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Governmental Public Health and the Economics of Adaptation to Population Health

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British Columbia Population Health Network | 6 October 2014

PUBLIC HEALTH SERVICES & SYSTEMS RESEARCH PRACTICE-BASED RESEARCH NETWORKS
National Coordinating Center

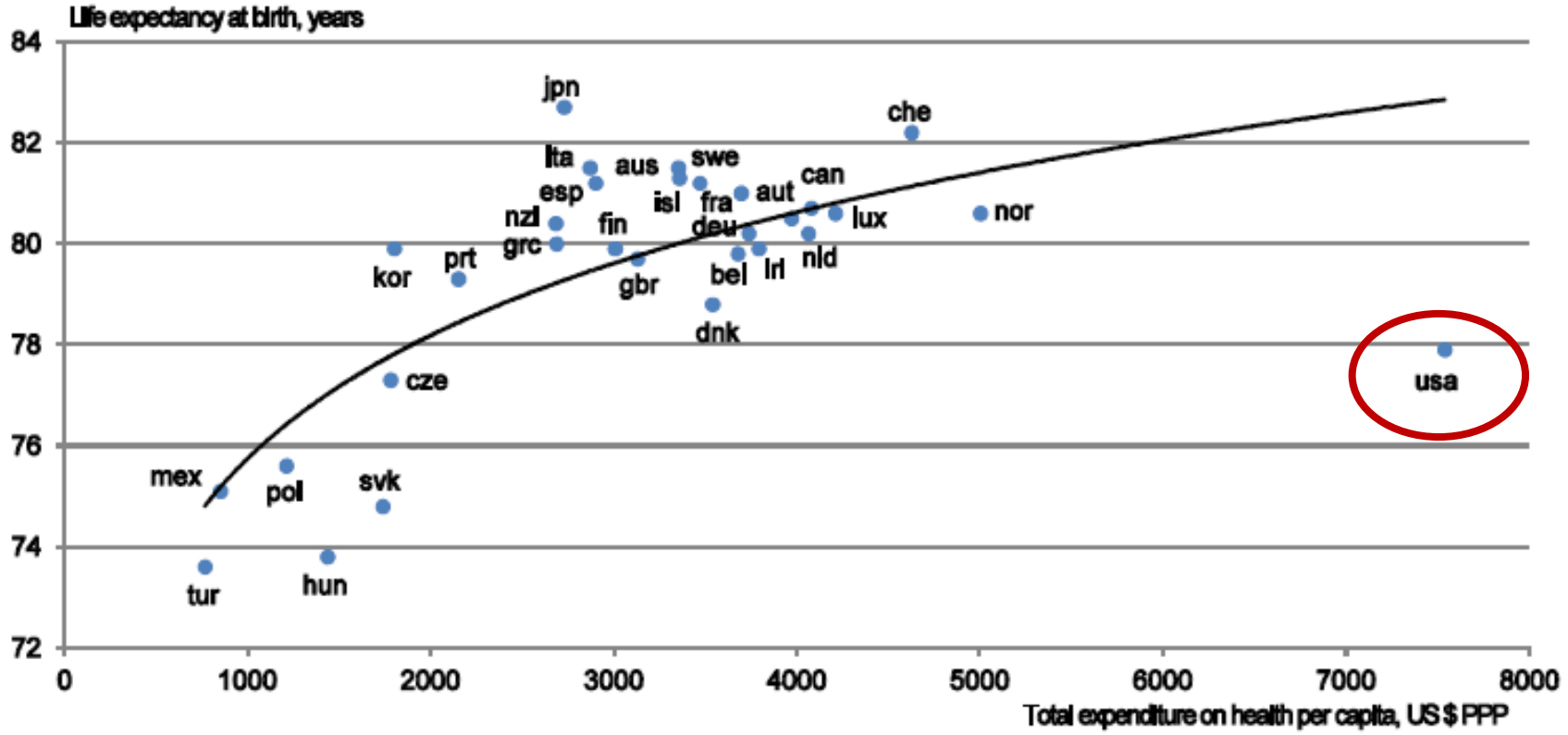
UK UNIVERSITY OF KENTUCKY
Center for Public Health Systems and Services Research

Overview

- How can systems research inform transformation in public health?
- Examples of systems research in public health
  - Delivery system organization & structure
  - Finance and economics
- Resources for advancing the field
- Opportunities and challenges for the future

Failures in population health

Figure 1. **There are large differences in life expectancy and health care spending across OECD countries 2008**[1]

