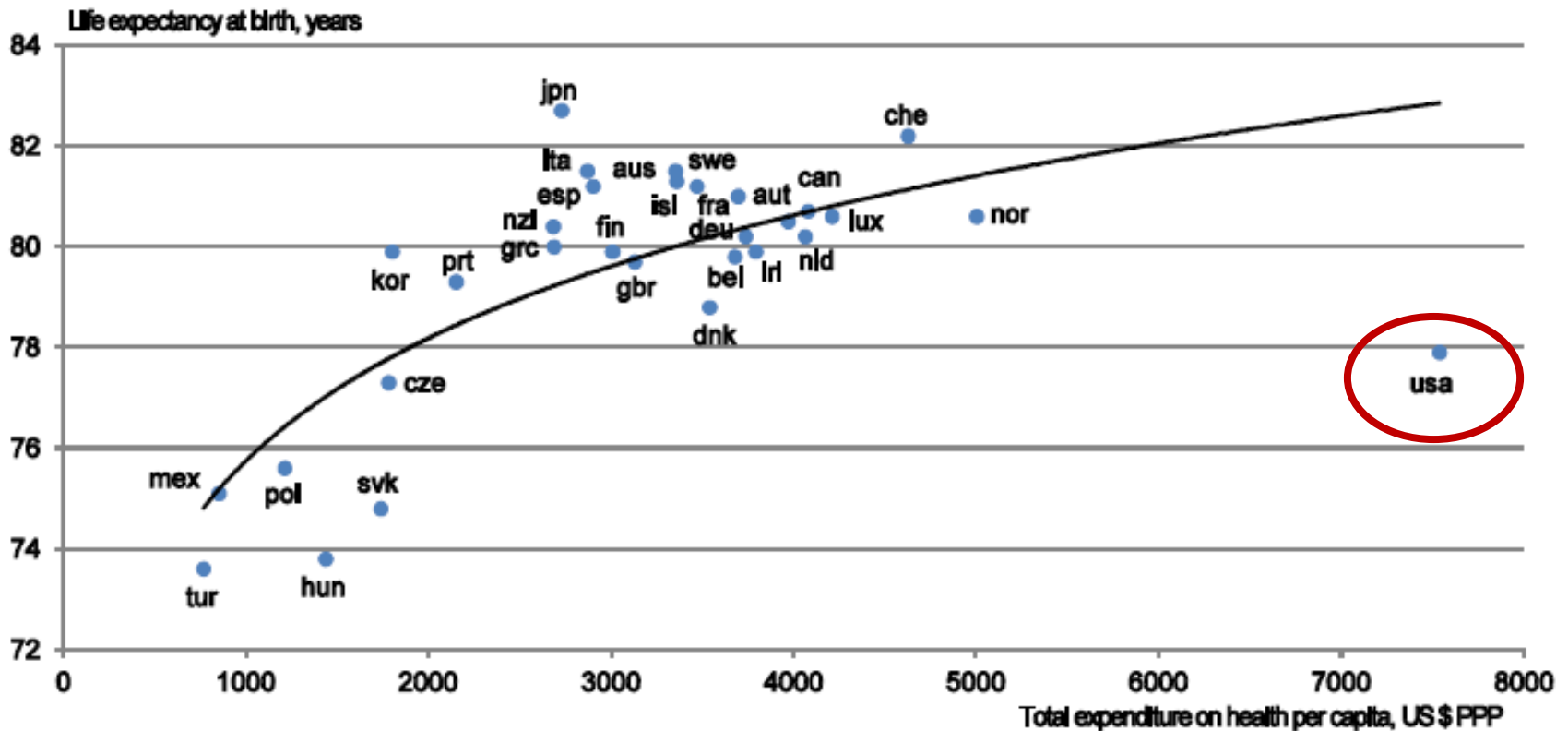
CDC Forum on Public Health Services & Systems Research • Atlanta GA • 19 May 2014

Overview

- Drivers of change in public & population health
- Laboratory roles in next-gen public health
- Making the case for laboratory ROI and value

Failures in population health

Figure 1. There are large differences in life expectancy and health care spending across OECD countries 2008¹



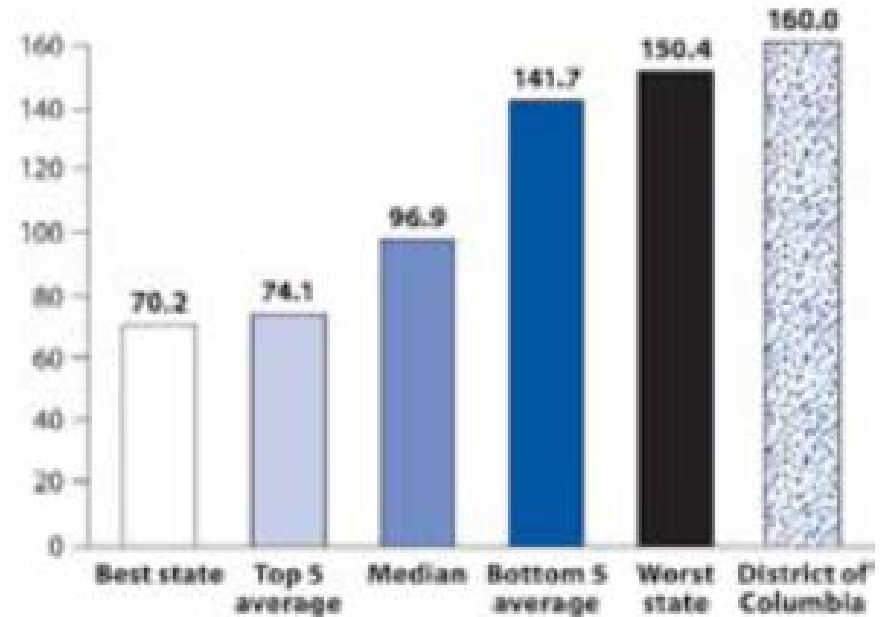
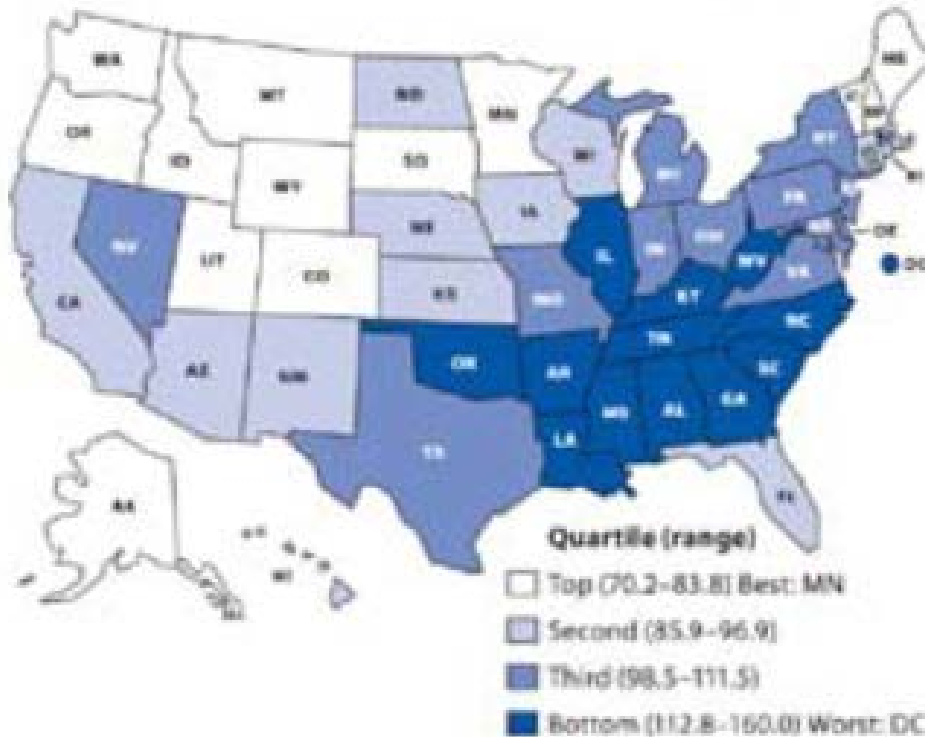
1. Or latest year available.

Source: OECD Health Data 2010.

