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Public Health Services & Systems Research: Building the Science of Public Health Delivery

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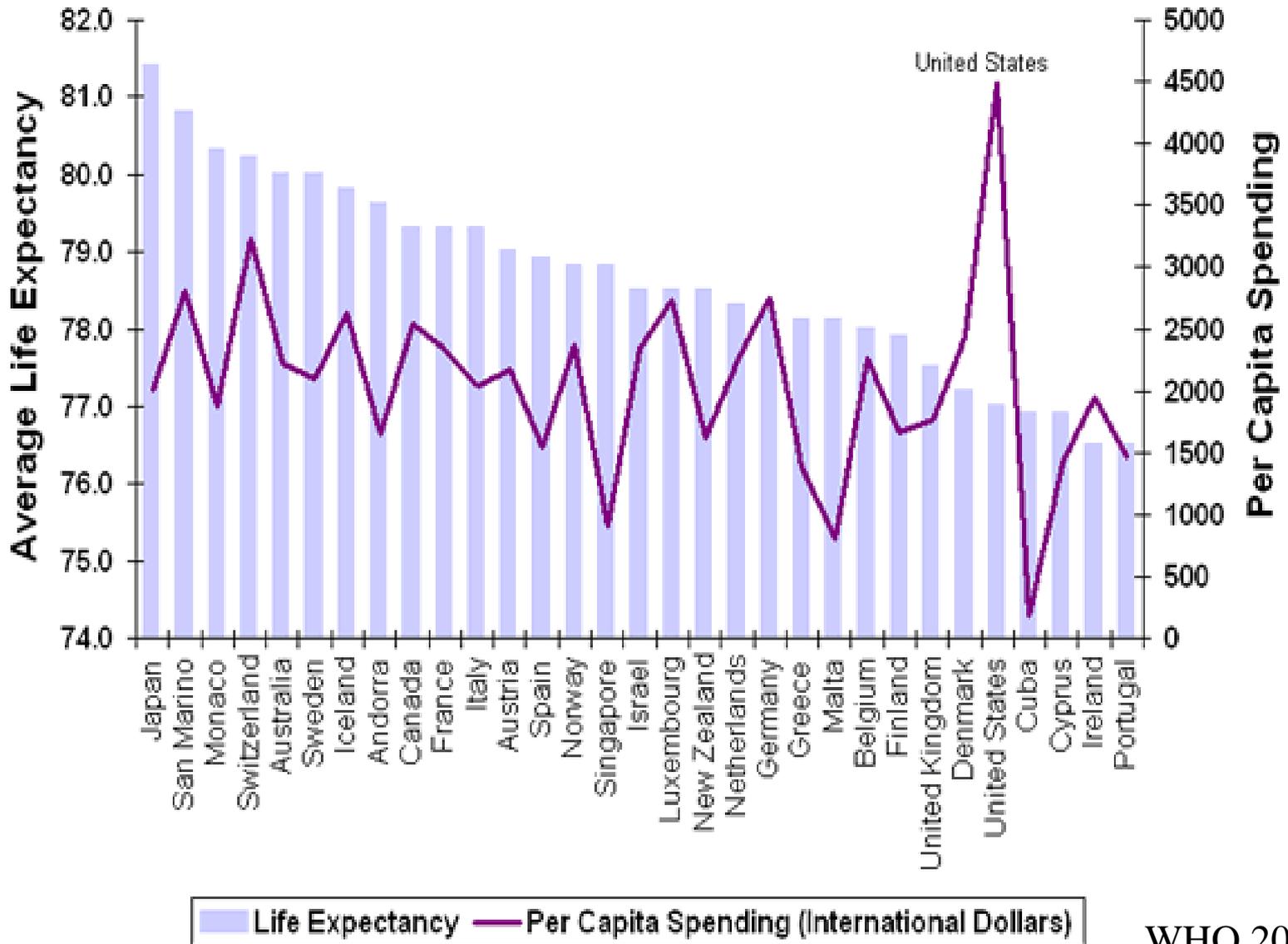
Public Health Services & Systems Research: Building the Science of Public Health Delivery

Glen Mays, PhD, MPH
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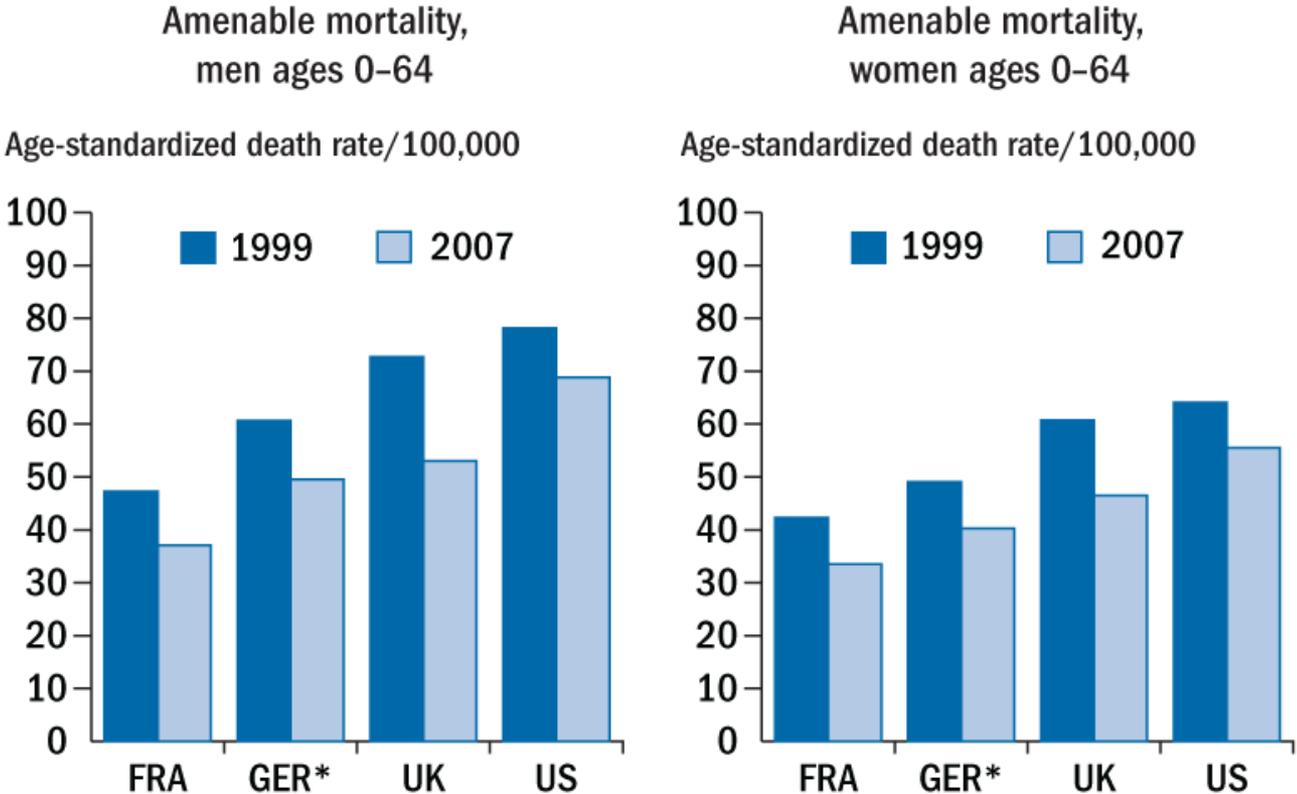
Virginia Tech University Public Health Grand Rounds • 24 October 2013

Fundamental health system performance



Fundamental health system performance

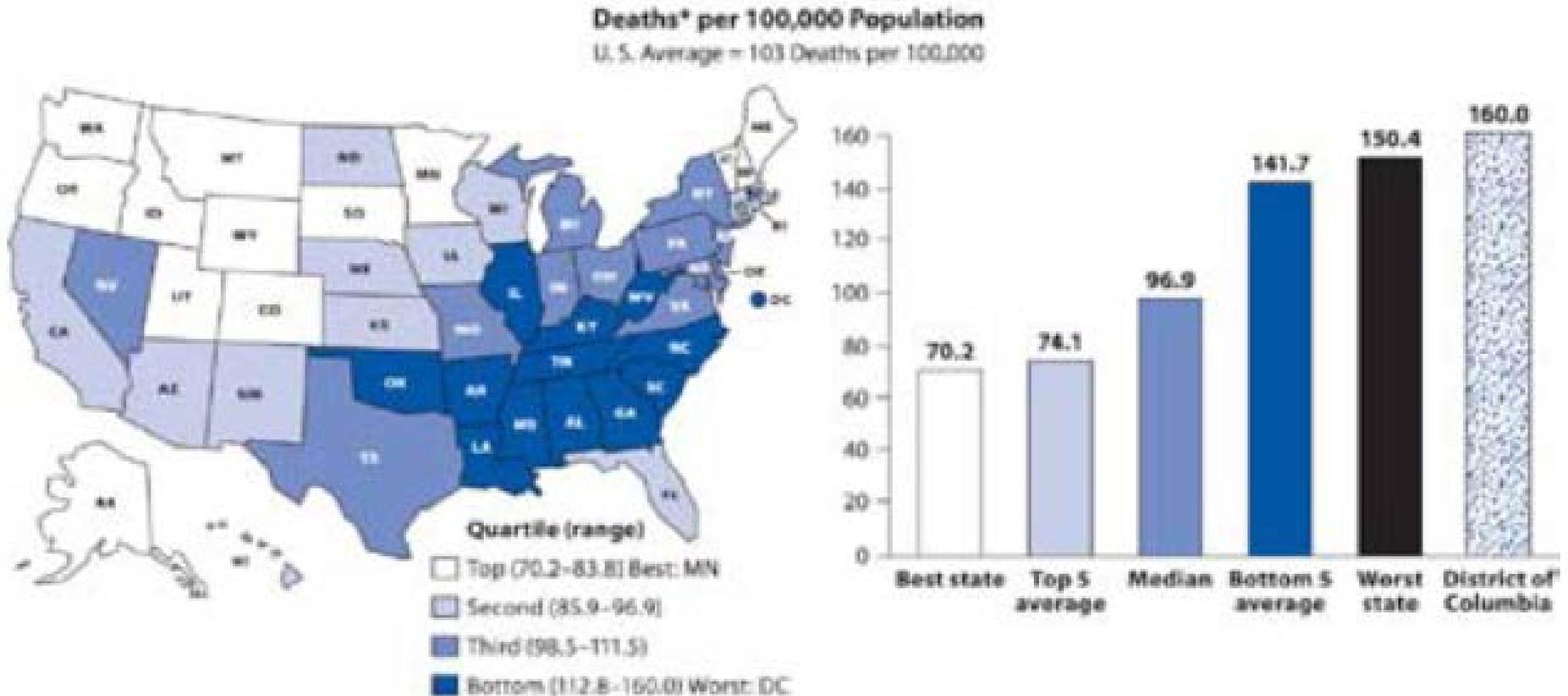
U.S. Men and Women Under Age 65 Have Higher Rates of Potentially Preventable Deaths Slowest Rate of Improvement, 1999–2007



* Data for Germany are 1999 and 2006.

Source: Adapted from E. Nolte and C. M. McKee, "In Amenable Mortality—Deaths Avoidable Through Health Care—Progress in the US Lags That of Three European Countries," *Health Affairs*, published online Aug. 29, 2012.