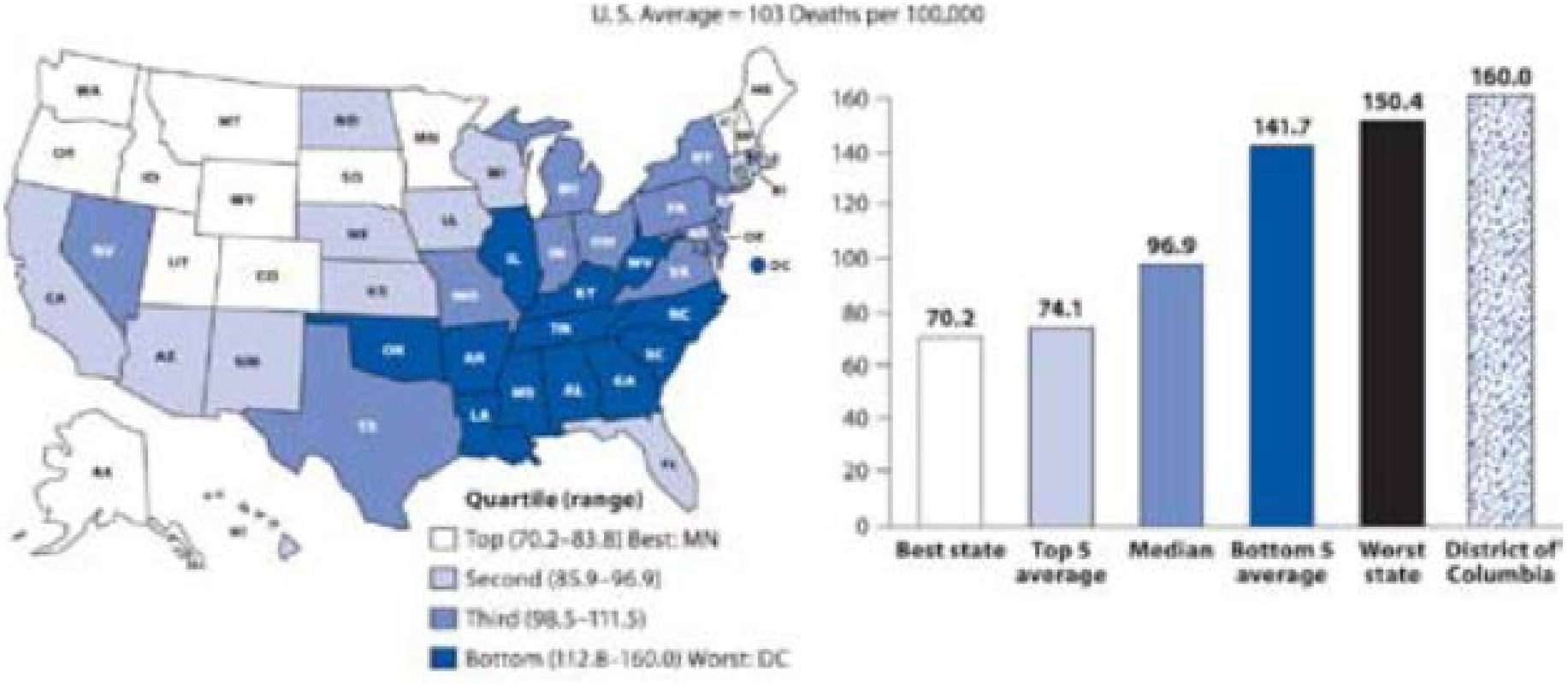


1. Or latest year available.

Source: OECD Health Data 2010.

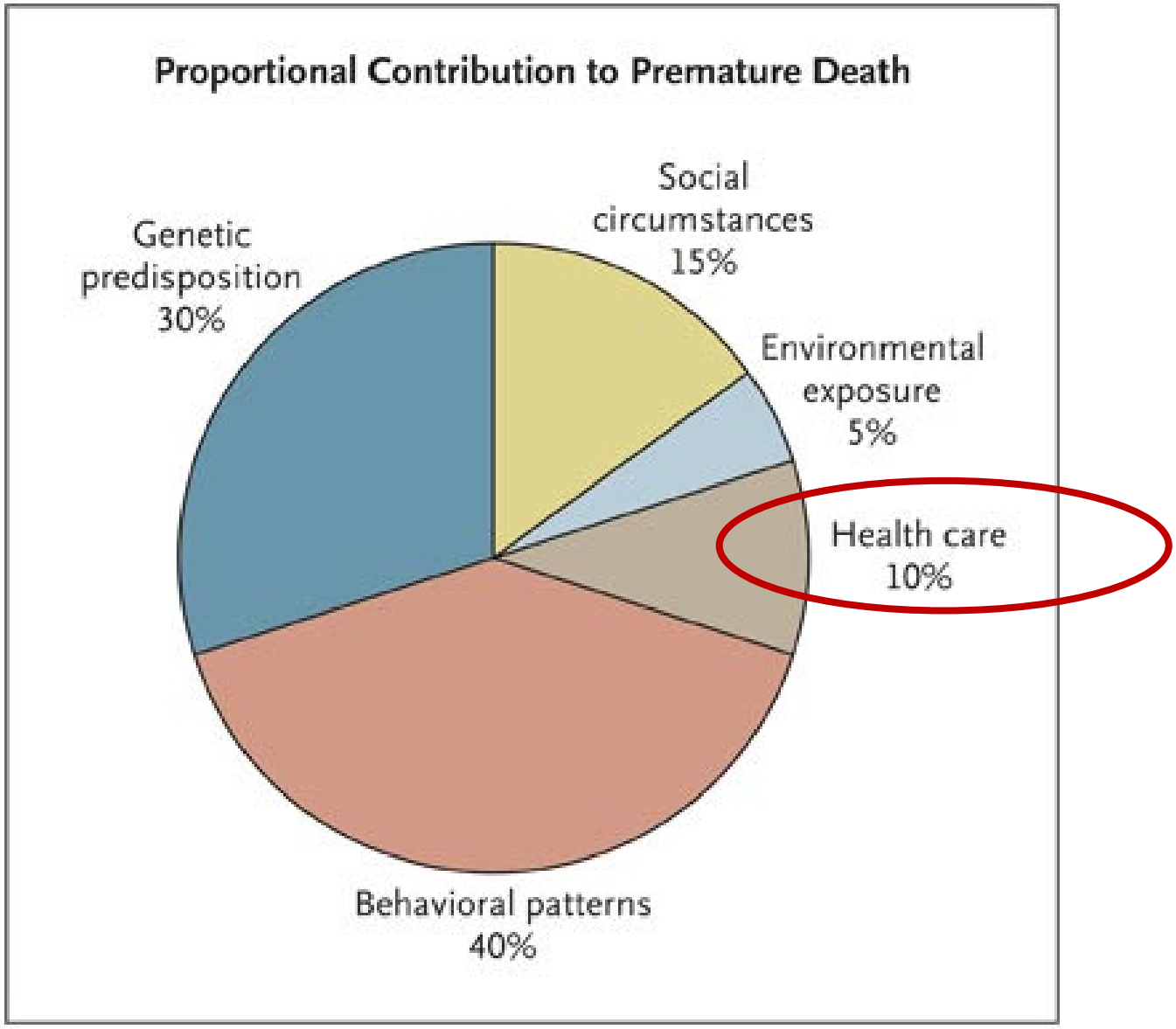
Failures in population health

Premature Deaths per 100,000 Residents



Commonwealth Fund 2012

Drivers of population health failures



Schroeder SA. N Engl J Med 2007;357:1221-1228

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***

Strategies to promote health and prevent disease & injury on a population-wide basis: programs, policies, administrative practices