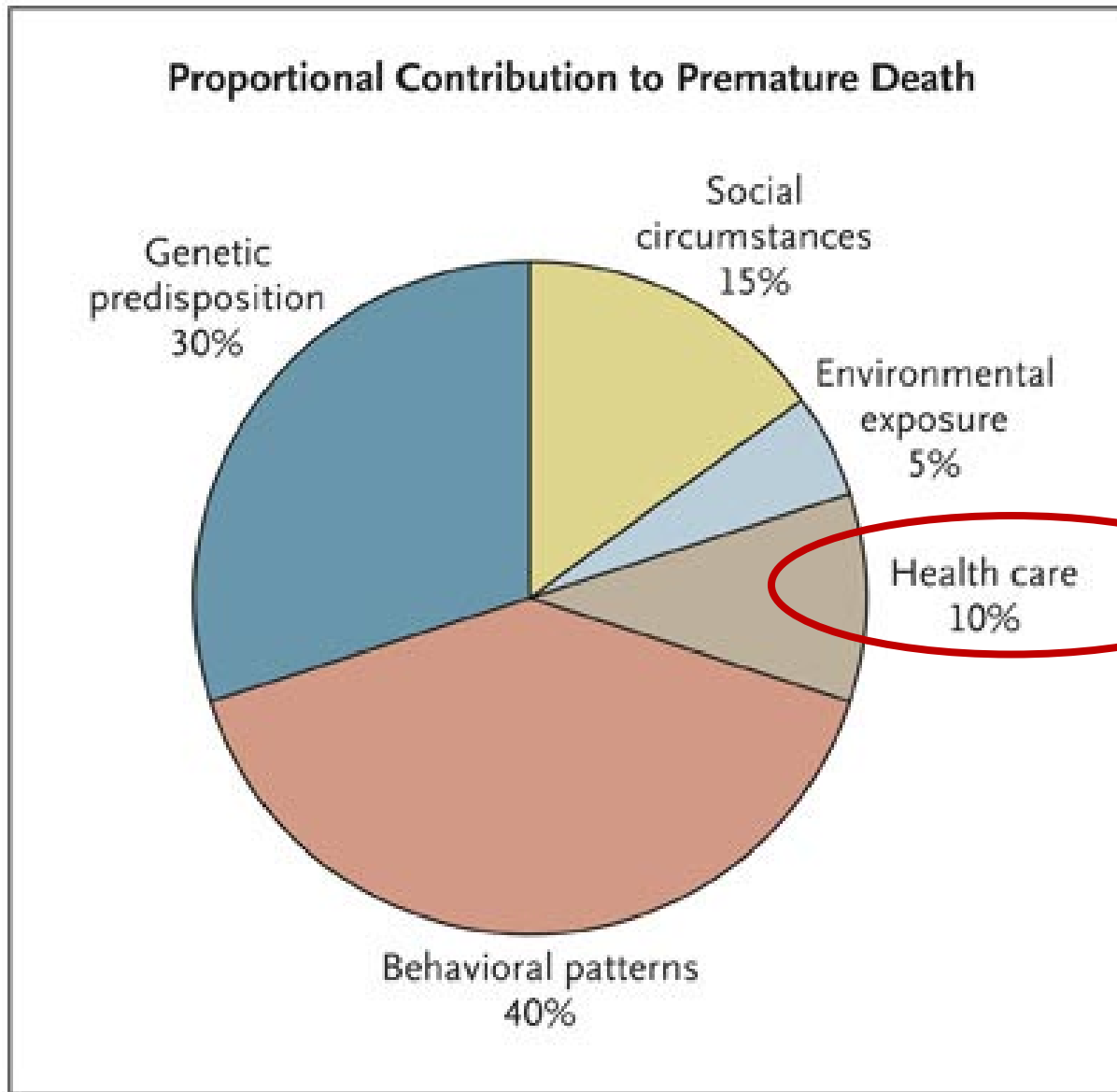
Failures in population health

Premature Deaths per 100,000 Residents

U.S. Average = 103 Deaths per 100,000



Drivers of population health failures



Public health's role in population health: Optimization

How to optimally deploy a diverse collection of responsibilities, resources, actors & expectations?

- 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
Prevent. Promote. Protect.

Pressures for public health change

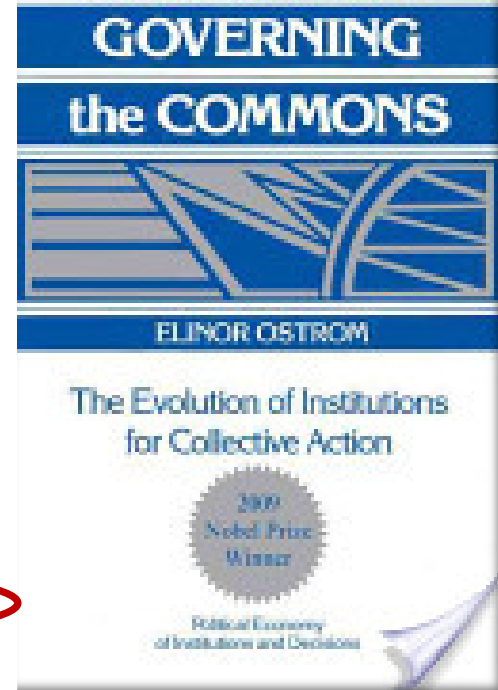


Learning how to succeed with population health strategies

- Designed to achieve **large-scale** health improvement: neighborhood, community, state
- Target **fundamental** and often **multiple** determinants of health
- Mobilize the **collective actions** of multiple stakeholders in government & private sector
 - Usual and unusual suspects
 - Infrastructure requirements

Overcoming collective action problems

- Incentive compatibility → public goods
- Concentrated costs & diffuse benefits
- Time lags: costs vs. improvements
- Uncertainties about what works
- Gaps and asymmetries in information
- Difficulties measuring progress
- Weak and variable institutions & infrastructure
- Imbalance: resources vs. needs
- Stability & sustainability of funding



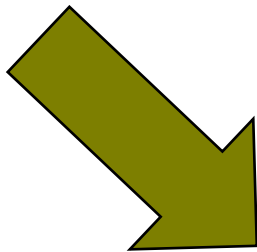
Standardization vs. Customization in public health delivery

Standardization

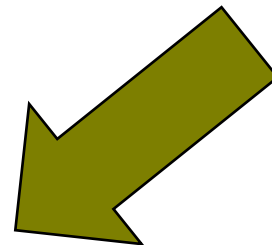
- ▼ Harmful variation
- ▼ Wasteful variation
- ▼ Inequitable variation
- ▼ Race to the bottom
- ▲ Network externalities:
interoperability/coordination

Customization

- ▲ Target resources to
greatest needs/risks
- ▲ Tailor approaches to
values & preferences of
stakeholders
- ▲ Deploy unique resources
& skills to their best
purposes



Effectiveness
Efficiency
Equity



Roles for research and innovation

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.

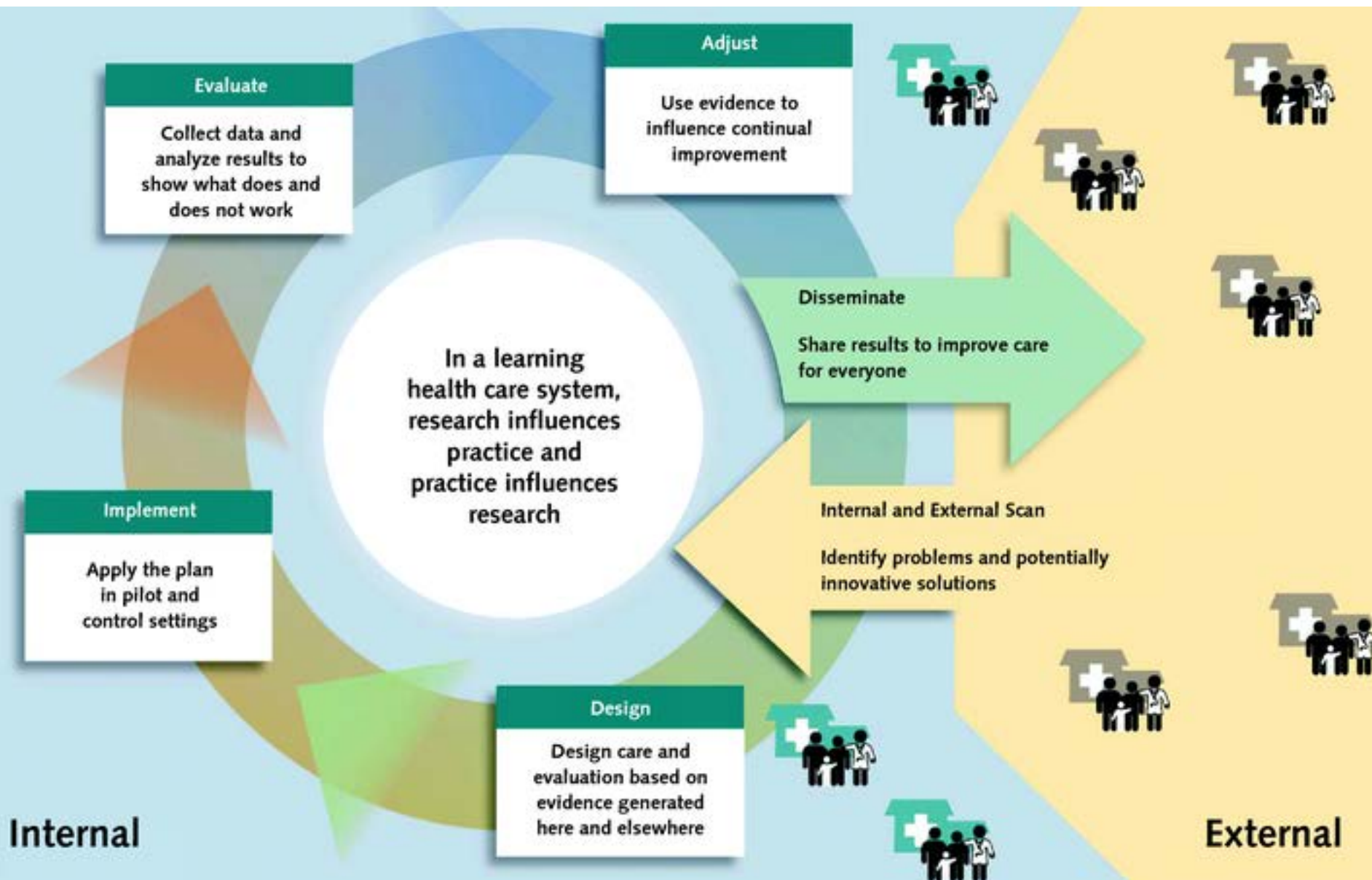
(b) **REQUIREMENTS OF RESEARCH.**—Research supported under this section shall include—