Geographic variation in population health



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

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

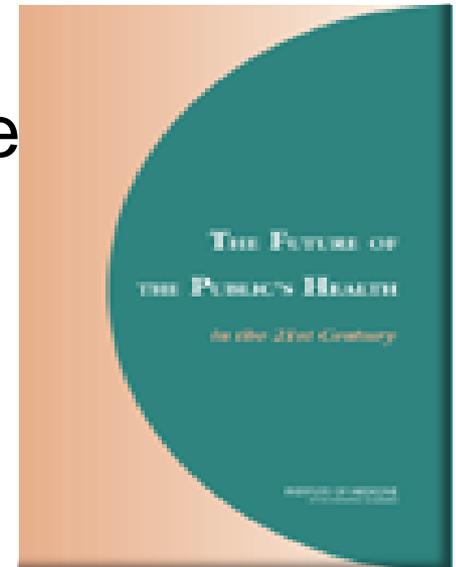
Public health services & systems research

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

Why study public health delivery?

“The Committee had hoped to provide specific guidance elaborating on the types and levels of workforce, infrastructure, related resources, and financial investments necessary to ensure the availability of essential public health services to all of the nation’s communities. However, such evidence is limited, and there is no agenda or support for this type of research, despite the critical need for such data to promote and protect the nation’s health.”

—Institute of Medicine, 2003



Fundamental empirical questions

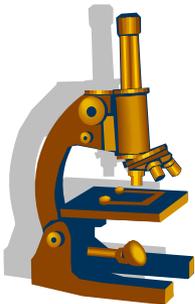


- Which programs, interventions, policies, strategies (*mechanisms*)....
- Work best (*outcomes*)...
- In which institutional & community settings (*contexts*)...
- For whom (*populations and subgroups*)?

PHSSR's place in the continuum

Intervention Research

- What works – proof of efficacy
- Controlled trials
- *Guide to Community Preventive Services*



Services/Systems Research

- How to organize, implement and sustain in the real-world
 - Reach
 - Enforcement/Compliance
 - Quality/Effectiveness
 - Cost/Efficiency
 - Equity/Disparities
- Impact on population health
- Comparative effectiveness & efficiency

PHSSR and policy relevance

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

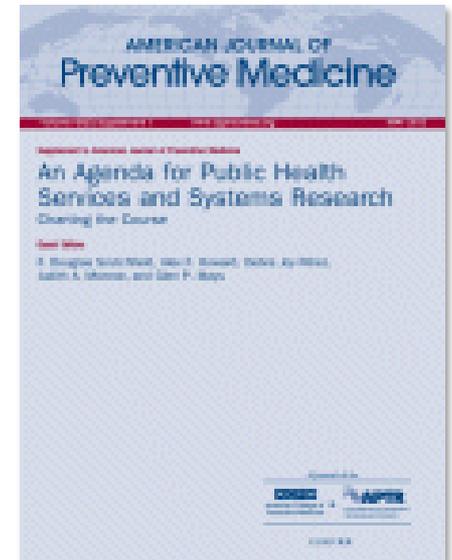
(3) identifying effective strategies for organizing, financing, or delivering public health services in real world community settings, including comparing State and local health department structures and systems in terms of effectiveness and cost.

Complexity in public health delivery



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

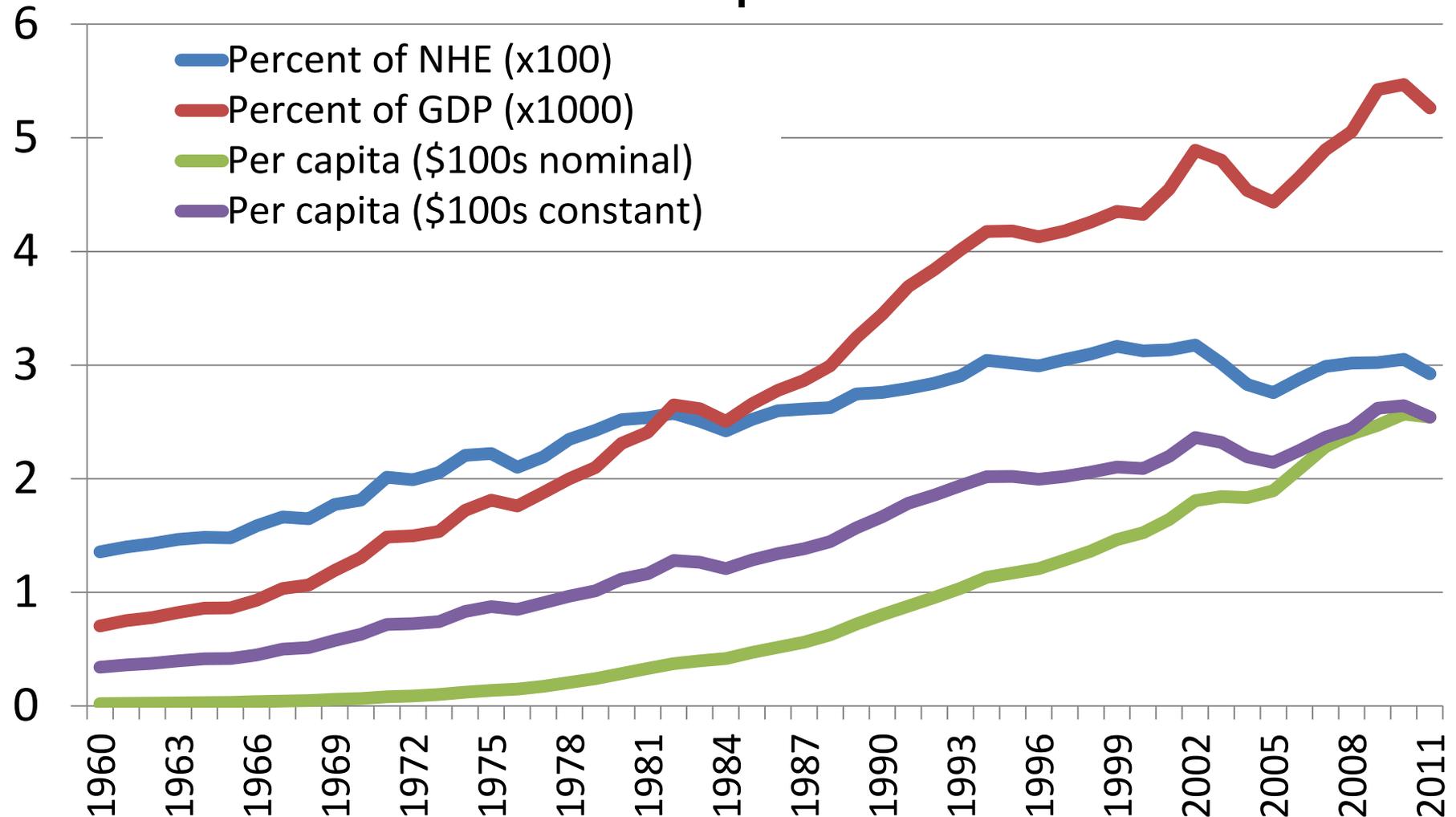


Emerging evidence: finance and economics

- 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?

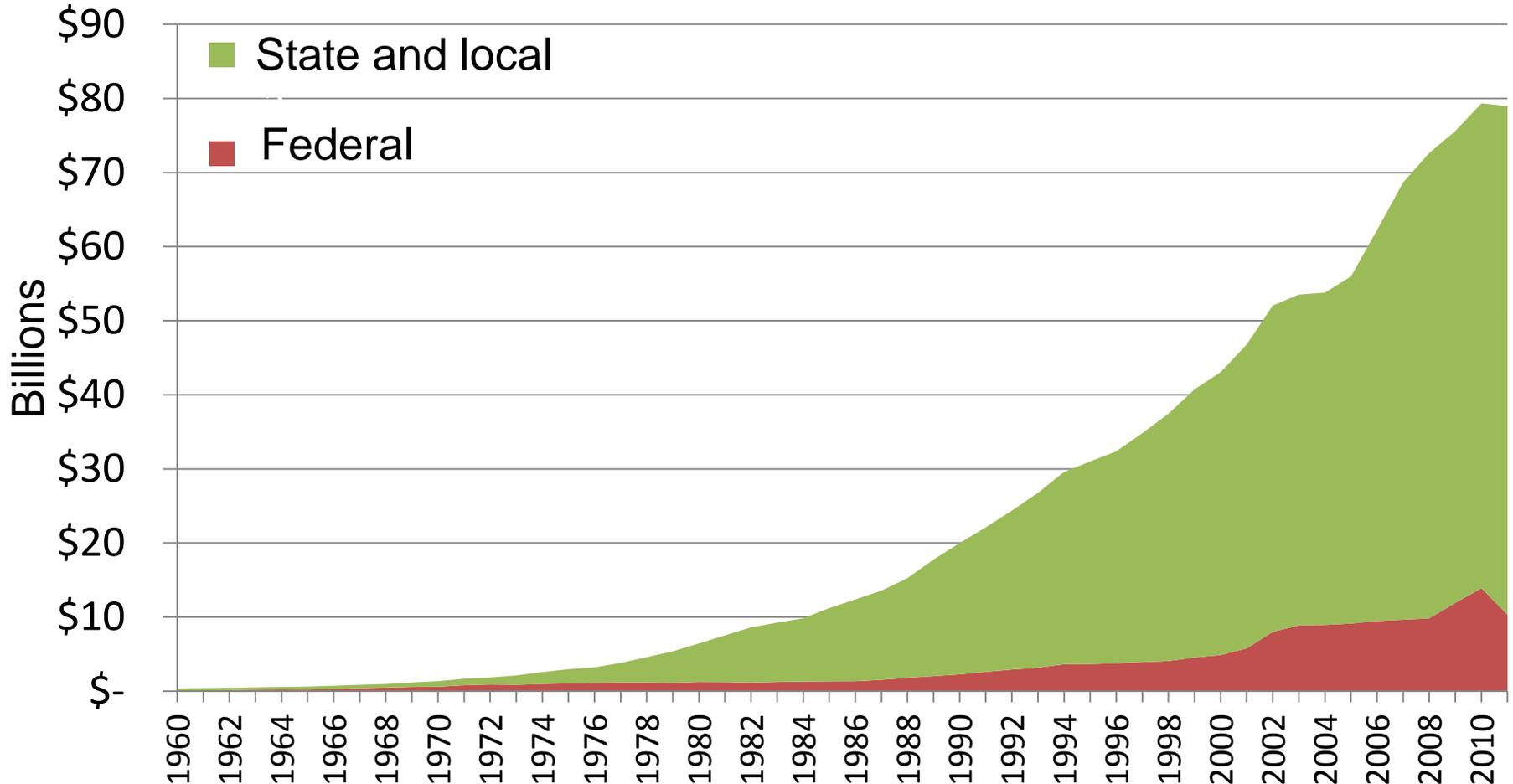
Public health spending in the U.S.