Mays, Halverson, and Scutchfield. 2003

A Key PHSSR Goal: Optimization

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

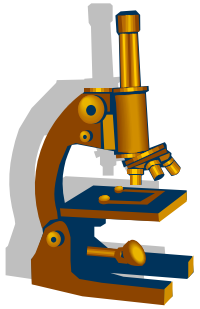
- Epidemiologic **surveillance & investigation**
- Community health **assessment & planning**
- Communicable disease control
- Chronic disease and injury prevention
- Health education and communication
- Environmental health **monitoring and assessment**
- Enforcement of health **laws and regulations**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

…and roles in **assuring access** to medical care

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

Complexity in public health delivery systems

Mays et al 2009

Standardization vs. Customization in public health delivery systems

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

Current delivery system shocks

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.

Learning how to succeed with population health strategies

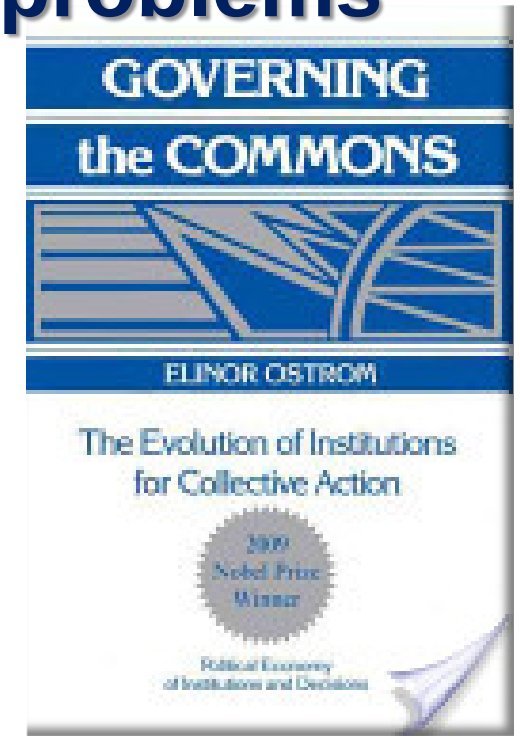
- Designed to achieve large-scale health improvement: neighborhood, city/county, region
- Target fundamental and often multiple determinants of health
- Mobilize the collective actions of multiple stakeholders in government & private sector

  - Usual and unusual suspects

  - Infrastructure requirements

Mays GP. Governmental public health and the economics of adaptation to population health strategies. IOM Population Health Roundtable Discussion Paper. February 2014.

Overcoming collective action problems



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

Ostrom E. 1994

Reform-relevant research: organization and structure

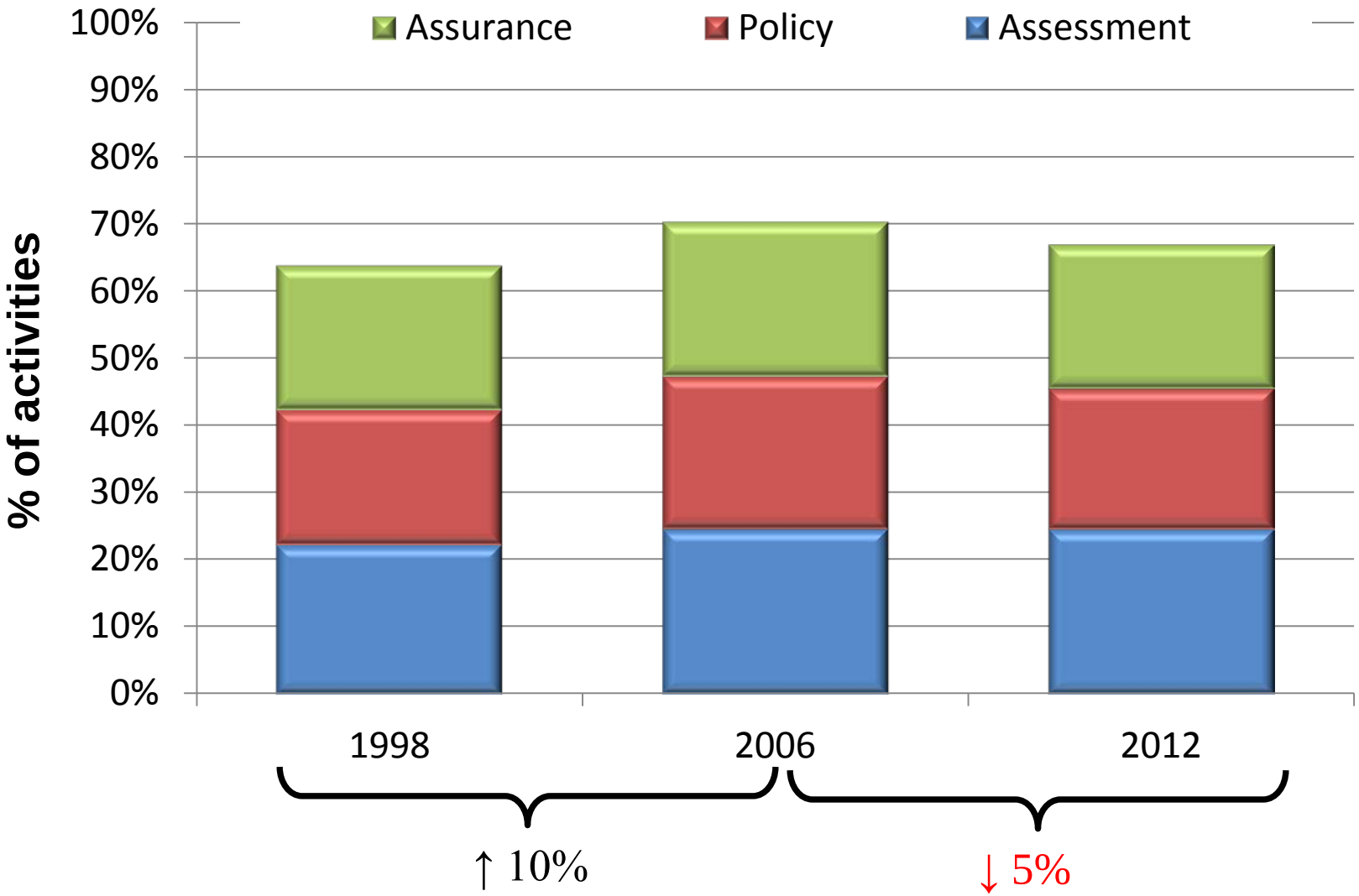
- Who contributes to public health delivery?
- How are roles and responsibilities divided?
- How and why do delivery systems vary and change over time?
- How do system structures affect public health delivery and outcomes?