(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

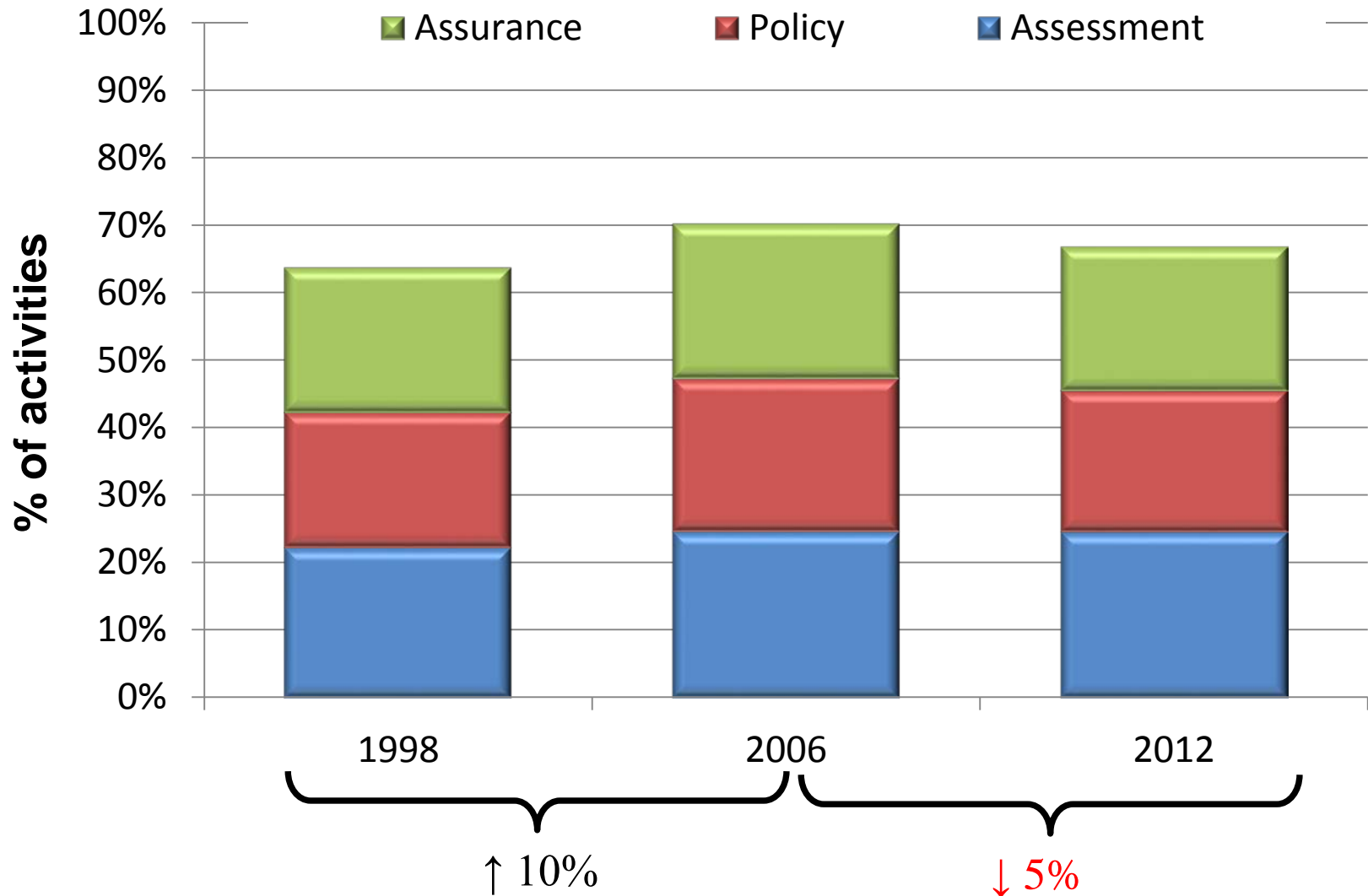
(3) identifying effective strategies for organizing, financing, or delivering public health services in real world community settings, including comparing State and local health department structures and systems in terms of effectiveness and cost.

Toward a “rapid-learning system” in public health



Changes in public health capability

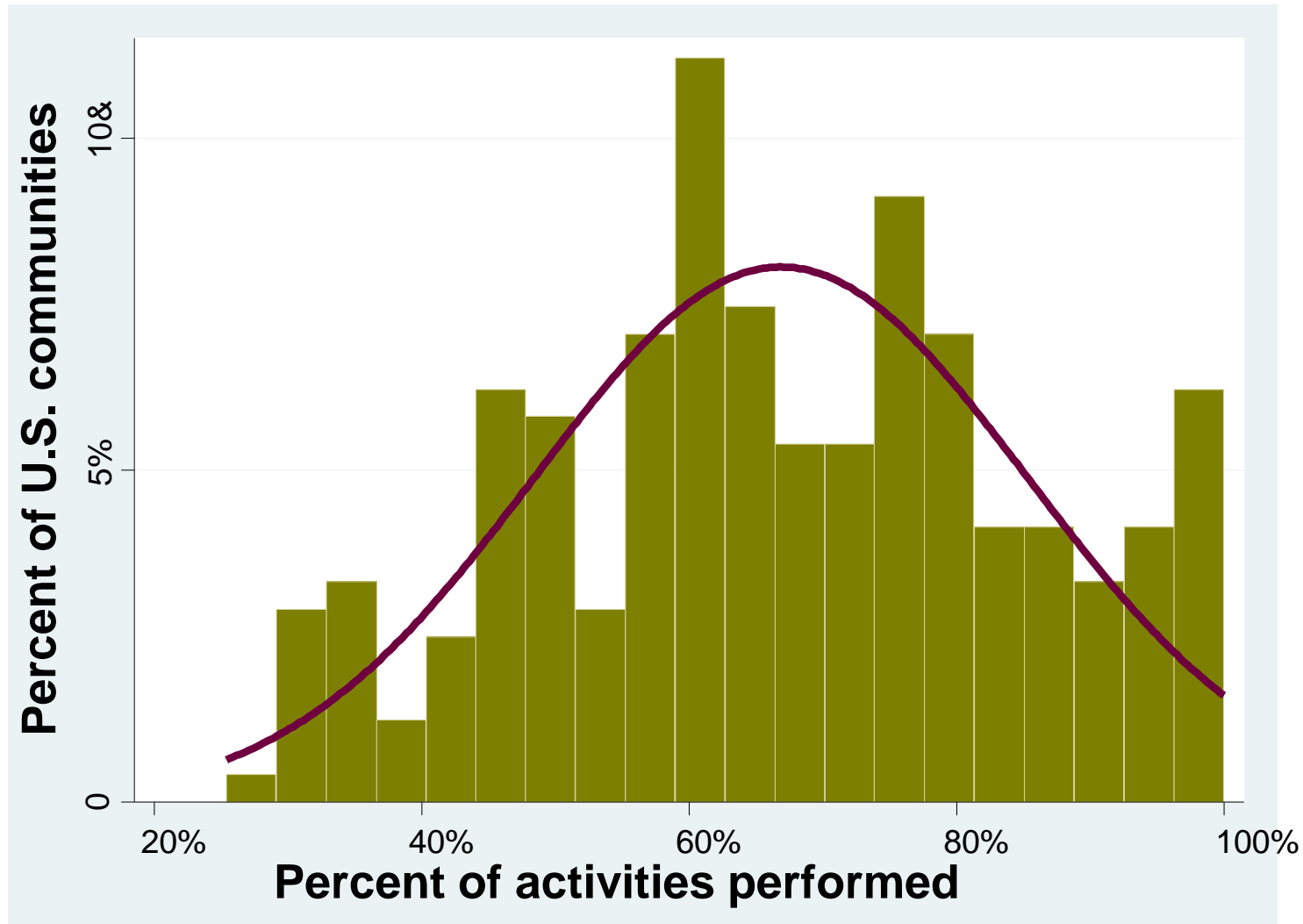
Delivery of IOM recommended public health activities