Governmental Expenditures for Public Health Activity, USDHHS National Health Expenditure Accounts



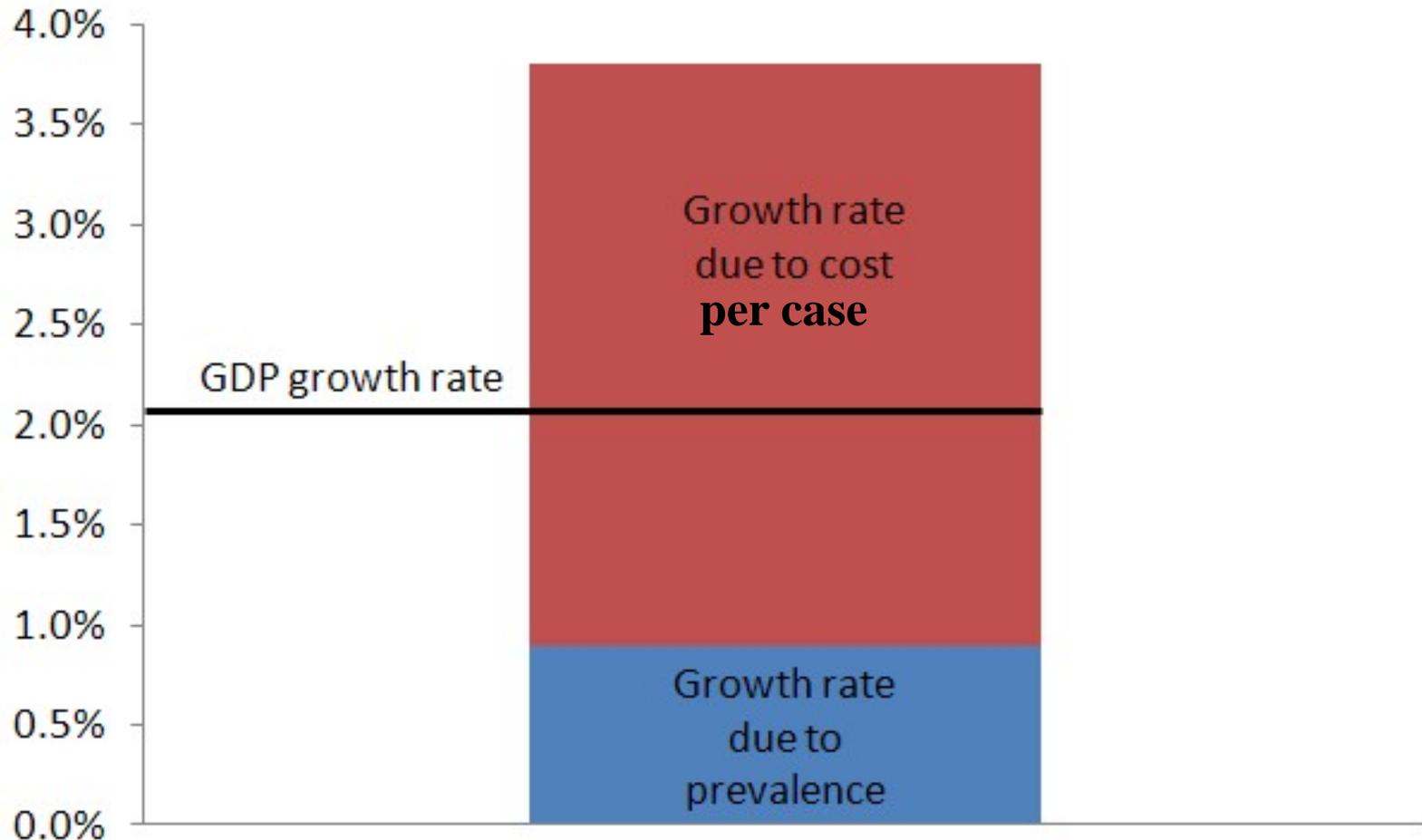
Who pays for public health?

Governmental Expenditures for Public Health Activity, USDHHS National Health Expenditure Accounts



Factors driving growth in medical spending

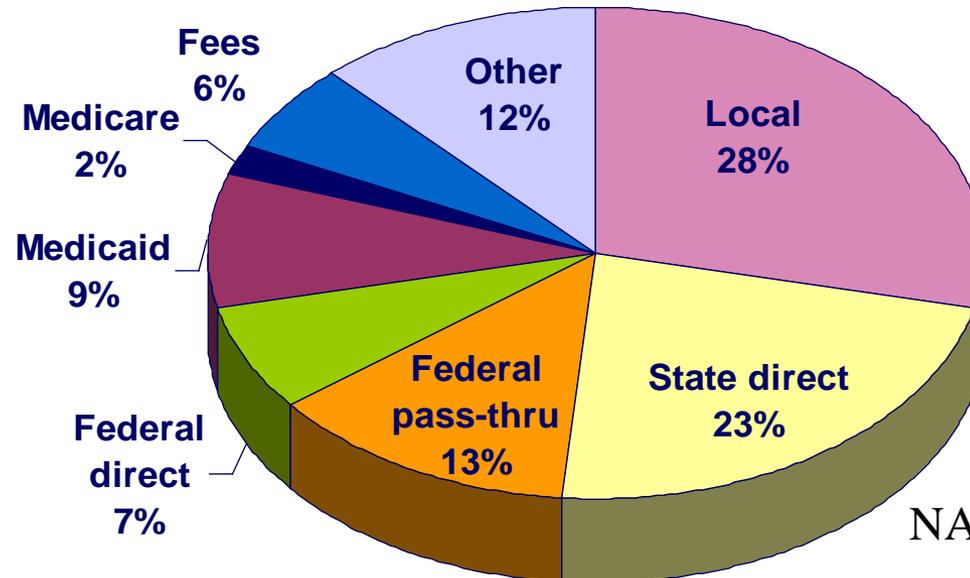
Health spending growth rate 1996-2006



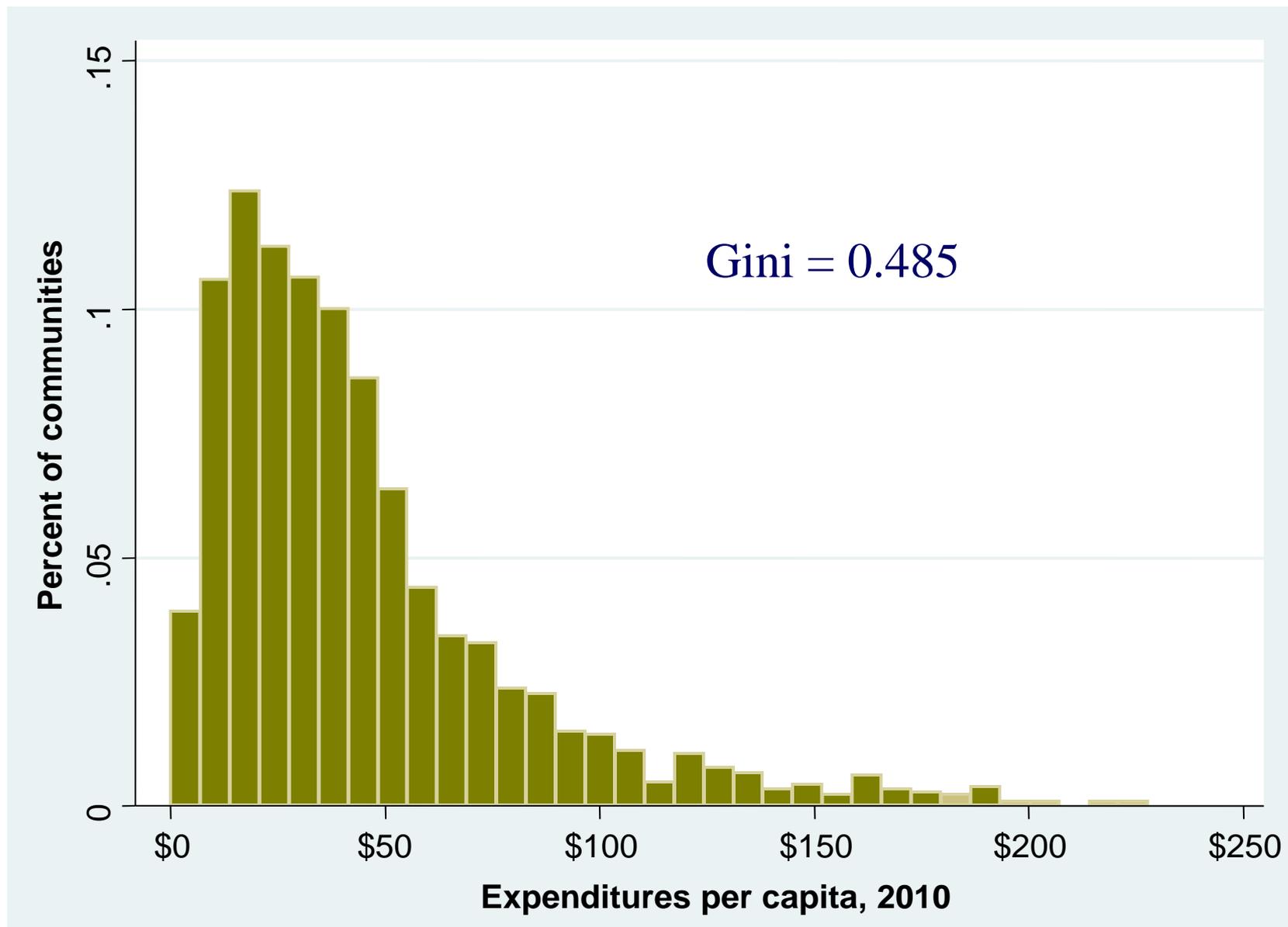
The problem with public health spending

- ◆ 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

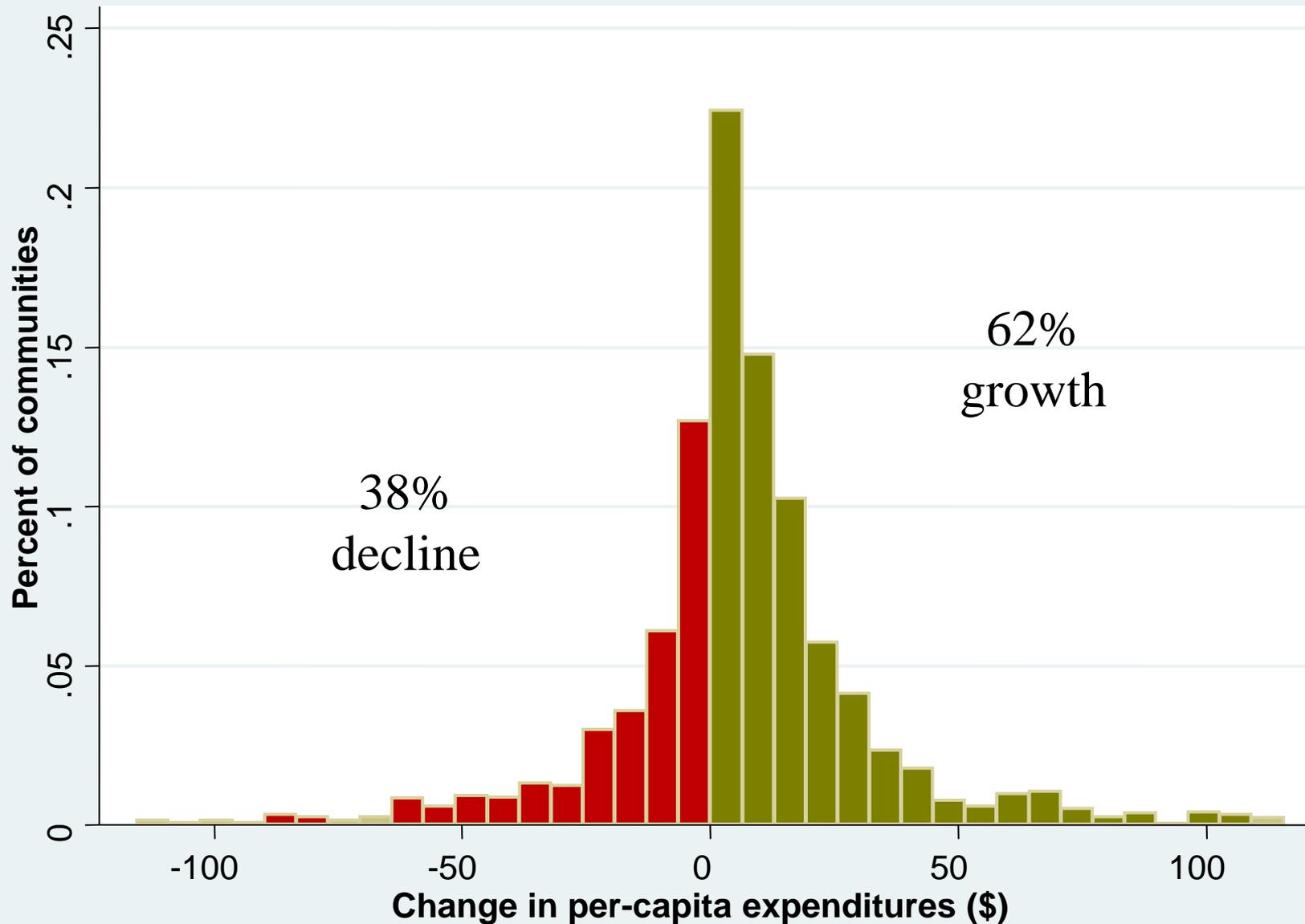
Sources of Local Public Health Agency Revenue, 2010