Data: public health production

National Longitudinal Survey of Public Health Systems

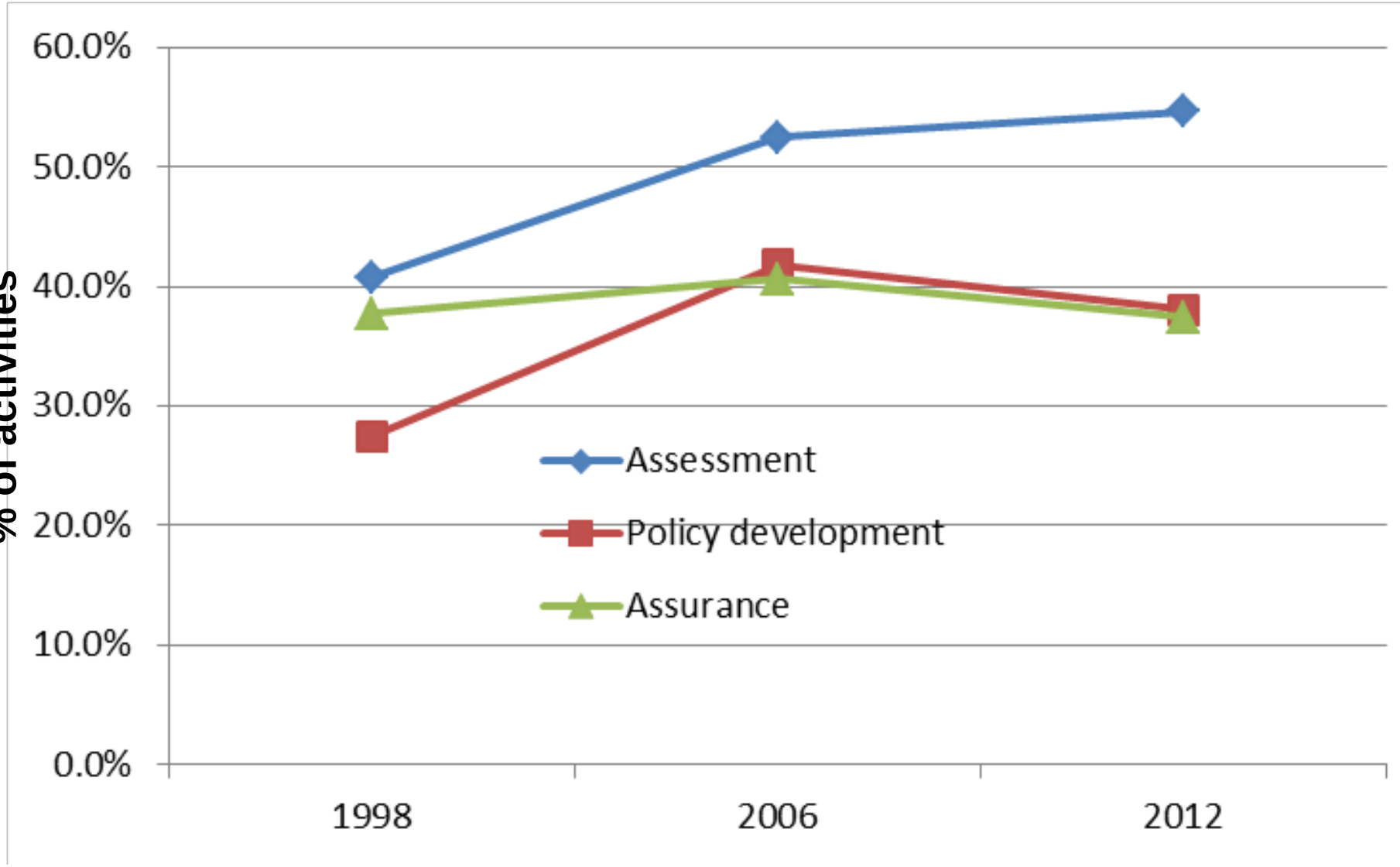
- Cohort of 360 communities with at least 100,000 residents
- Followed over time: 1998, 2006, 2012, 2014*
- Measured from local public health official's perspective:
  - ***Scope***: availability of 20 recommended public health activities
  - ***Network***: types of organizations contributing to each activity
  - ***Effort***: contributed by designated local public health agency
  - ***Quality***: perceived effectiveness of each activity