National Longitudinal Survey of Public Health Systems, 2012

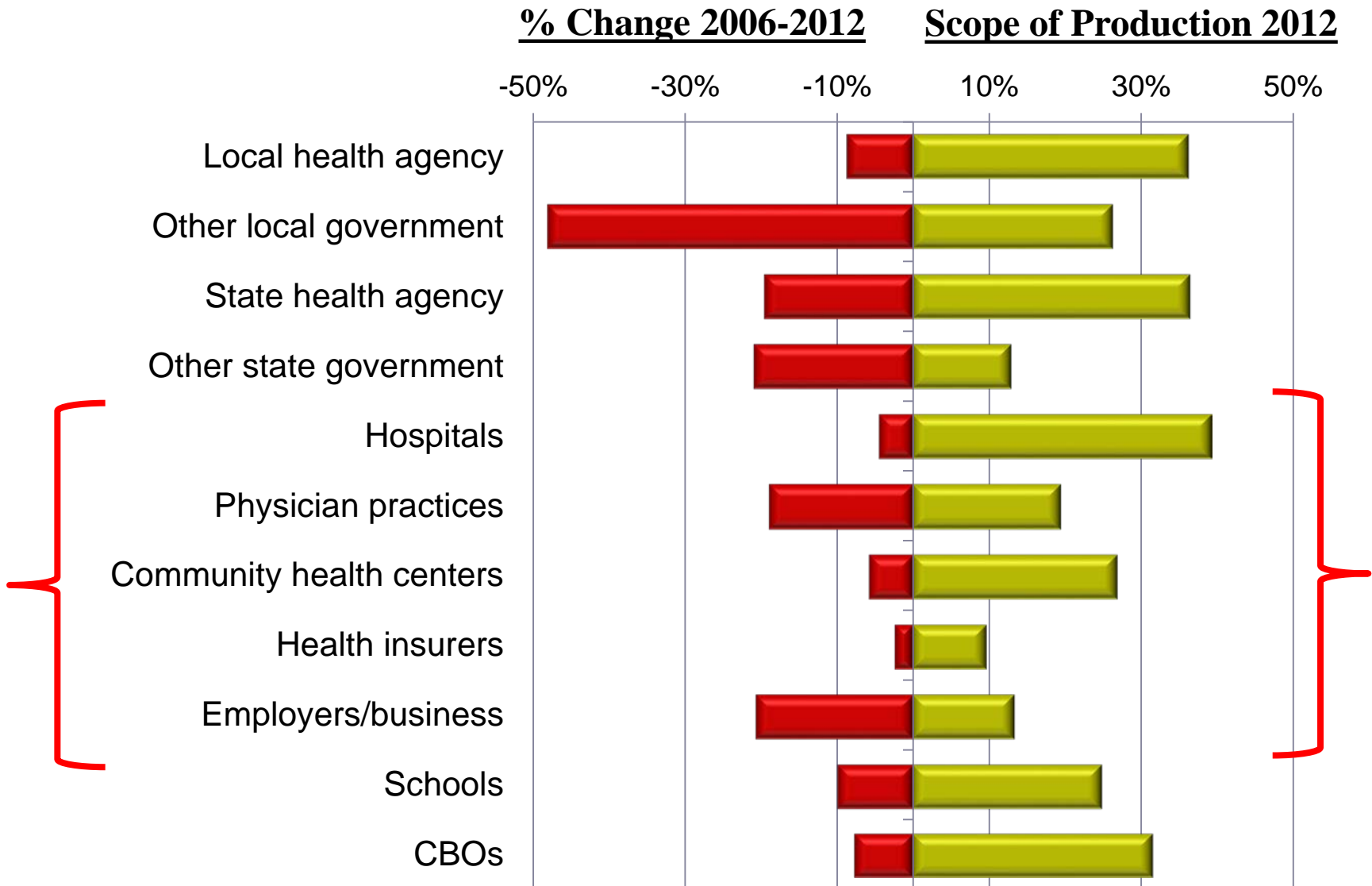
Variation in Public Health Delivery

Delivery of IOM recommended public health activities, 2012

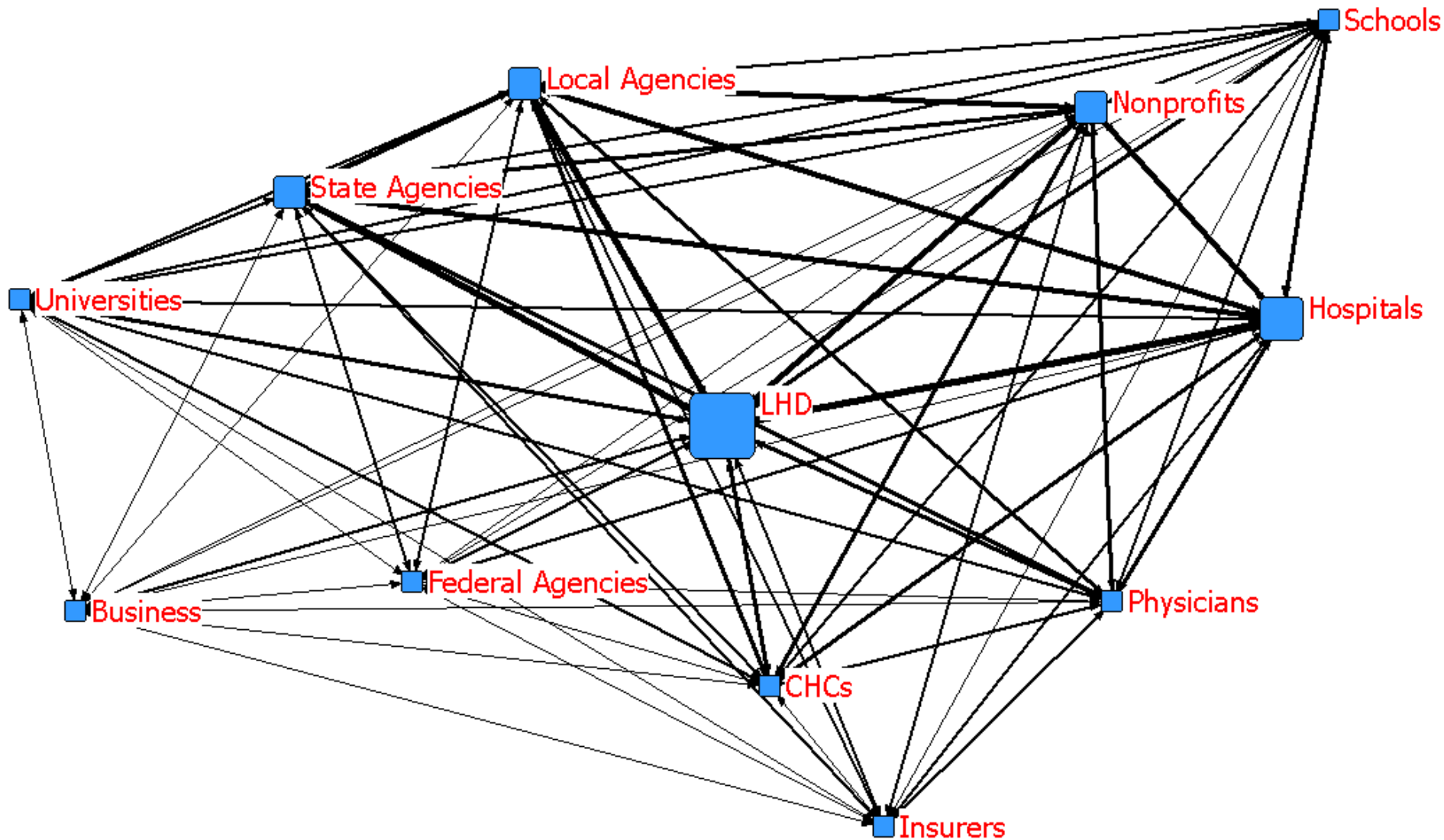


National Longitudinal Survey of Public Health Systems, 2012

Organizations contributing to local public health production



Inter-organizational relationships in public health delivery



National Longitudinal Survey of Public Health Systems, 2012

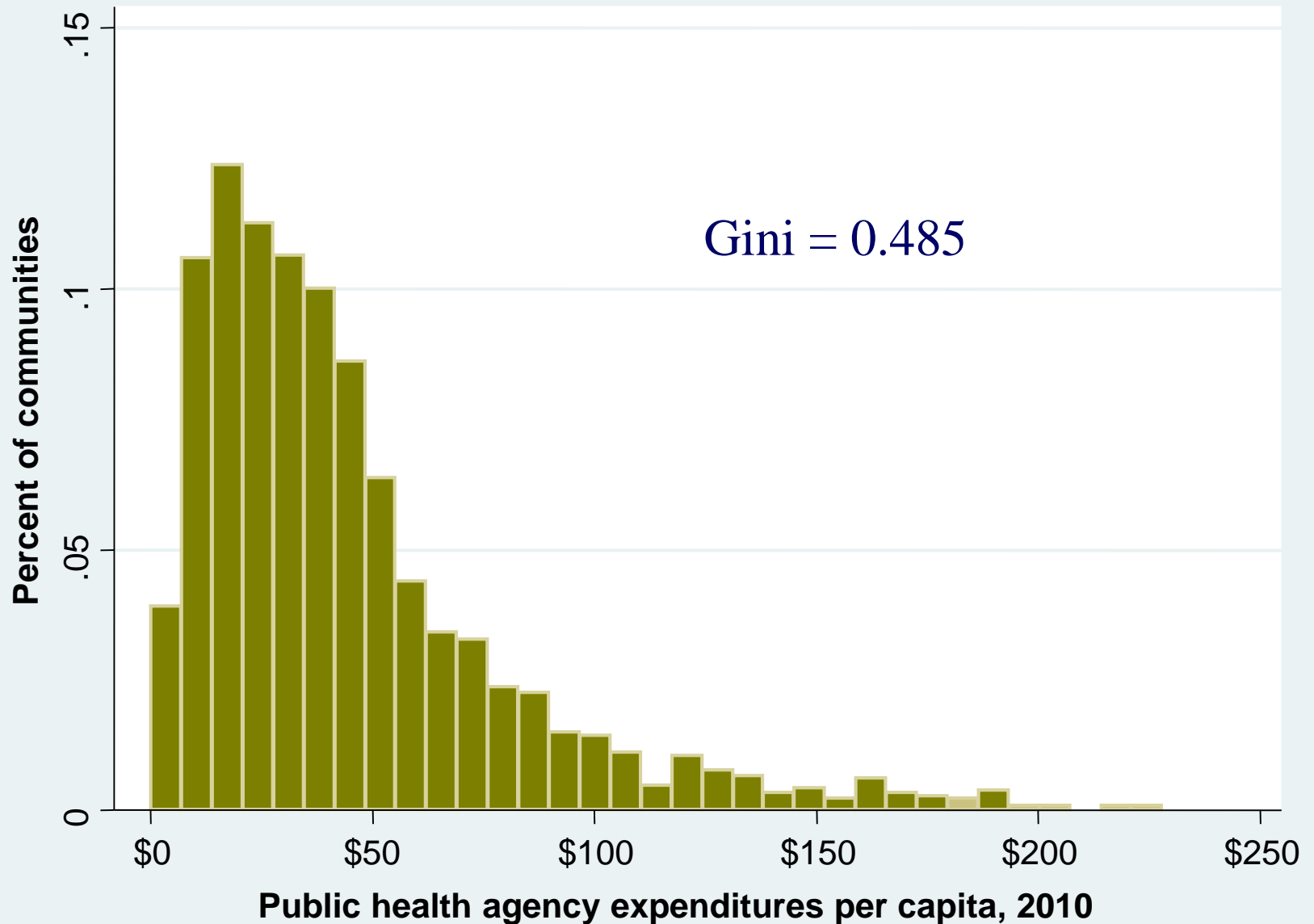
Laboratory roles in next generation public health

- Expanding volume & quality of information
- Accelerating timeliness of testing & dissemination
- Examining cost/benefit trade-offs of new testing
- Innovating information transmission/exchange
- Harvesting laboratory information flows for research
- Using real-time laboratory information to target and tailor public health interventions

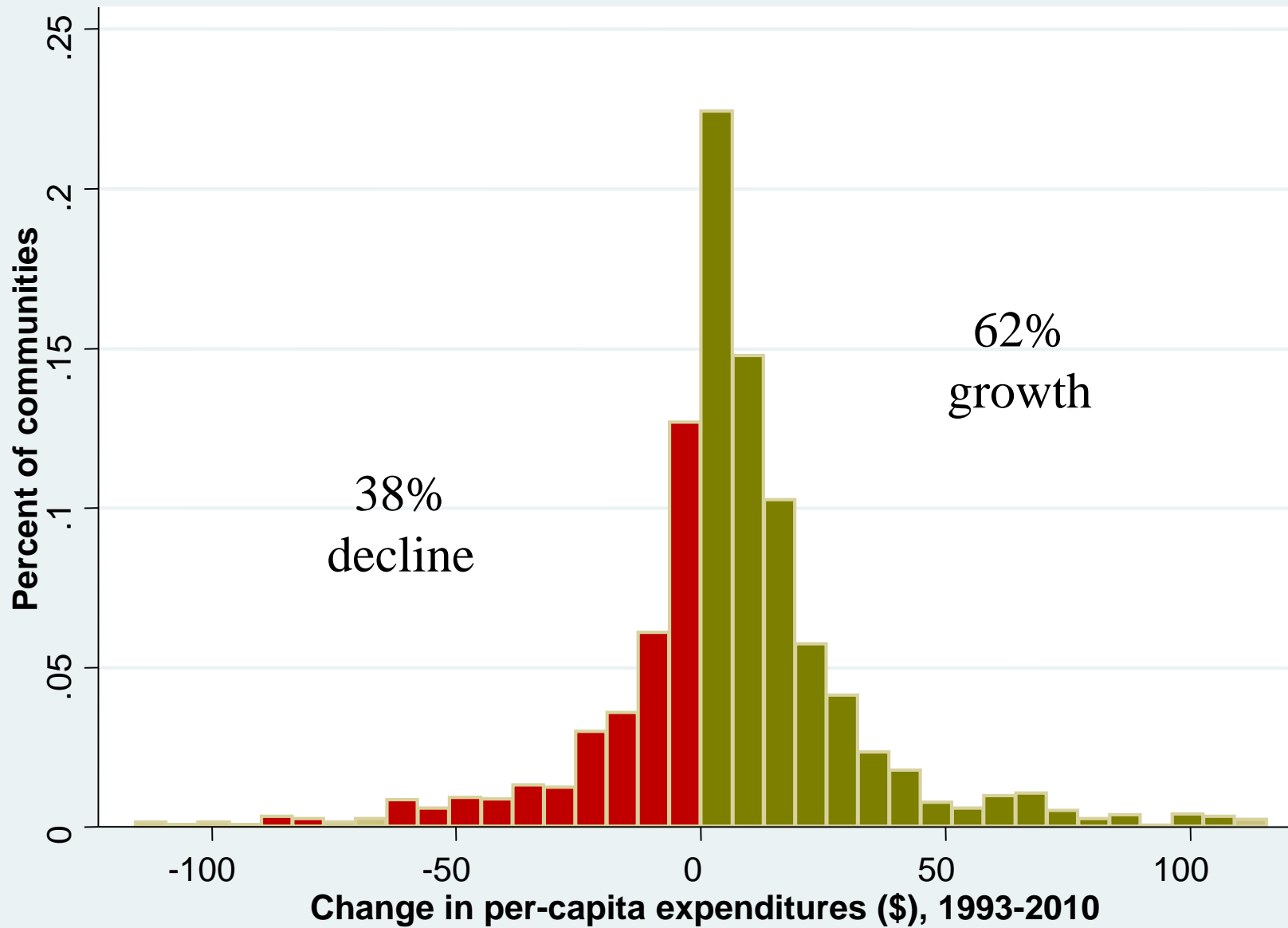
Enhancing laboratory capacity requires ROI