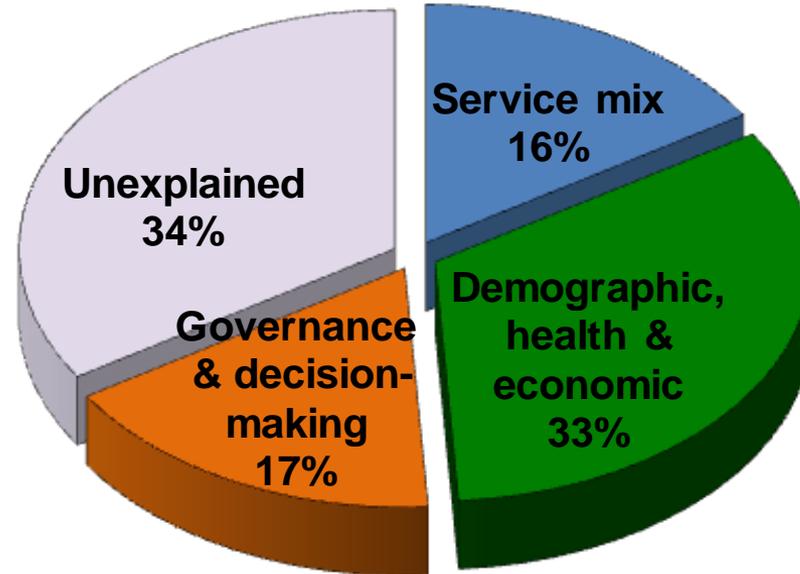
Variation in Local Public Health Spending



Changes in Local Public Health Spending 1993-2010

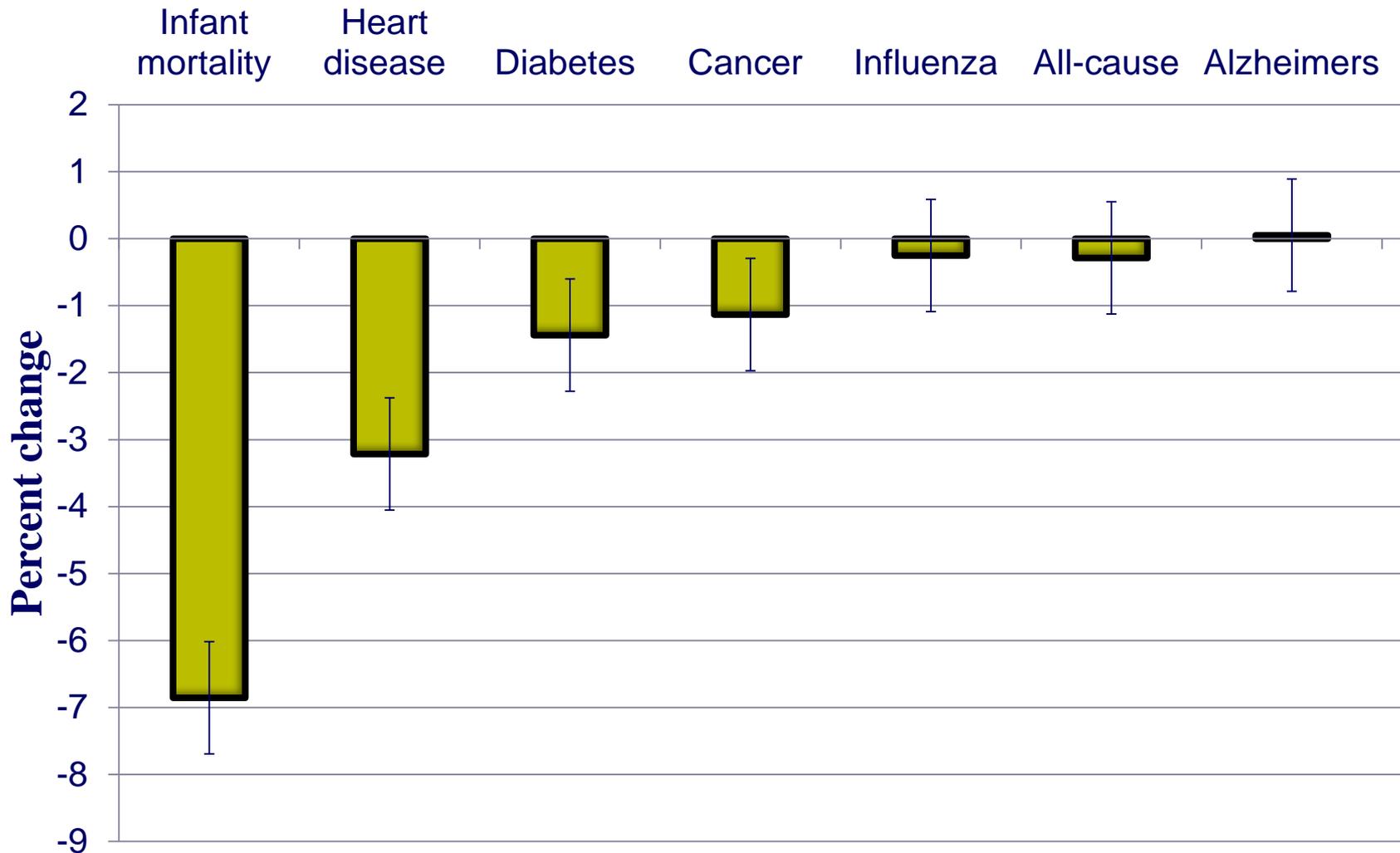


Determinants of Local Public Health Spending Levels



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

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



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

Effects of public health spending on medical care spending 1993-2008

Change in Medical Care Spending Per Capita Attributable to 1% Increase in Public Health Spending Per Capita

<u>Model</u>	<u>N</u>	<u>Elasticity</u>	<u>S.E.</u>
One year lag	8532	-0.088	0.013***
Five year lag	6492	-0.112	0.053**
Ten year lag	4387	-0.179	0.112

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

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

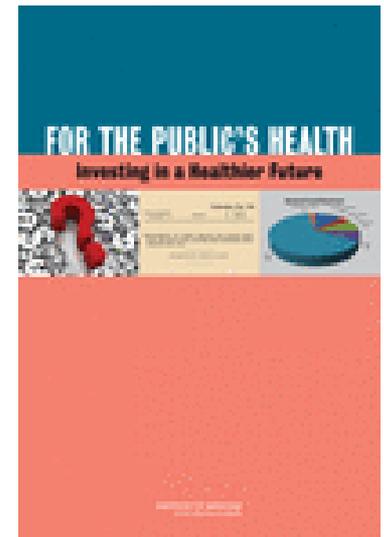
Estimated value of public health spending

- ◆ 10% increase in public health spending in average community:

Public health cost	\$594,291	
Medical cost offset	-\$515,114	(Medicare only)
LY gained	148	
Net cost/LY	\$534	

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

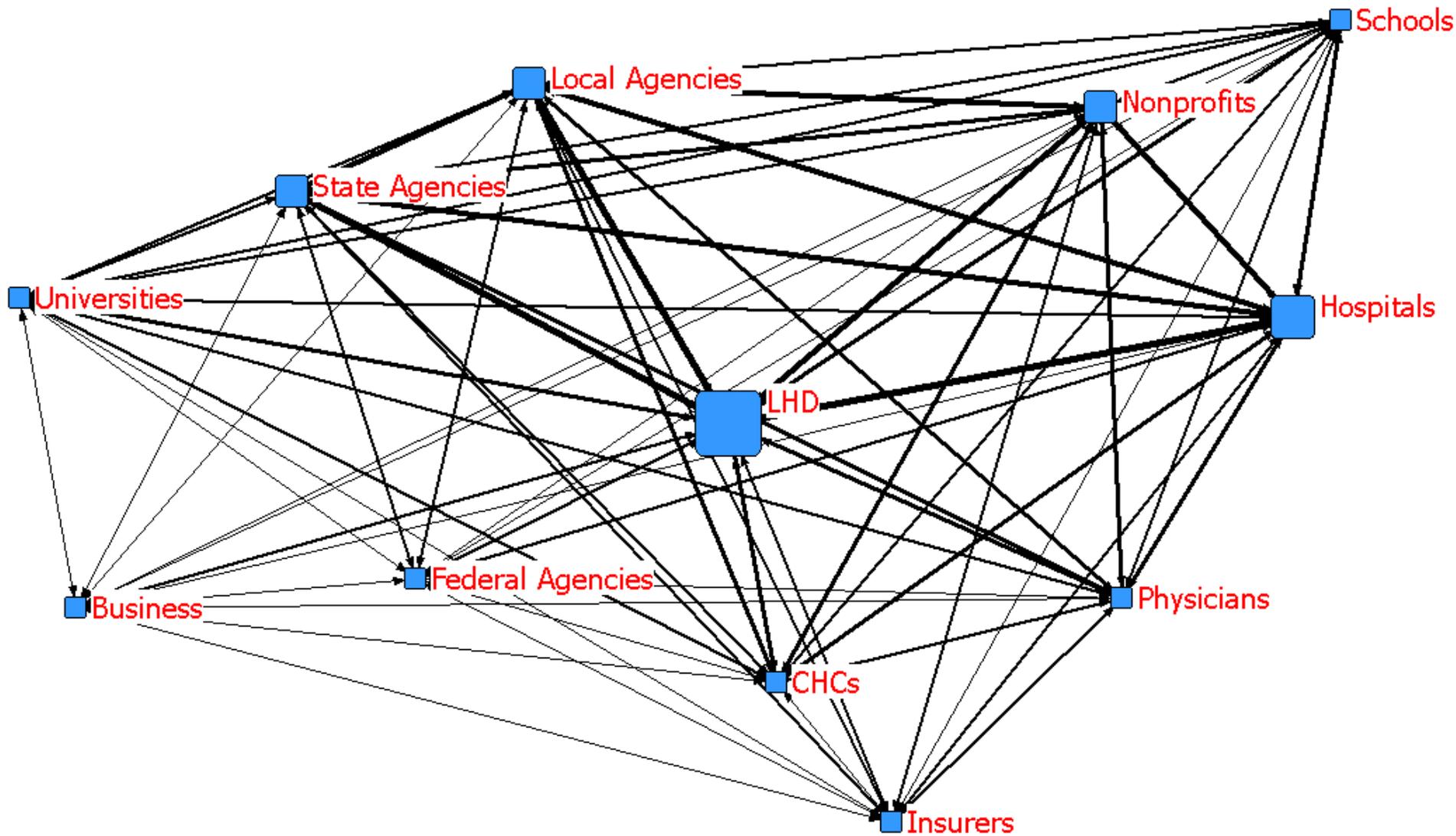


Institute of Medicine. For the Public's Health: Investing in a Healthier Future. Washington, DC: National Academies Press; 2012.