Delivery of recommended public health activities in U.S. communities



National Longitudinal Survey of Public Health Systems, 2012

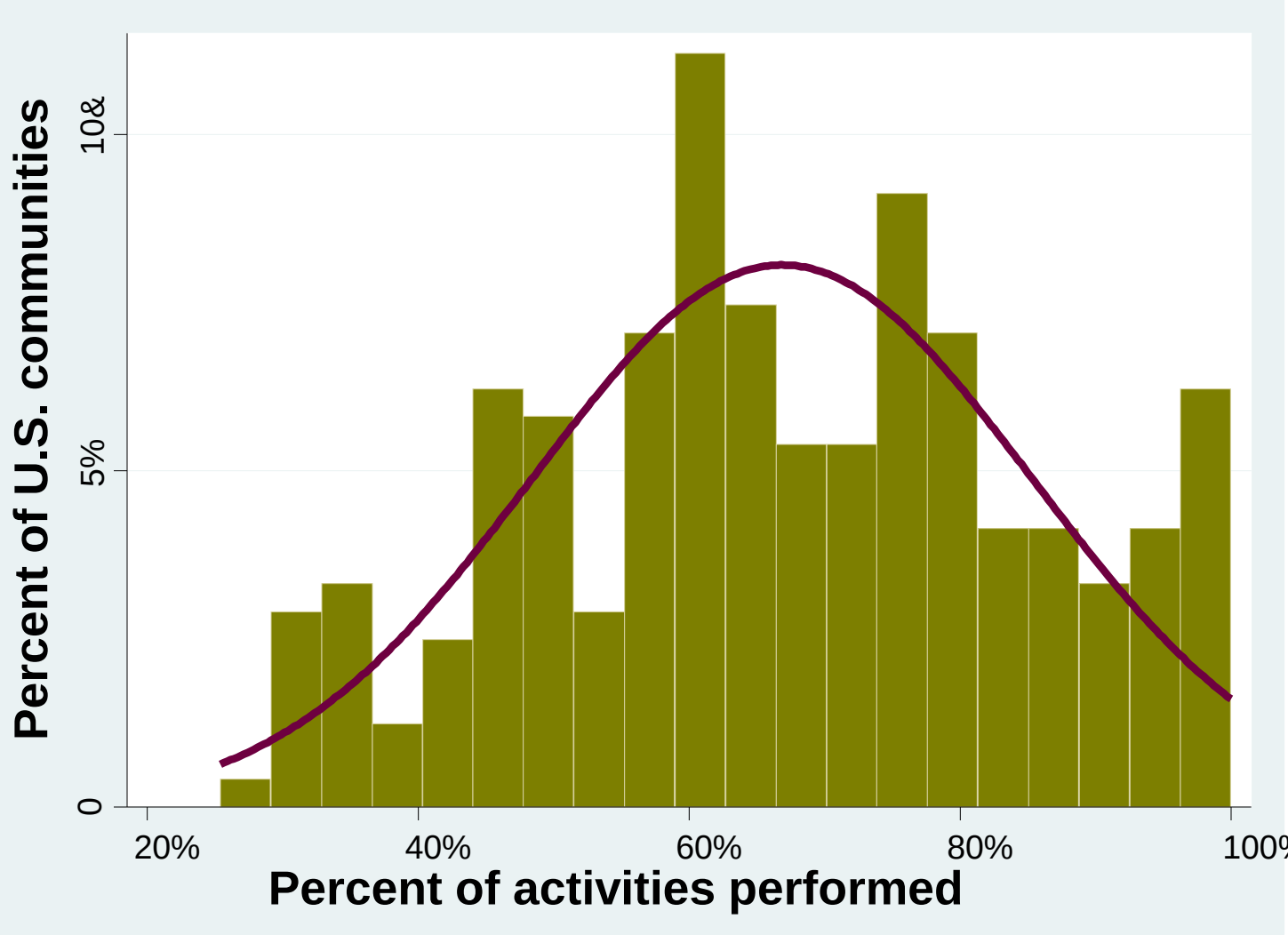
Delivery of recommended public health activities in U.S. communities



National Longitudinal Survey of Public Health Systems, 2012

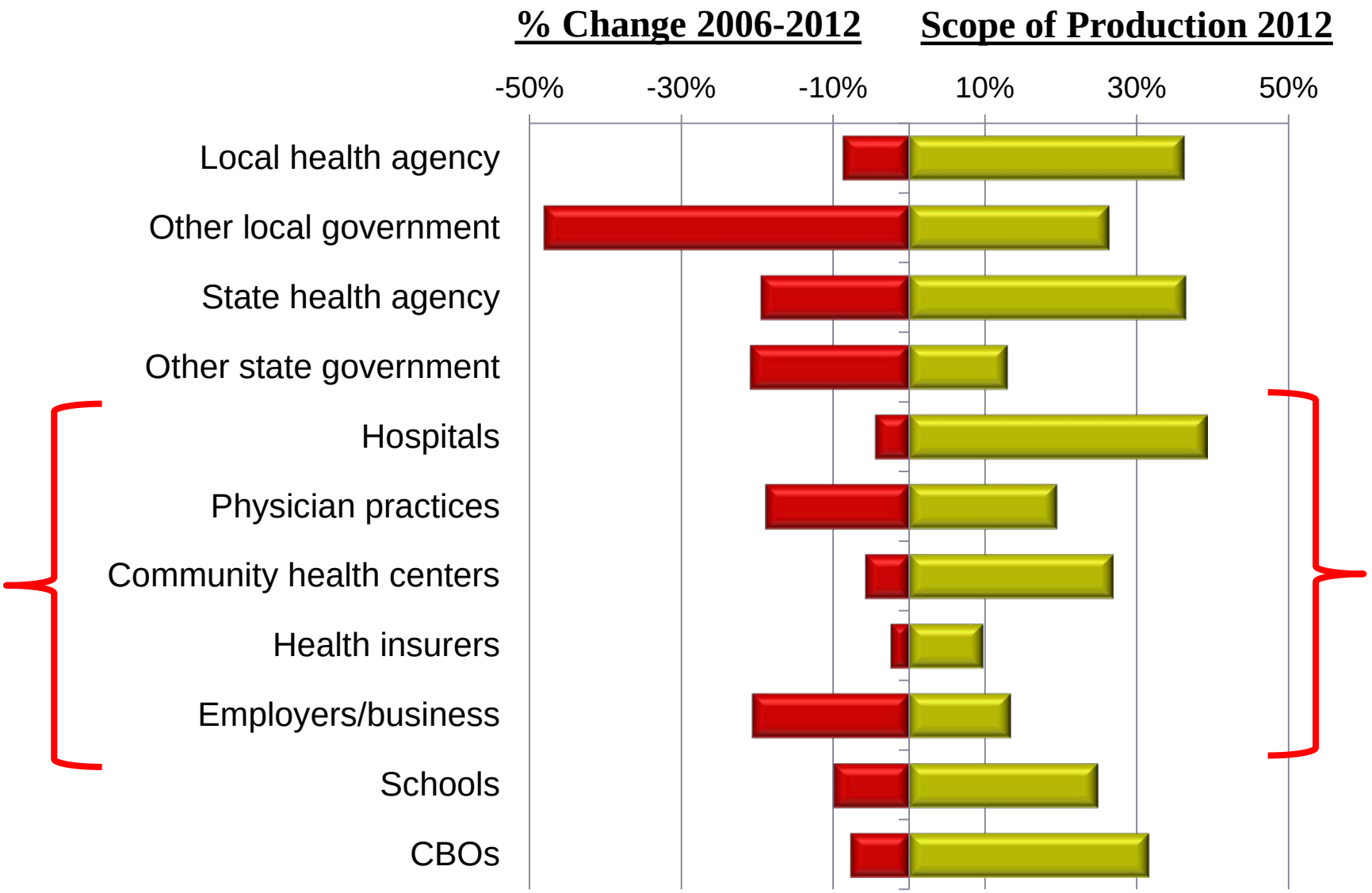
Variation in Scope of Public Health Delivery