- Health **AND** economic returns
- Information production **AND** application
- Multiple users of laboratory information
 - Public health agencies
 - Health care providers
 - Other regulatory bodies
 - Industry
 - Individuals/families/communities
- Key concept: **value of information** (VOI)
 - How does **new information** change decision-making & action

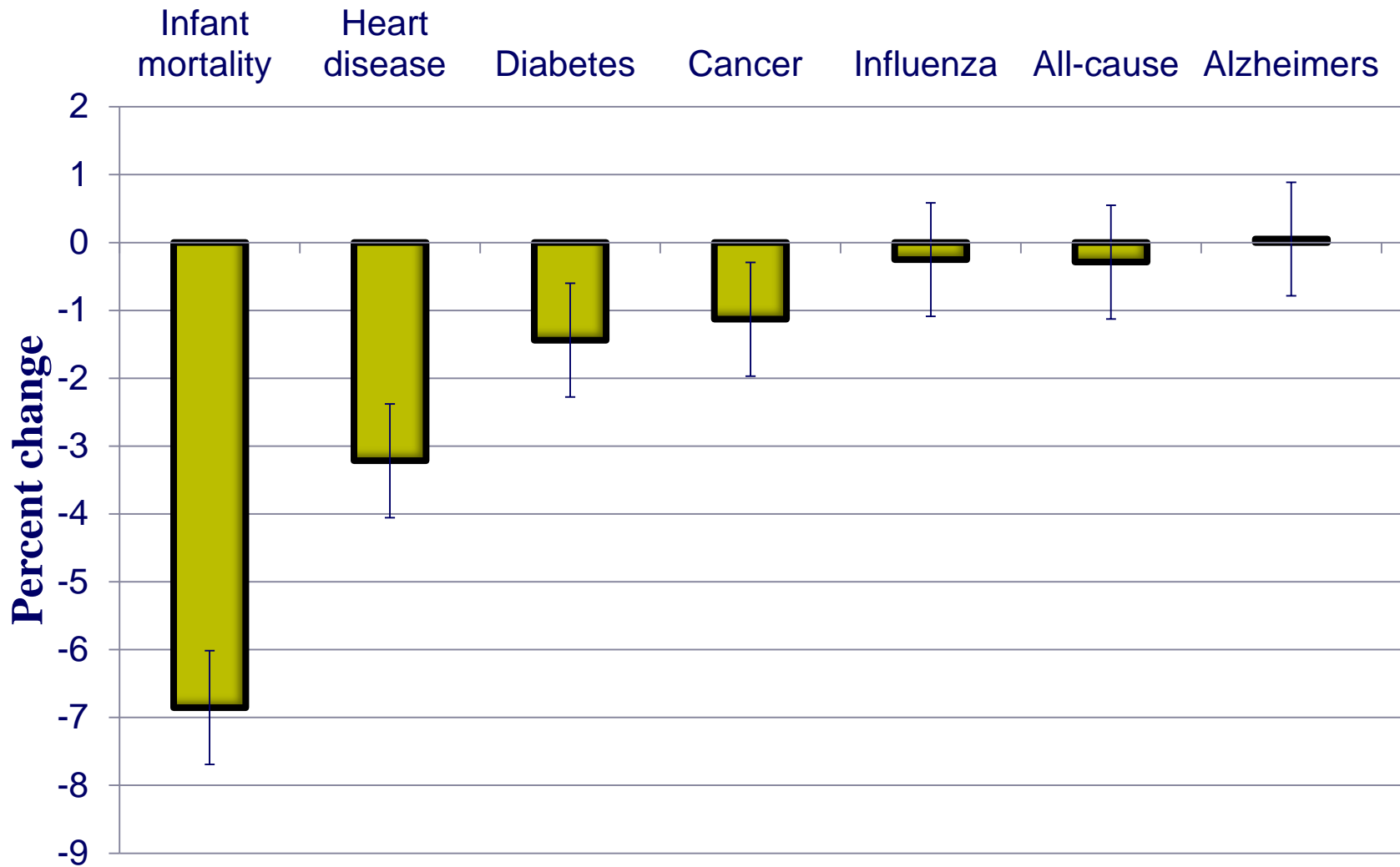
Example: from variation to ROI



Example: from variation to ROI



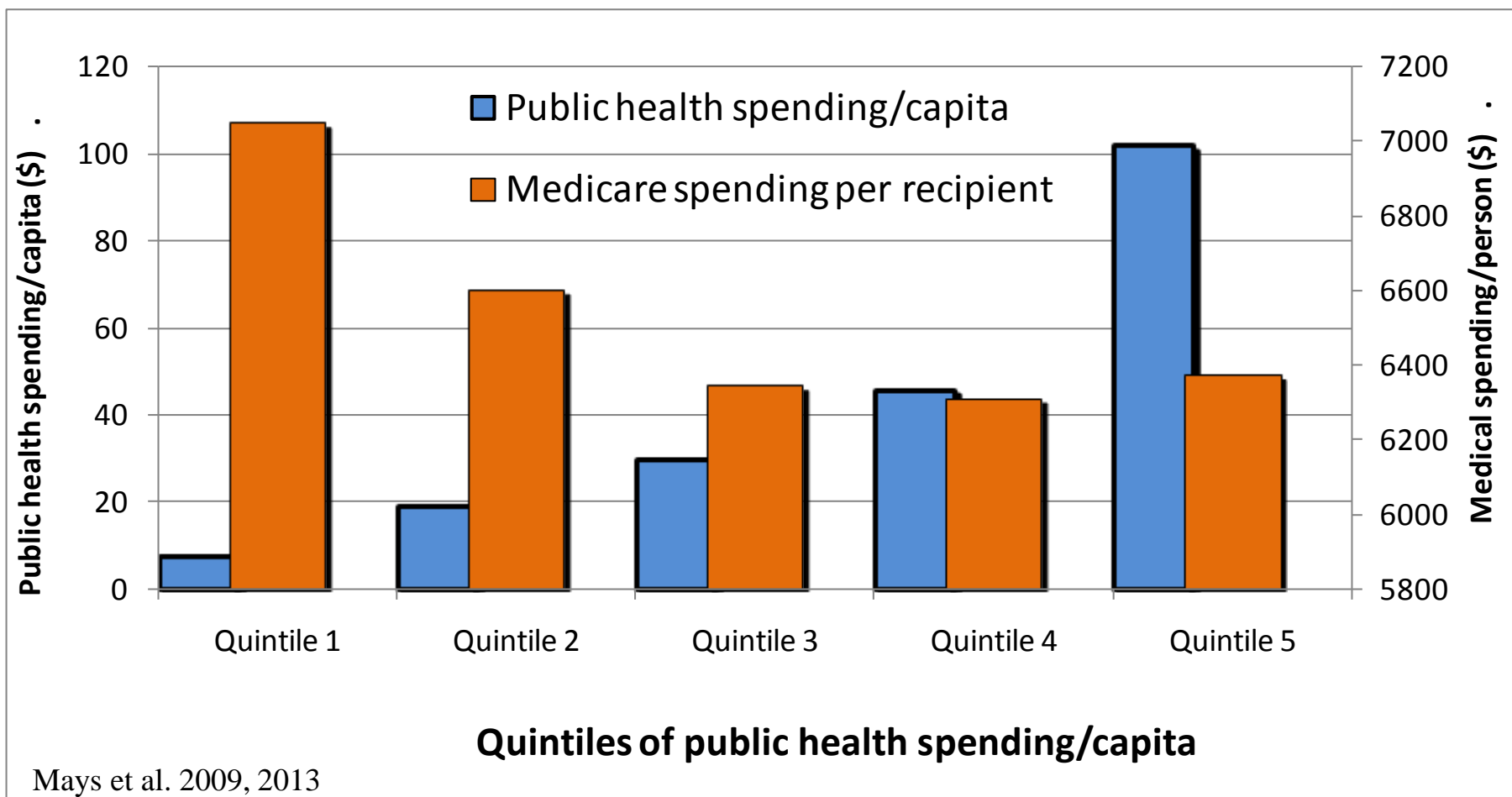
Mortality reductions attributable to local public health spending, 1993-2008



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

Medical cost offsets attributable to investments in public health delivery, 1993-2008

For every \$10 of public health spending, ≈\$9 are recovered in lower medical care spending over 15 years