Emerging evidence: organization and structure

- Who contributes to public health delivery?
- How are roles and responsibilities divided?
- How and why do delivery systems vary and change over time?
- How do system structures affect public health delivery and outcomes?

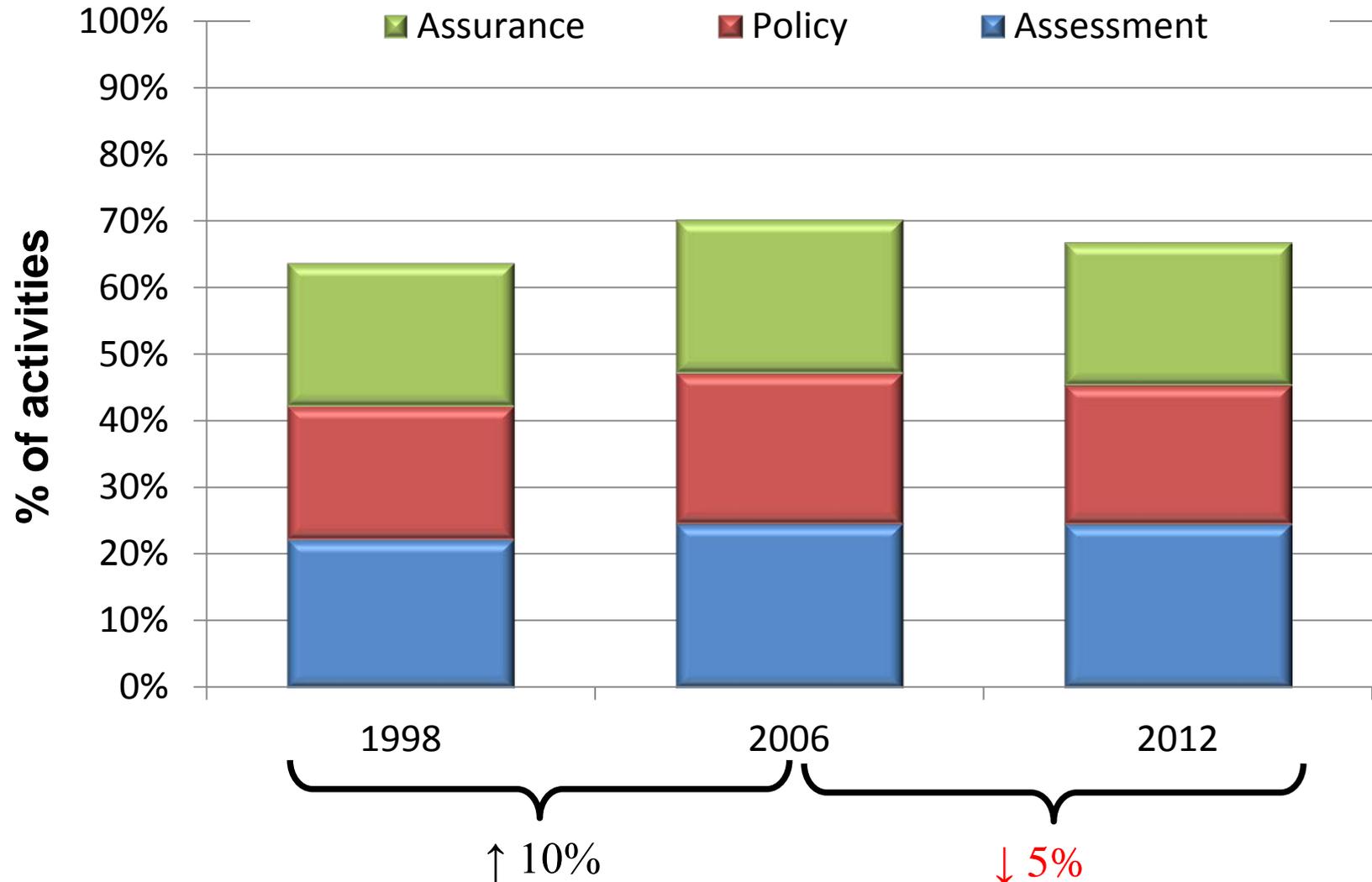
Public health delivery systems



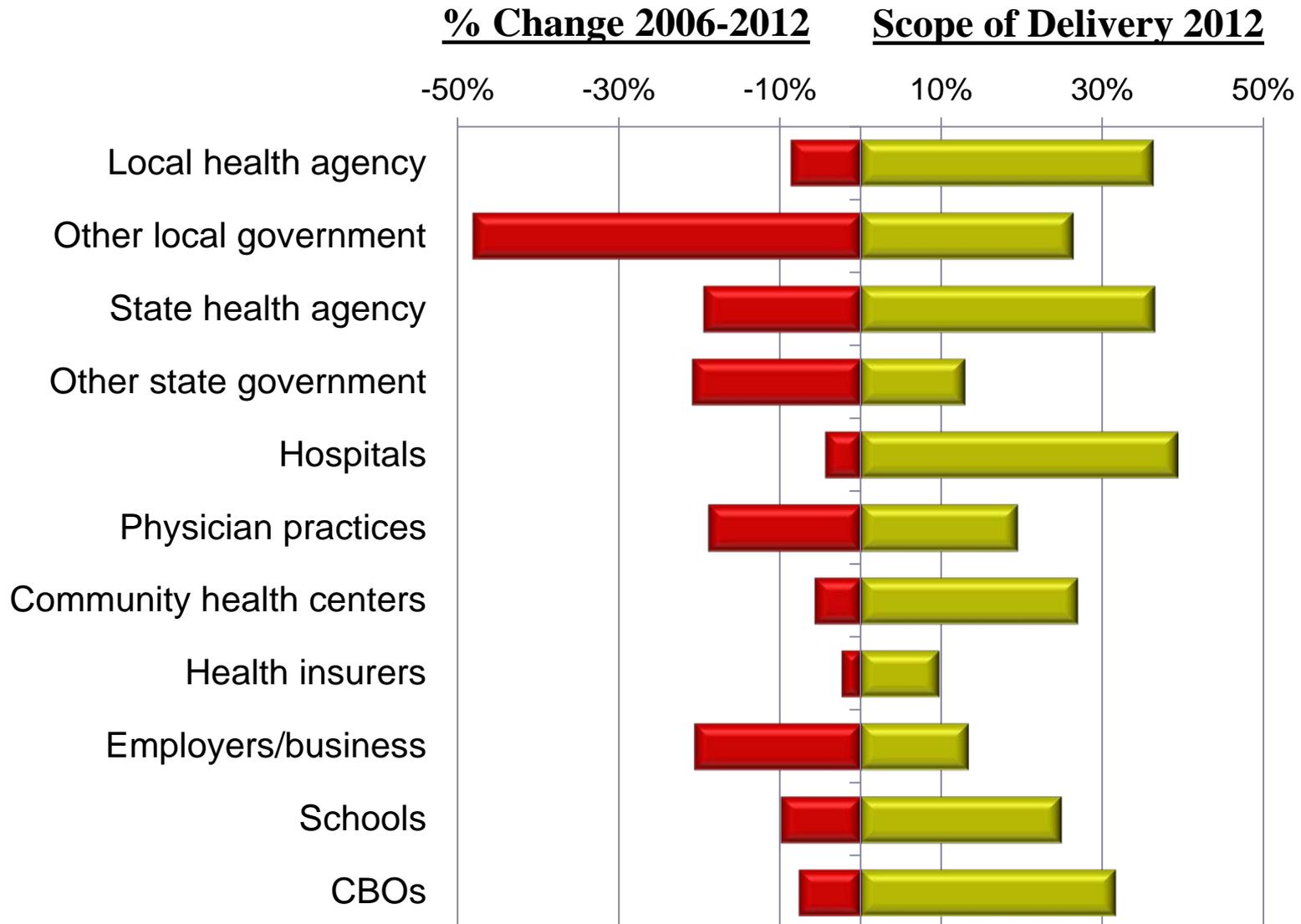
National Longitudinal Survey of Public Health Systems, 2012

National Longitudinal Survey of Public Health Systems

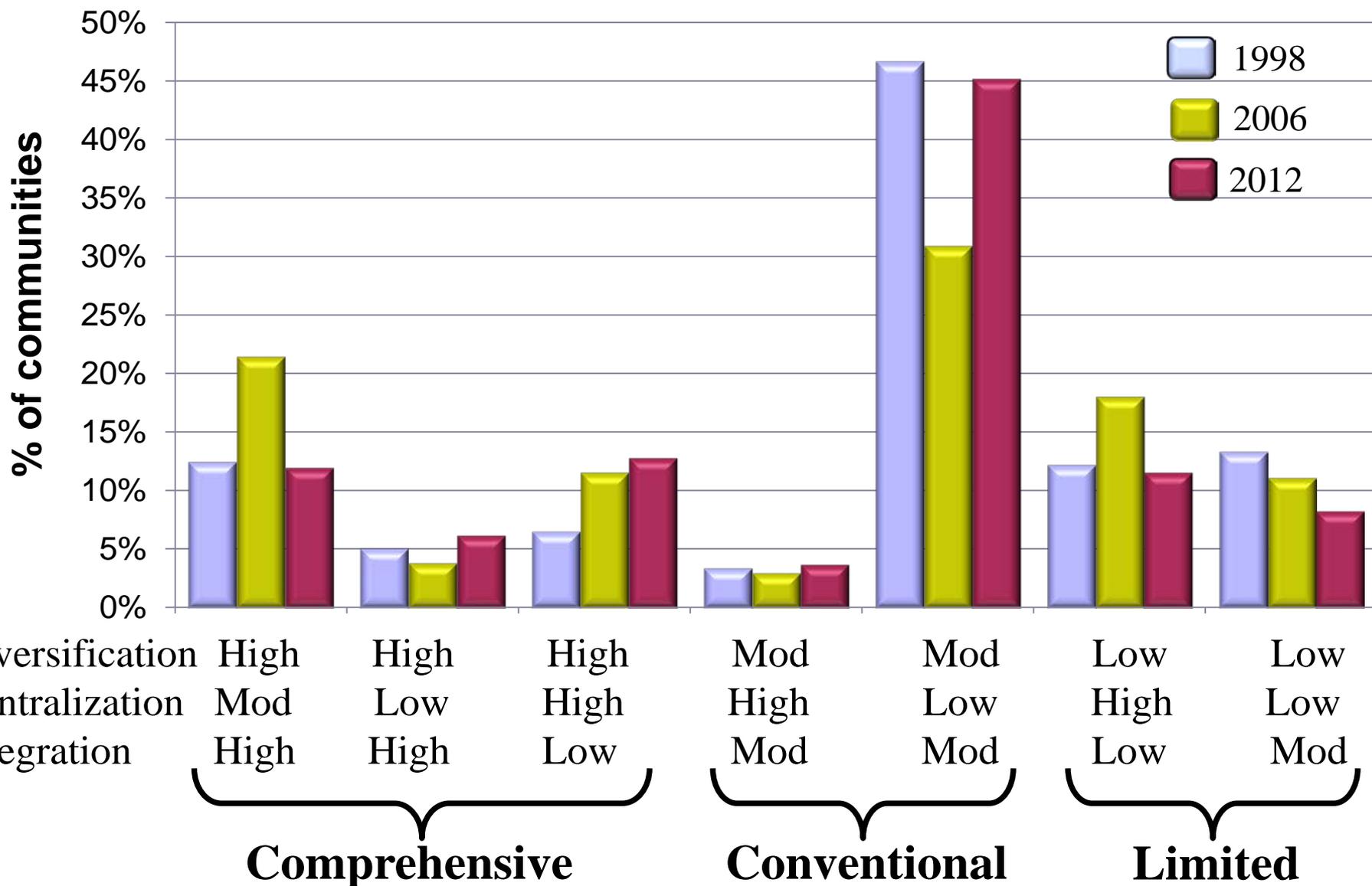
Delivery of recommended public health activities