Delivery of recommended public health activities, 2012



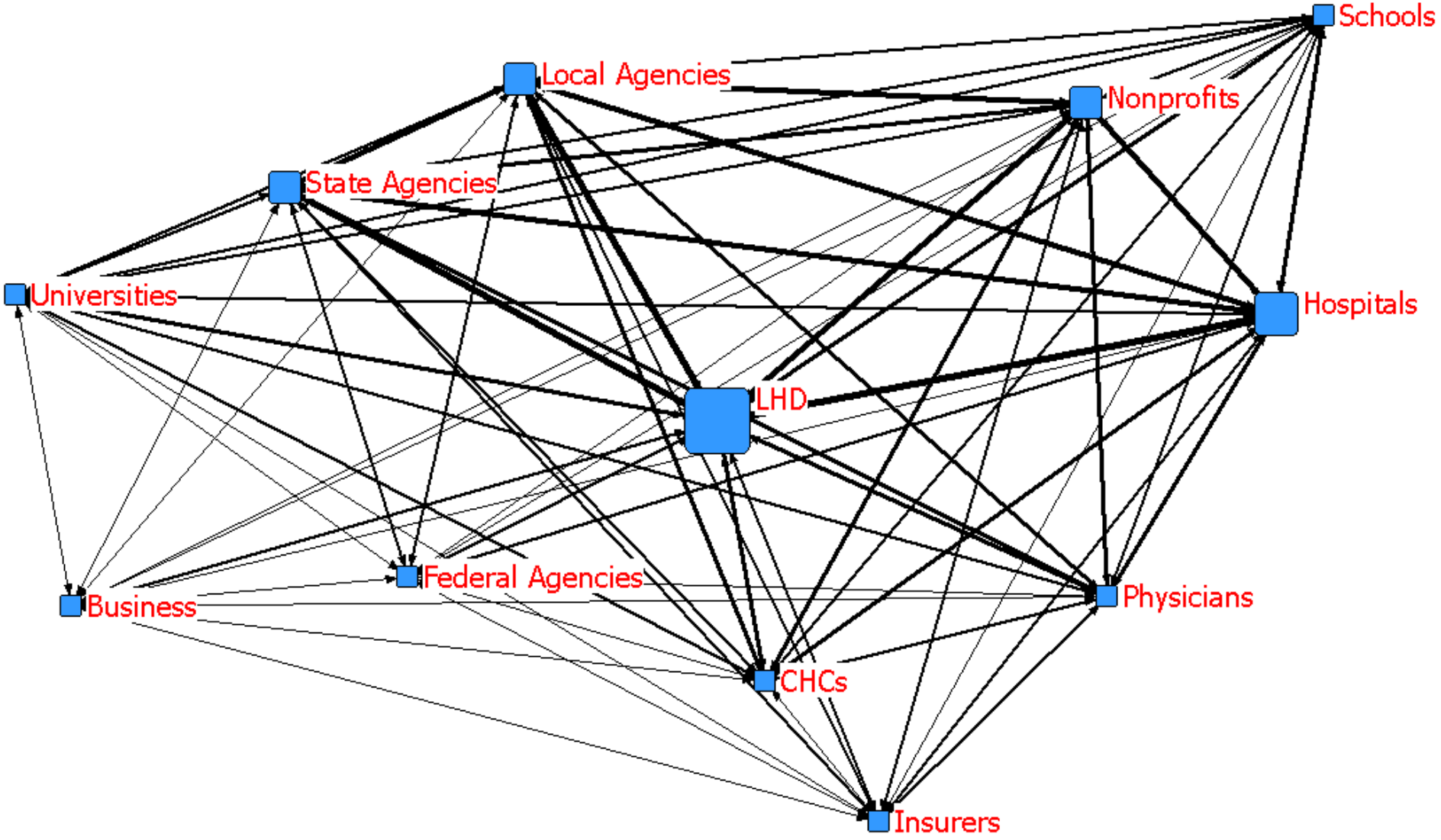
National Longitudinal Survey of Public Health Systems, 2012