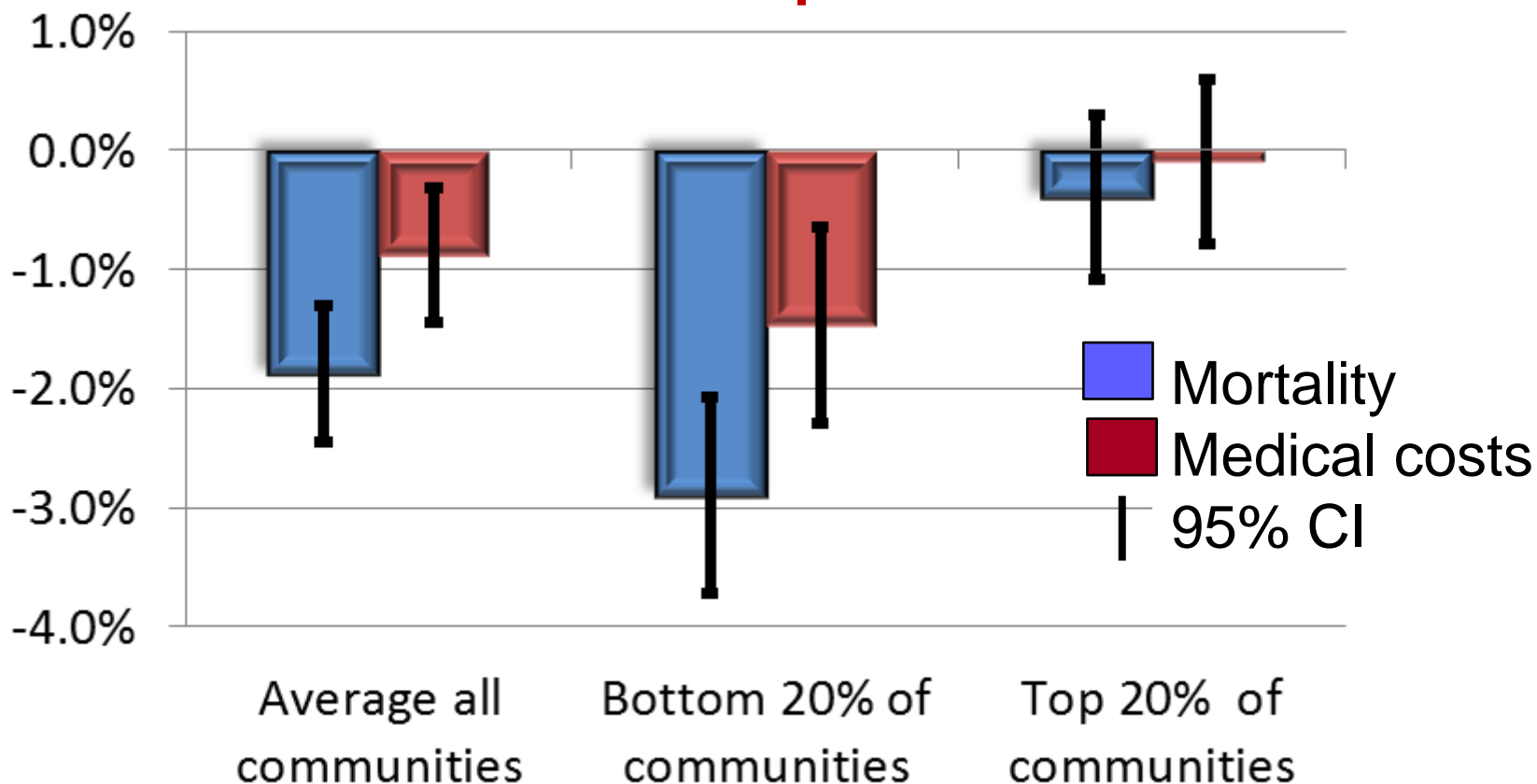
ROI for public health spending

1.2% increase in public health spending in the average community over 10 years:

Public health cost	\$7.2M
Medical cost offset	-\$6.3M (Medicare only)
Deaths averted	175.8
Life years gained	1758
Net cost/LY	\$546

How does ROI vary across communities?

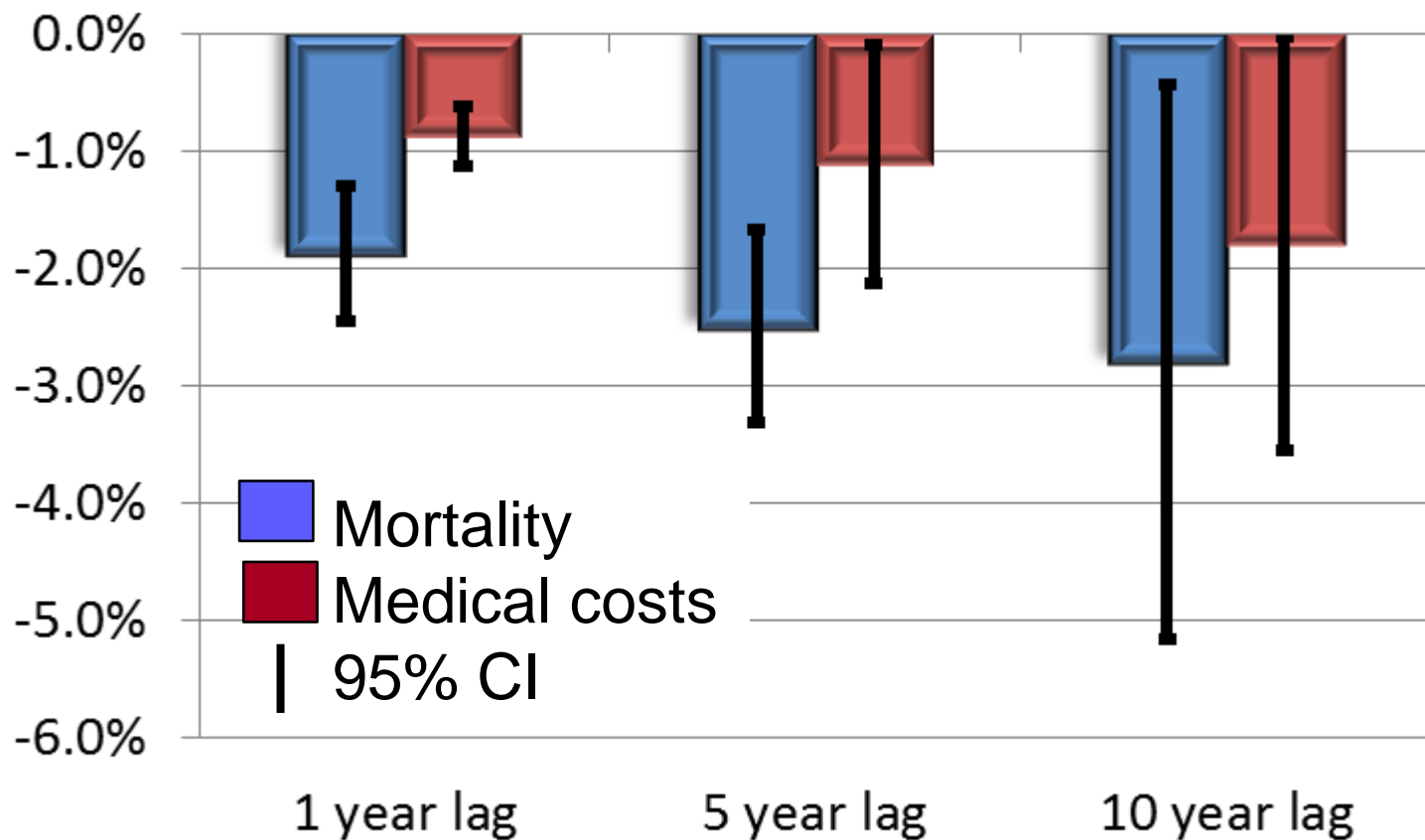
Impact of 10% Increase in Public Health Spending/Capita Based on Income Per Capita in Communities



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

How long does ROI take: Cumulative effects of public health spending

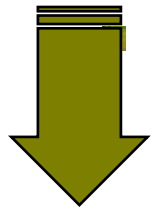
Changes in Mortality and Medical Care Spending Attributable to 10% Increase in Public Health Spending /Capita



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

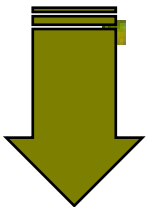
Mays et al. forthcoming 2014

Applying the ROI lens to laboratories

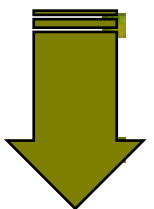


Identify the value chain

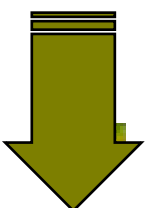
information → action → outcome



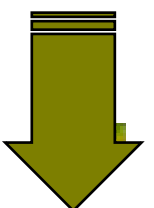
Consider the roles of information **volume/**
completeness, quality, and timeliness



Identify the **costs** of information production



Use variation in information production to model
downstream effects on actions and outcomes



Evaluate the value of effects using health and/or
monetary metrics: e.g. cases detected, cases
prevented, QALYs saved, costs avoided

Example: detecting food-borne illness

Mixed Results In Tracking Food Scores

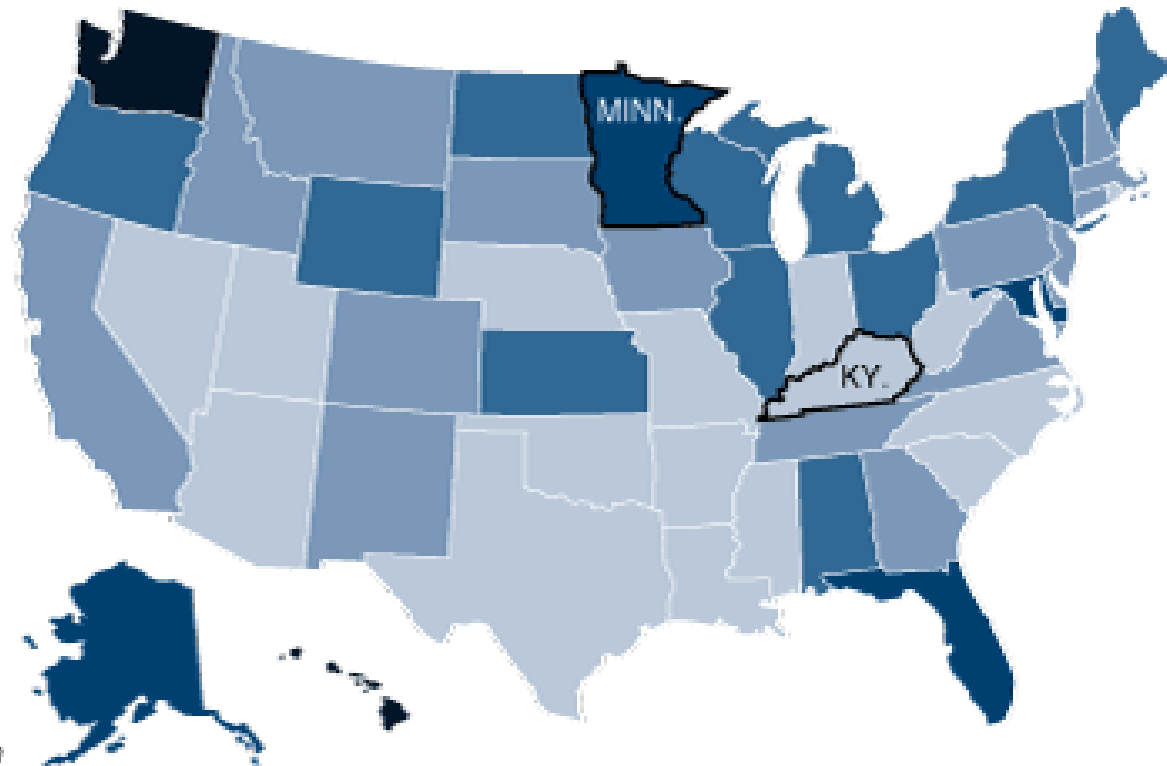
Minnesota health officials investigate all reports of food-borne illness, but officials in many states do not. From 1990 to 2006, Minnesota reported 548 outbreaks, while Kentucky reported 18.