Organizations engaged in local public health delivery



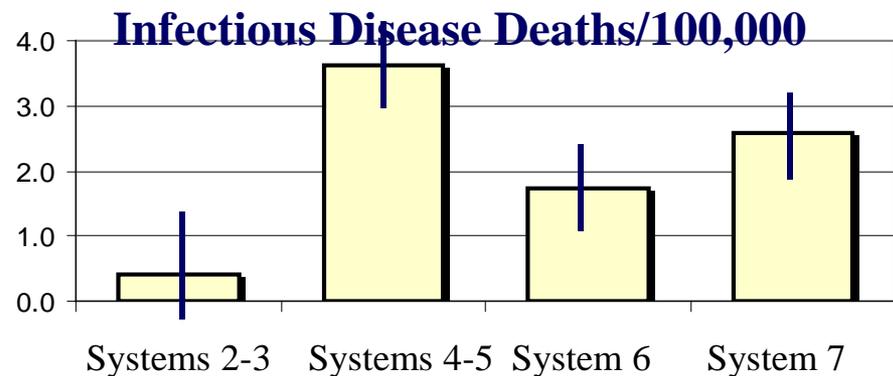
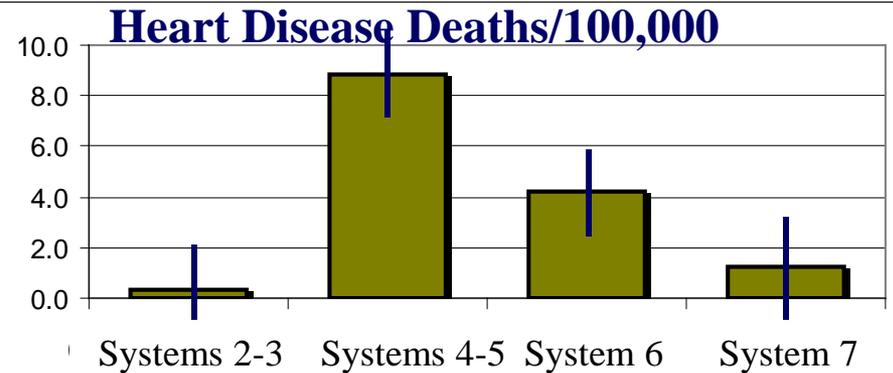
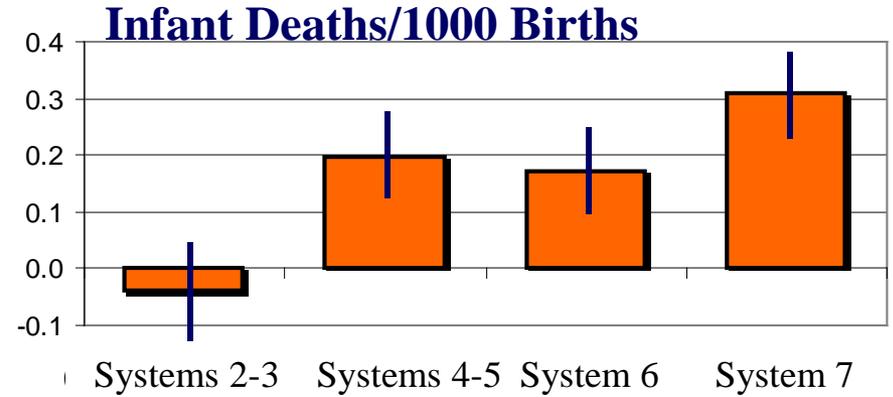
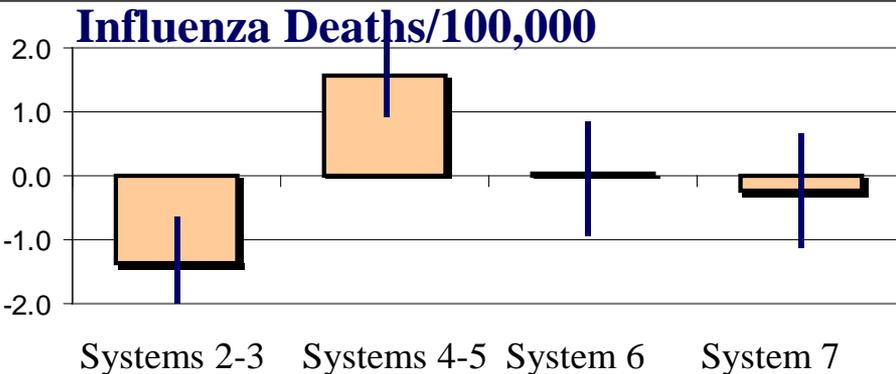
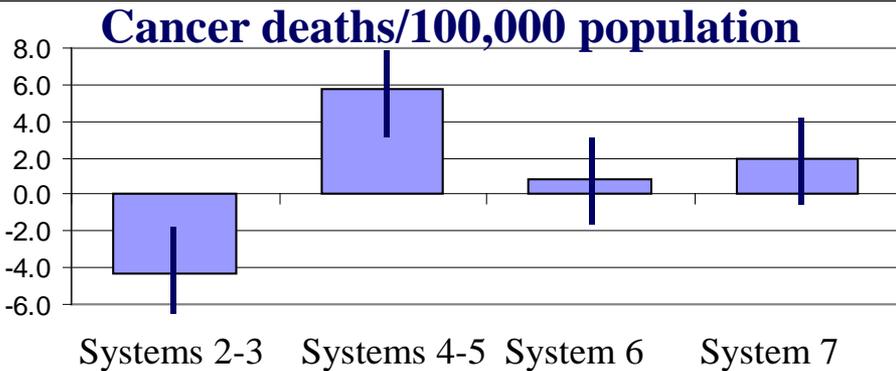
A typology of public health delivery systems



Source: Mays et al. 2010; 2012

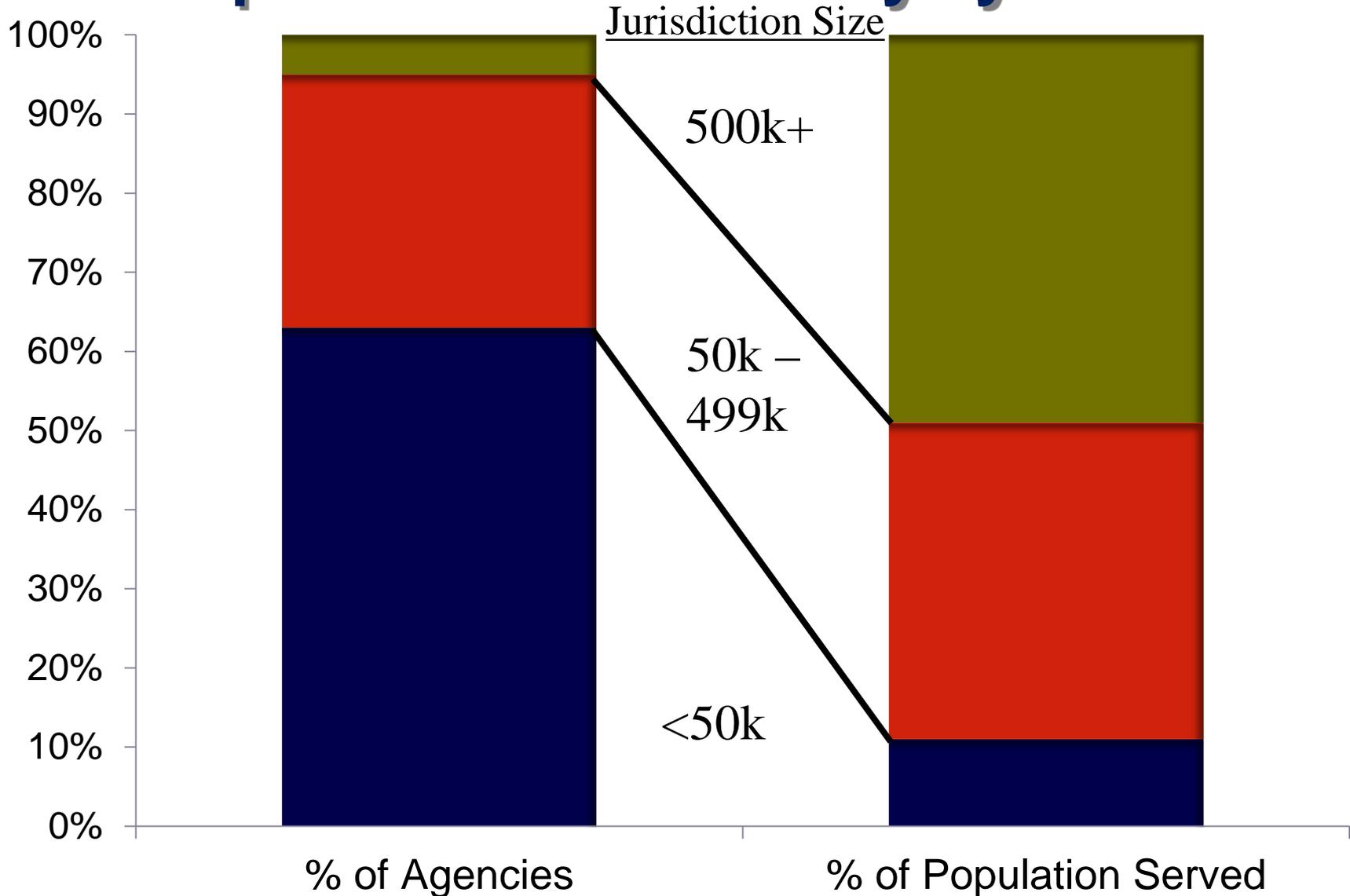
Changes in health associated with delivery system

Percent Changes in Preventable Mortality Rates by System Typology (Reference: System 1)



Fixed-effects models control for population size, density, age composition, poverty status, racial composition, and physician supply