Organizations contributing to local public health production



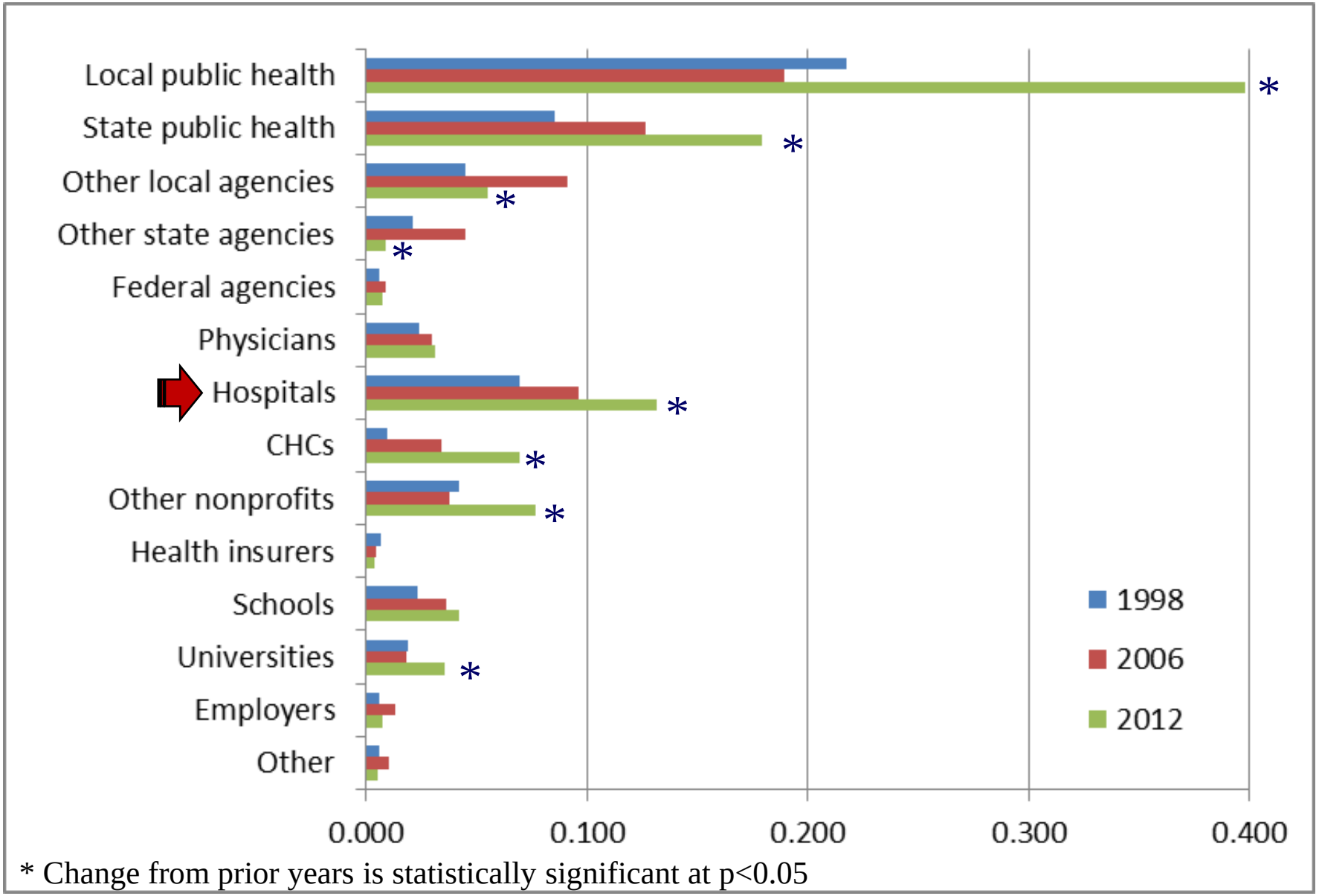
National Longitudinal Survey of Public Health Systems, 2012

Inter-organizational relationships in public health delivery systems



National Longitudinal Survey of Public Health Systems, 2012

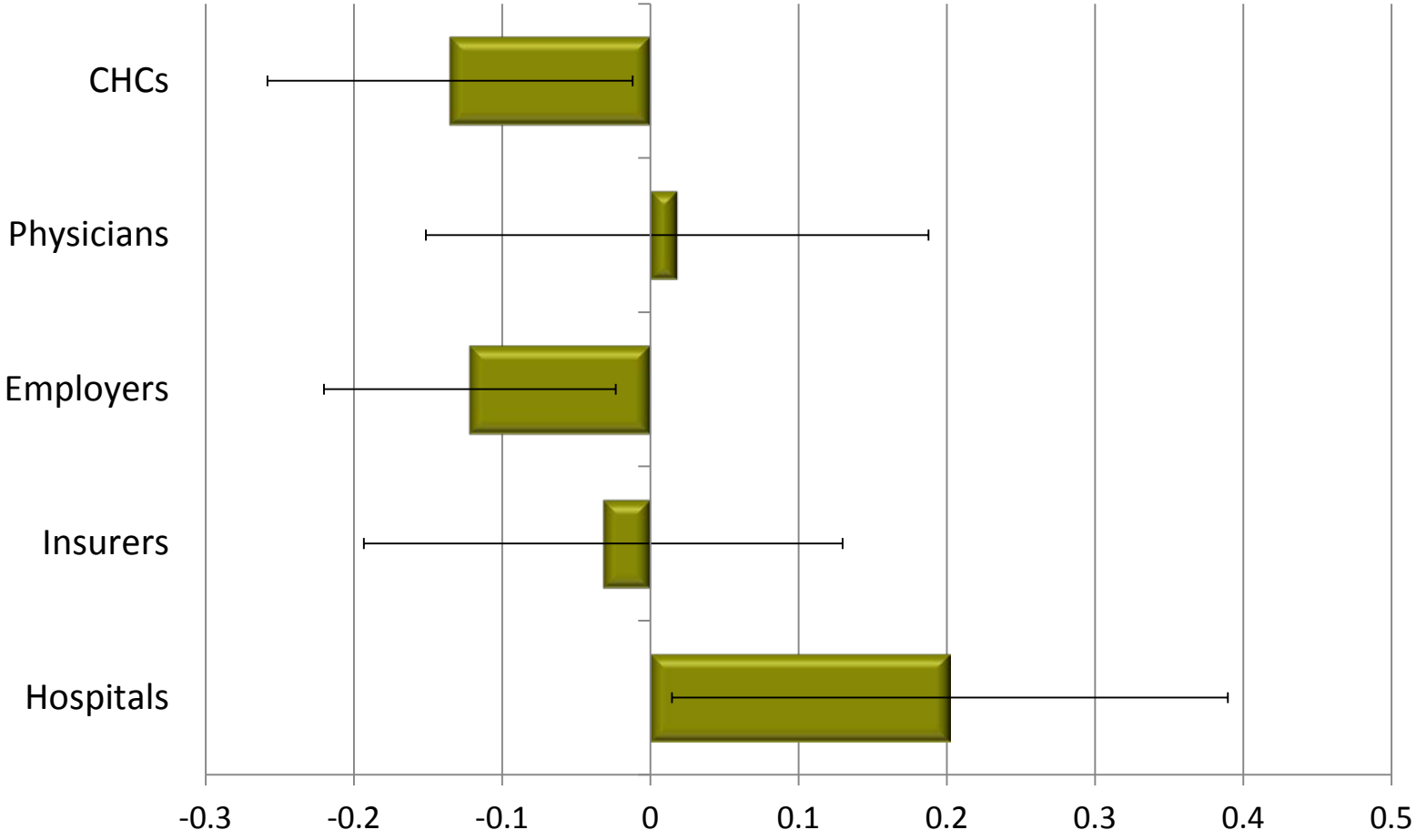
Bridging capital in public health delivery systems
Trends in betweenness centrality