Reported outbreaks of food-related illness

Per 100,000 people, 1990 to 2006



Source: Centers for Disease Control and Prevention



Example: timeliness in case report response



Local Variation In Public Health Preparedness: Lessons From California

Even in California—one of the best-prepared states—much work remains to ensure preparedness for a public health emergency.

by Nicole Lurie, Jeffrey Wasserman, Michael Stoto, Sarah Myers, Poki Namkung, Jonathan Fielding, and Robert Burrolaga Valdez

EXHIBIT 1

Characteristics Of Local Public Health Agencies (LPHAs) Participating In Test Of Response To Case Reports, 2004

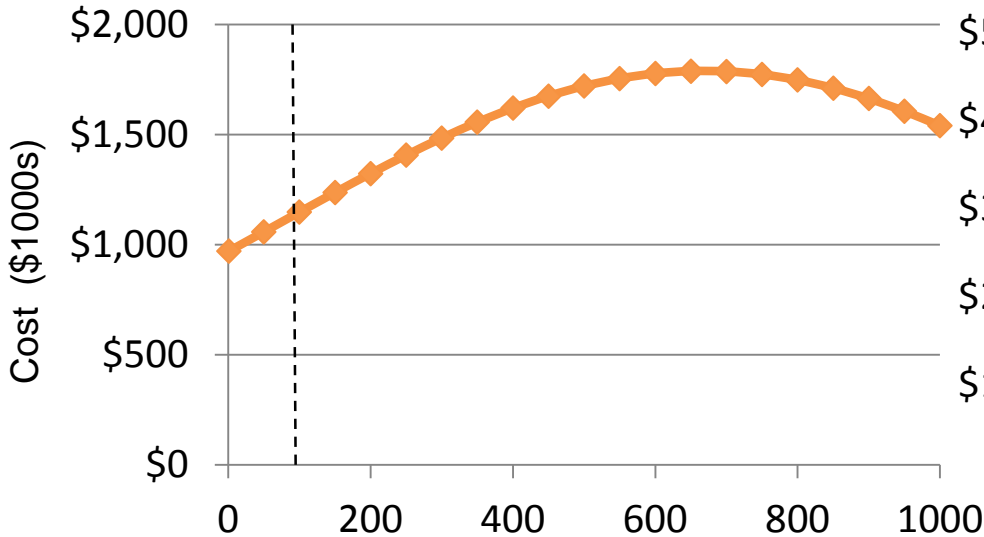
LPHA	Region	Population served ^a	Urban/rural ^b	Mean time until calls returned (minutes)	Longest period before calls returned (minutes)	Number of calls not returned	Percent "warm transfers"
1	Midwest	Small	Rural	93	630	2	44
2	Midwest	Medium	Rural	51	350	1	57
3	Midwest	Medium	Urban	4	6	0	88
4	Midwest	Large	Urban	14	30	0	50
5	Midwest	Large	Urban	10	23	0	38

The push and pull of laboratory ROI

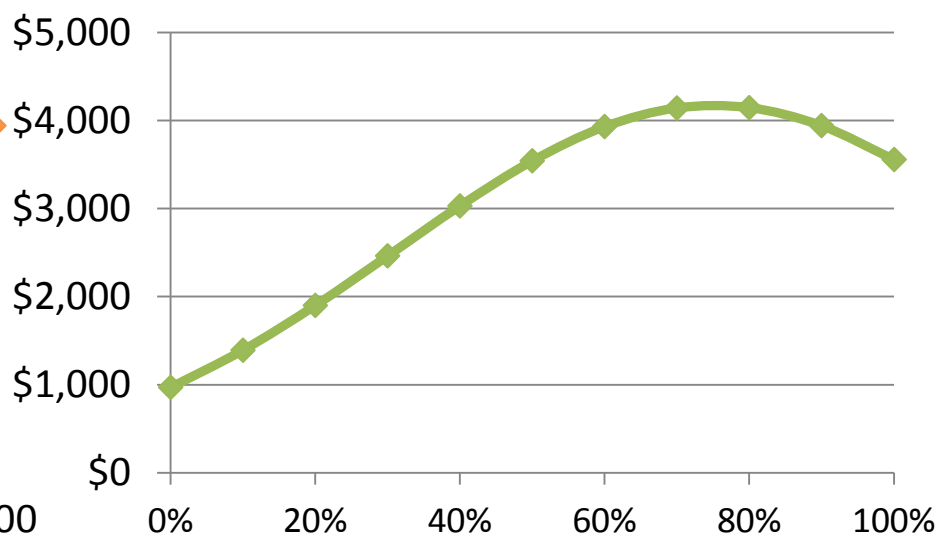
- ROI is contingent on the flow of information into and out of the laboratory
 - The right tests in the right circumstances at the right time
 - Accurate specimen collection & transport
 - Timely access and use of test results
- Labs can play important roles in push and pull
 - Monitor & feedback on submission volume & quality
 - Reminders & prompts

Considering economies of scale and scope

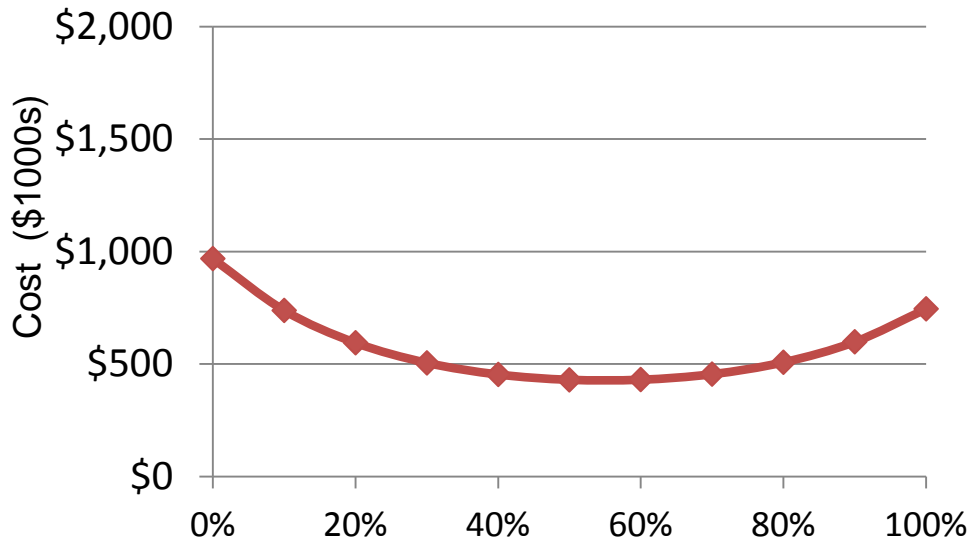
Scale (Population in 1000s)



Scope (% of Activities)



Quality (Perceived Effectiveness)



Adding fuel to the fire: 2012 Institute of Medicine Recommendations

- Identify **components and costs** of a “minimum package” of public health activities
- Allow greater flexibility in how states and localities use federal public health funds
- Implement national chart of accounts for tracking spending levels and flow of funds
- Expand research on costs and ROI of public health delivery



Institute of Medicine. For the Public's Health: Investing in a Healthier Future. Washington, DC: National Academies Press; 2012.