Economies of scale and scope in public health delivery systems

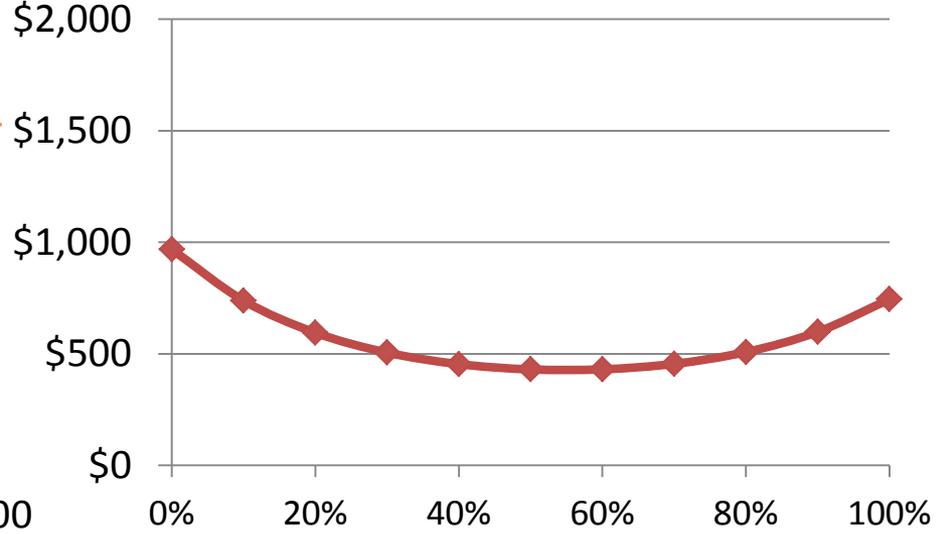
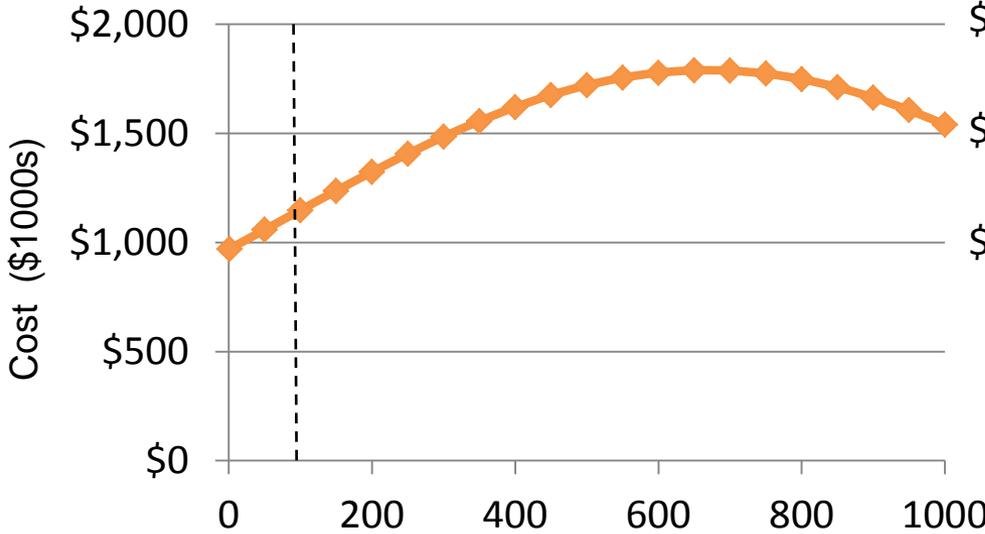


Source: 2010 NACCHO National Profile of Local Health Departments Survey

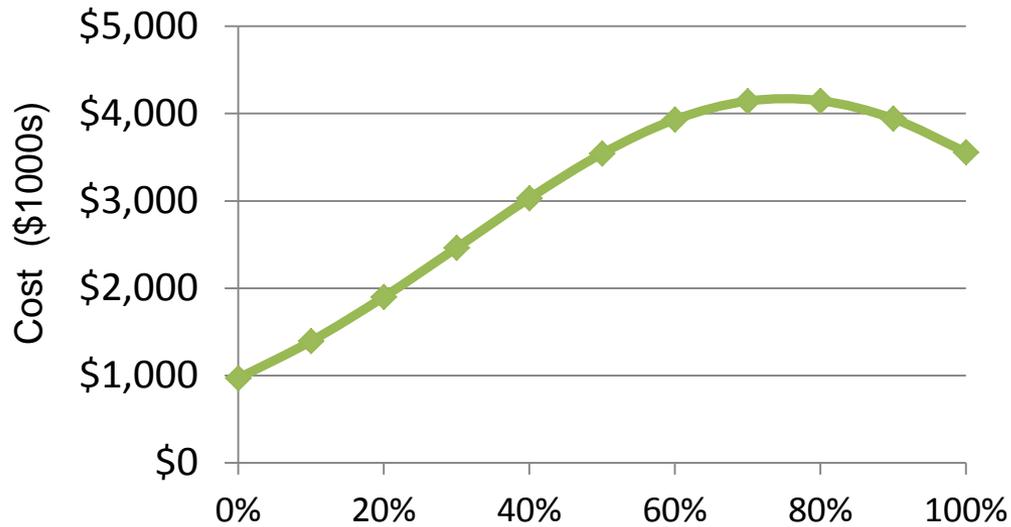
Empirical estimates of scale and scope economies

Scale (Population in 1000s)

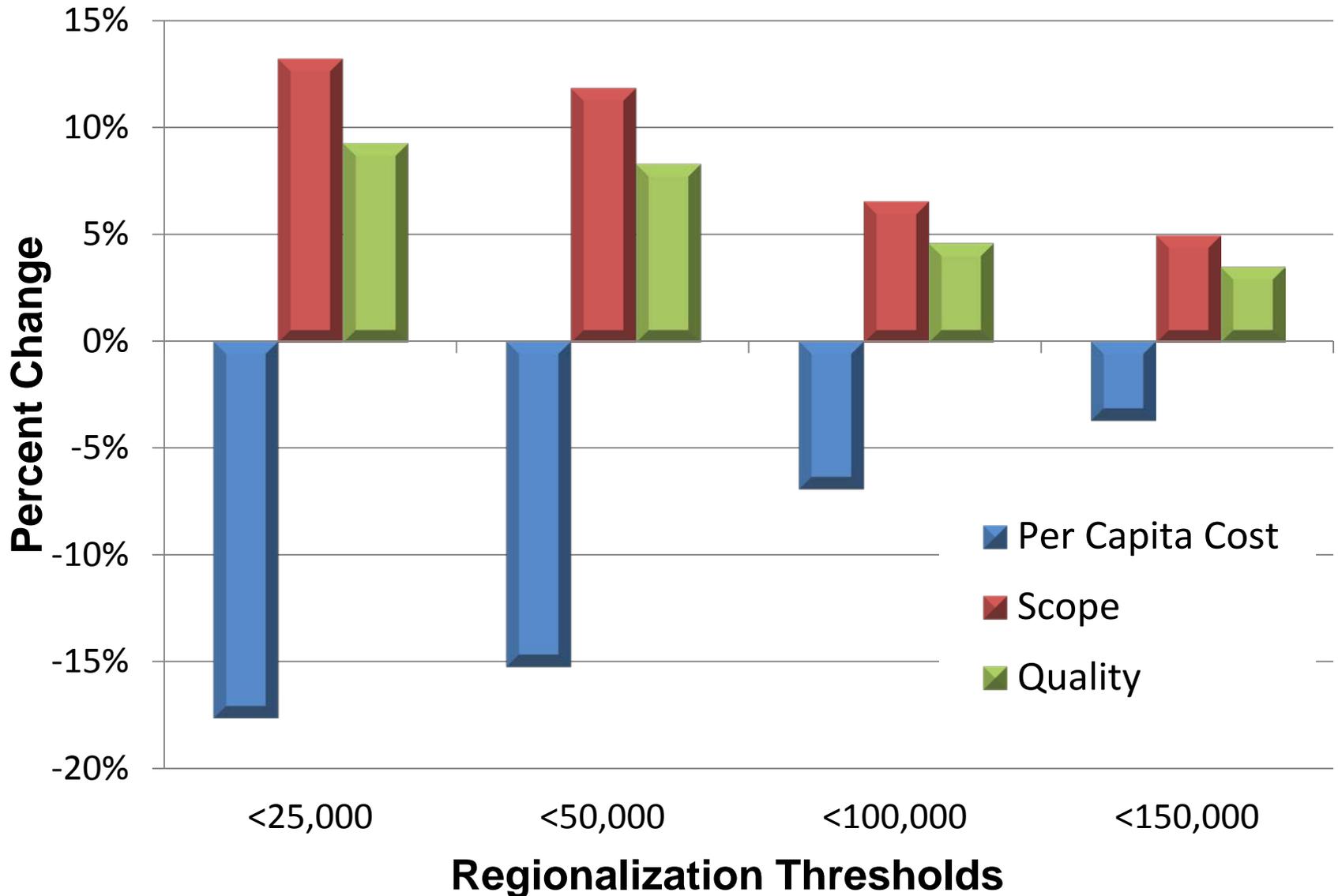
Quality (Perceived Effectiveness)



Scope (% of Activities)



Simulated Effects of Regionalization



Practice-based research in public health

- Examines the adoption, implementation & impact of public health practices in real-world ***public health settings***
- Addresses uncertainties and information needs of real-world public health ***decision-makers***
- Evaluates the implementation and impact of ***innovations in practice***
- Uses ***observations generated through public health practice*** to produce new knowledge (learning systems)

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*.

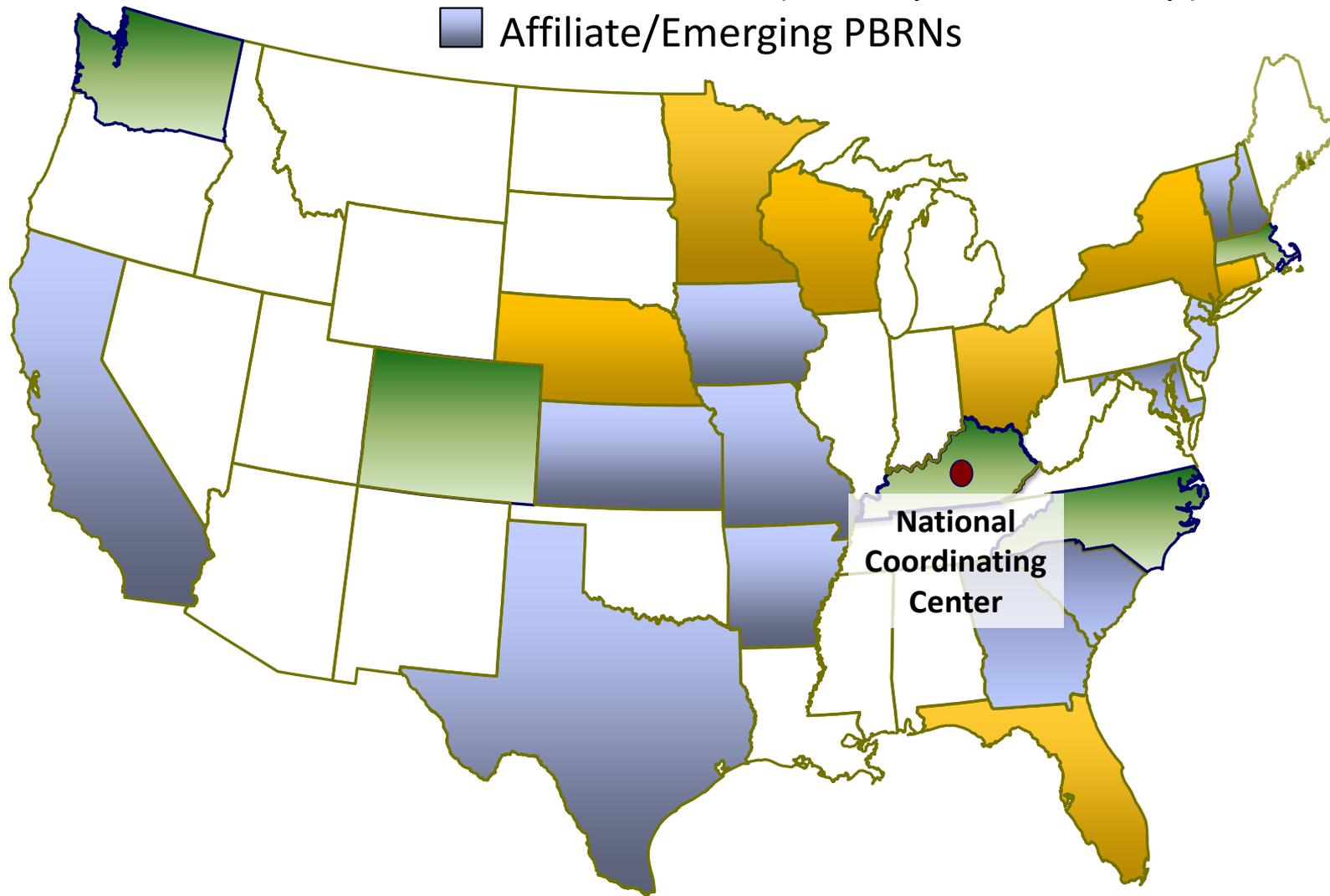
How can PBRNs help?