The importance of cost studies

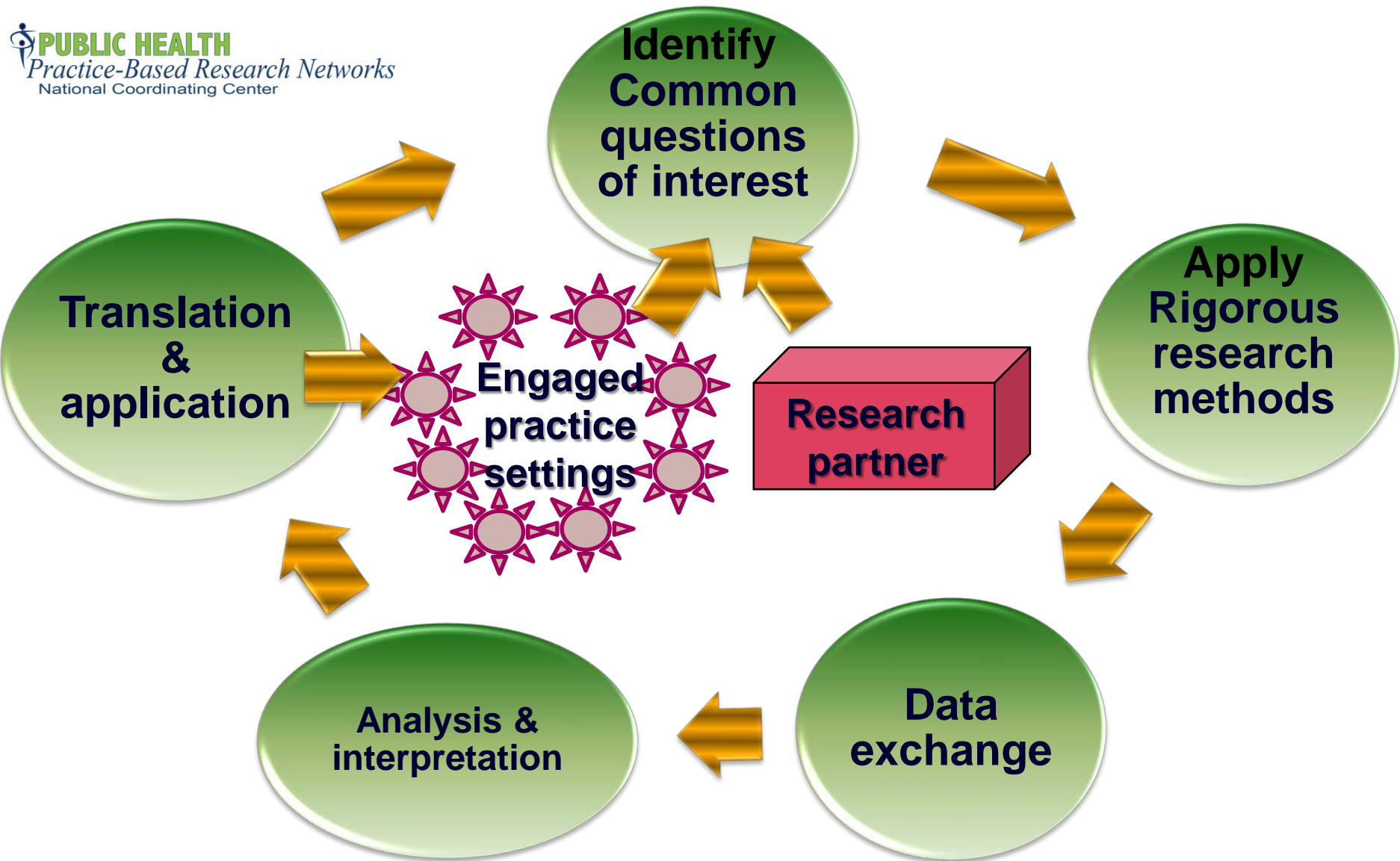
Foundational Public Health Capabilities

- 3 state-specific studies to estimate current spending on FCs
- 1 national study to estimate FC resource requirements and cost function parameters

Public Health Delivery and Cost Studies

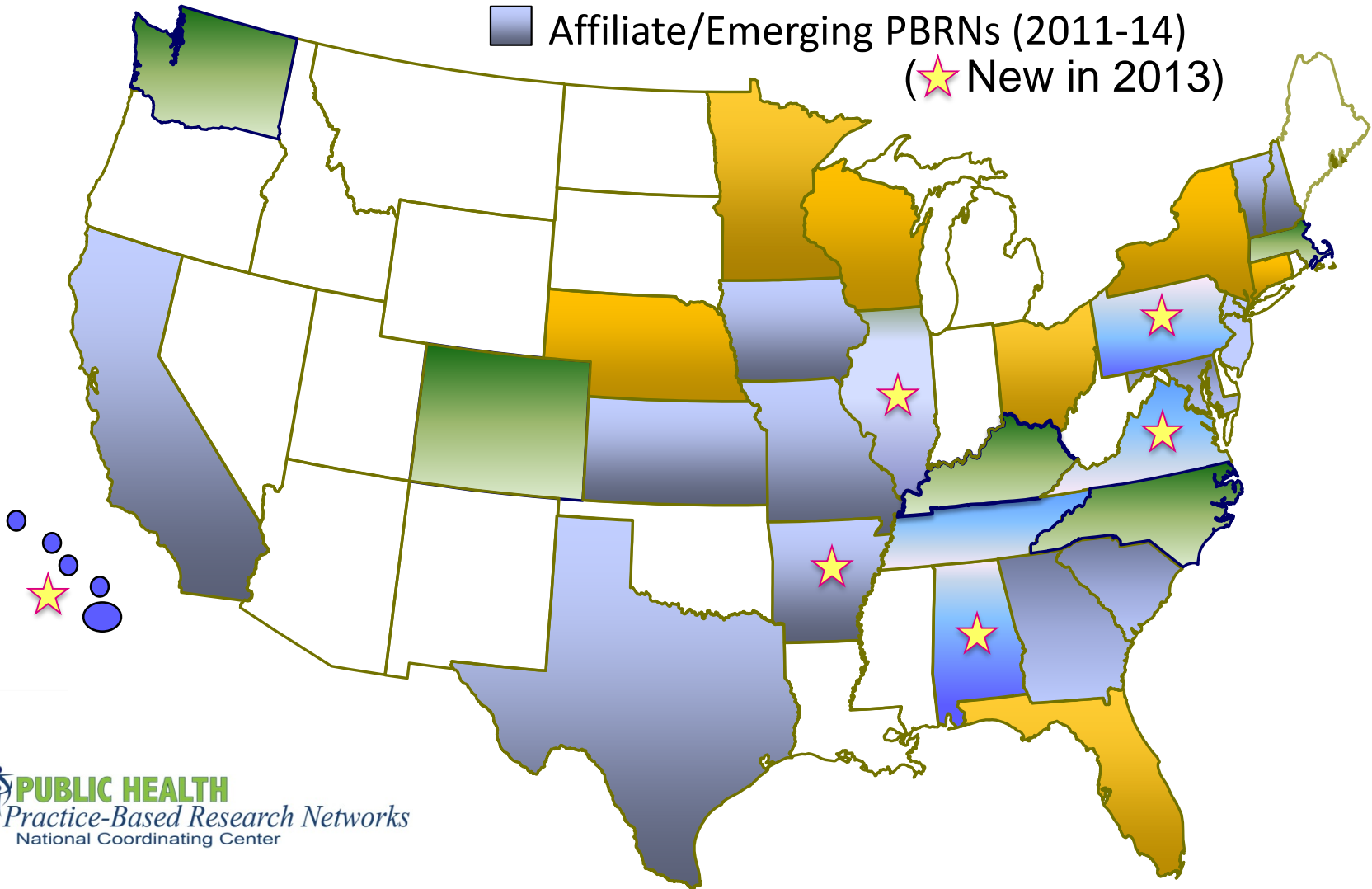
- 11 state-specific studies on cost variation
- 3 multi-state studies examining connections between spending, service delivery, and outcomes

PBRNs as Mechanisms for Learning

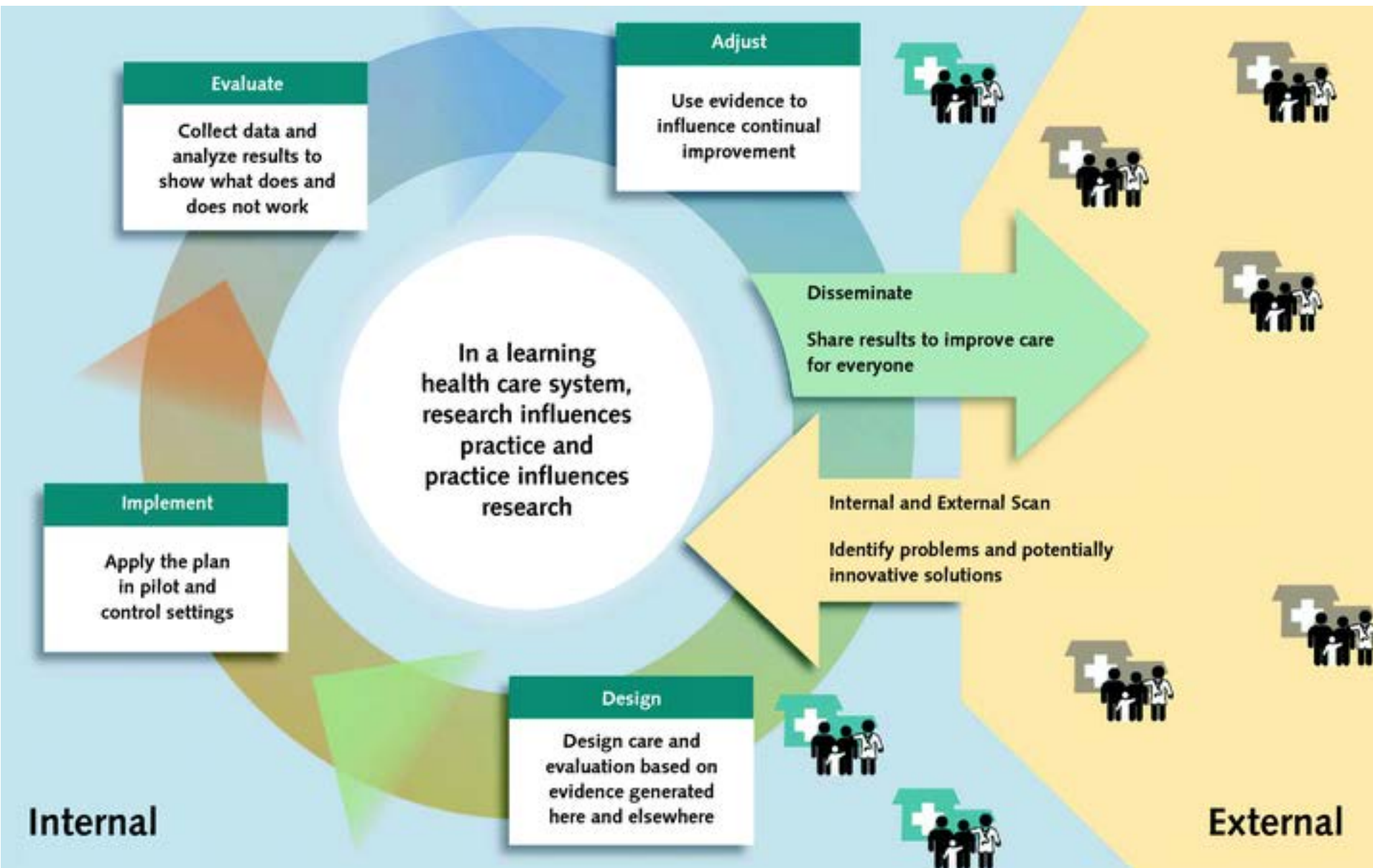


Public Health PBRNs

- First cohort (December 2008 start-up)
- Second cohort (January 2010 start-up)
- Affiliate/Emerging PBRNs (2011-14)
(★ New in 2013)



Laboratories and learning systems in public health



Always Open



Supported by The Robert Wood Johnson Foundation

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