- 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



The Robert Wood Johnson Foundation's Public Health PBRN Program

- First cohort (December 2008 start-up)
- Second cohort (January 2010 start-up)
- Affiliate/Emerging PBRNs



PBRN Performance in Engaging Practice Settings

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

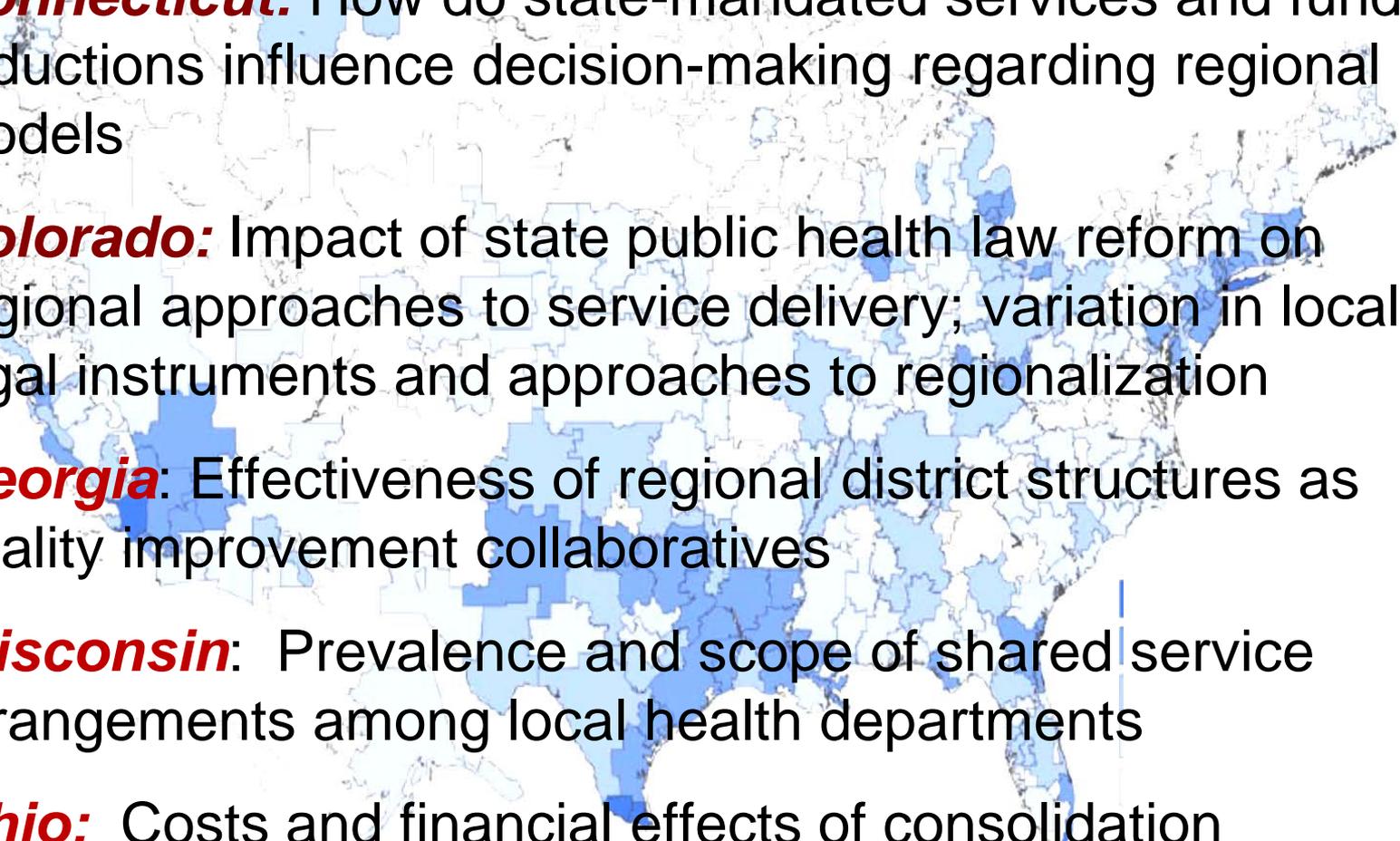
<u>Activity</u>	PBRN Agencies		National Sample		
	<u>Percent/Mean</u>		<u>Percent/Mean</u>		
Identifying research topics	94.1%		27.5%		***
Planning/designing studies	81.6%		15.8%		***
Recruitment, data collection & analysis	79.6%		50.3%		**
Disseminating study results	84.5%		36.6%		**
Applying findings in own organization	87.4%		32.1%		**
Helping others apply findings	76.5%		18.0%		***
Research implementation composite	84.04	(27.38)	30.20	(31.38)	**
N	209		505		

Examples: Economic Shocks and Decisions

- **Washington:** Variation in LHD budget reductions during the 2009-10 economic downturn, and how the reductions have affected service delivery and use of evidence-based practices
- **Nebraska:** Estimating program-specific workforce shortages
- **North Carolina:** LHD responses to Medicaid maternity case management funding cut, and impact on service delivery
- **Connecticut:** Responses to elimination of state subsidies to small LHDs
- **Ohio:** LHD enforcement of smoke-free workplace act (magnitude & frequency) in response to economic downturn
- **Wisconsin & Florida:** Changes in LHD spending, funding sources and resource allocation during economic recession

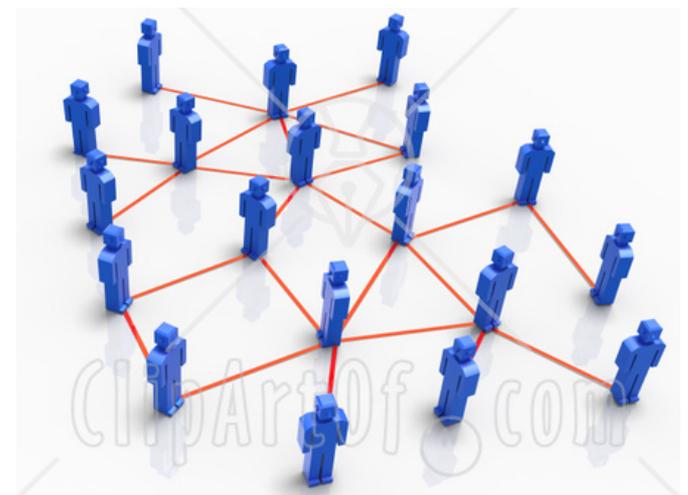


Examples: Regionalized Service Delivery

- **Massachusetts:** Local variation in decision-making and implementation regarding regional delivery models
 - **Connecticut:** How do state-mandated services and funding reductions influence decision-making regarding regional models
 - **Colorado:** Impact of state public health law reform on regional approaches to service delivery; variation in local legal instruments and approaches to regionalization
 - **Georgia:** Effectiveness of regional district structures as quality improvement collaboratives
 - **Wisconsin:** Prevalence and scope of shared service arrangements among local health departments
 - **Ohio:** Costs and financial effects of consolidation
- 

New frontiers through PBRN research

- **MPROVE**: Effects of public health delivery system characteristics on the delivery of evidence-based programs
- **DACS**: Effects of public health delivery system characteristics on costs of delivering evidence-based programs and policies
 - Chronic disease prevention
 - Communicable disease control
 - Environmental health protection



Conclusions: getting inside the box

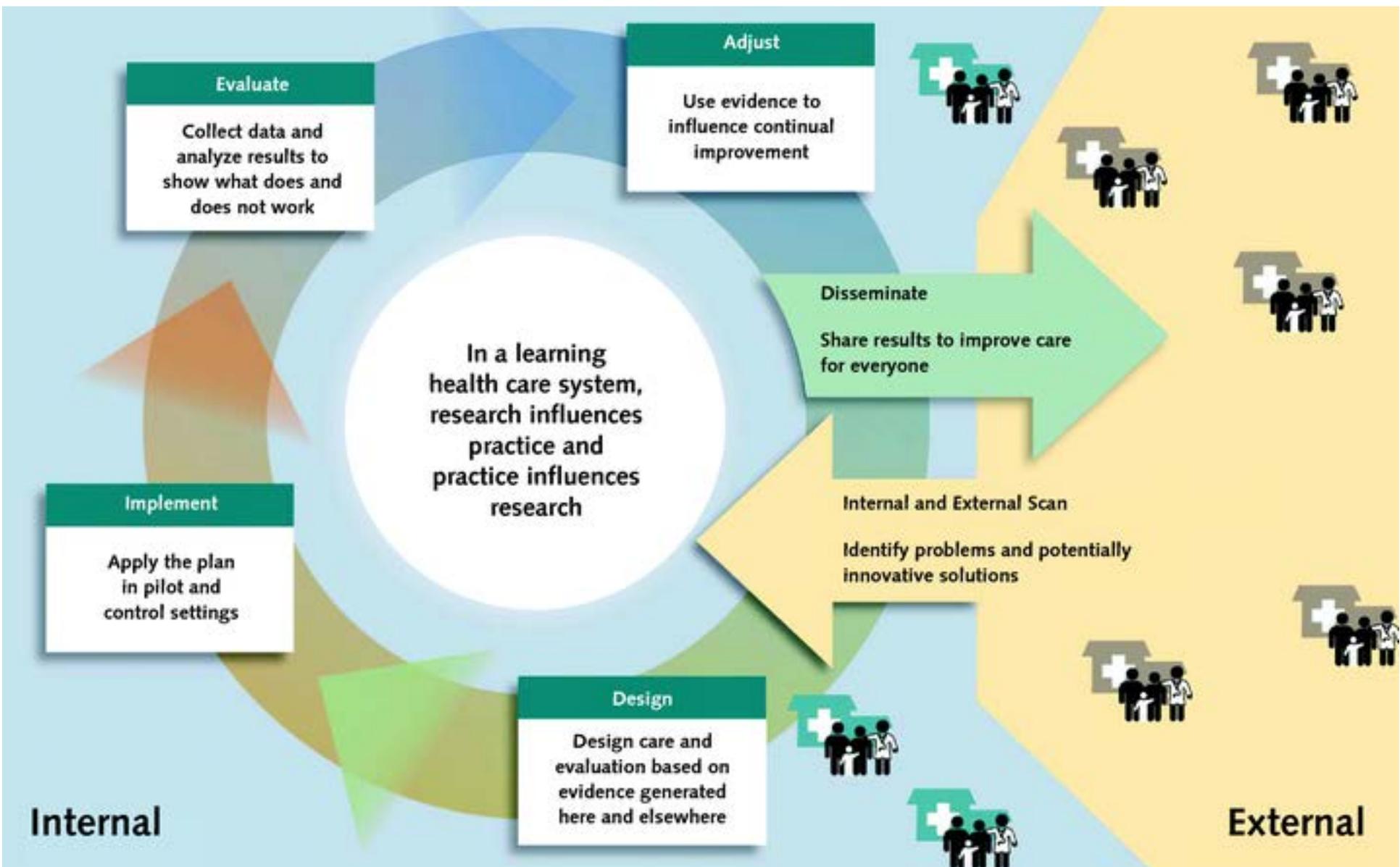
- Engagement of practice and research partners
- Better measures and data sources
- Research designs in real-world settings



- What works best in which settings and why
- Informed public health decisions
- Smarter investments and greater value



Toward a “rapid-learning system” in public health



For More Information



Supported by The Robert Wood Johnson Foundation

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