* Change from prior years is statistically significant at $p<0.05$

Do other organizations complement or substitute for local public health agency effort?

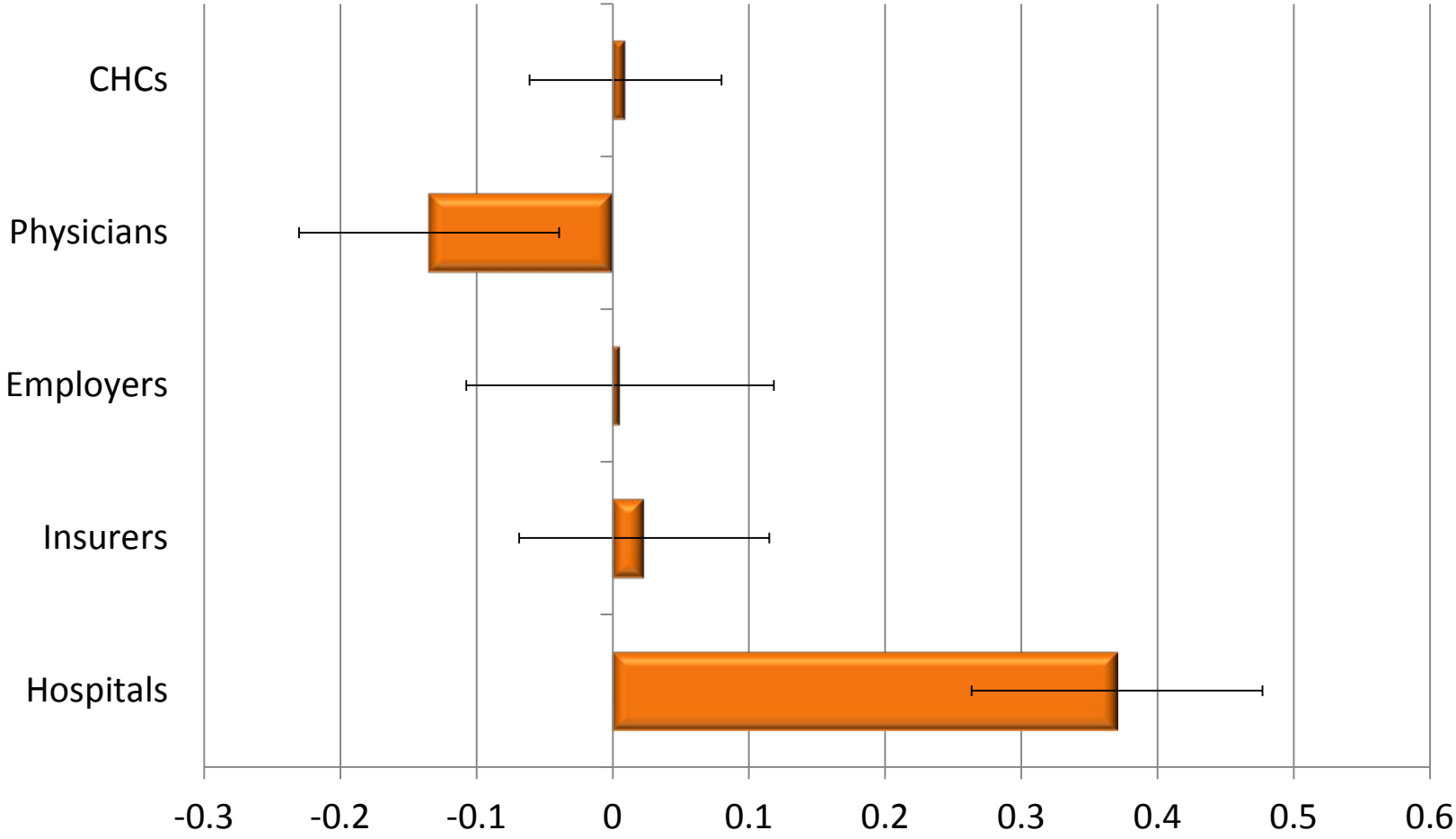
Results from Multivariate GLLAMM Models



Note: GLLAMM estimates, holding all other variables constant in the model

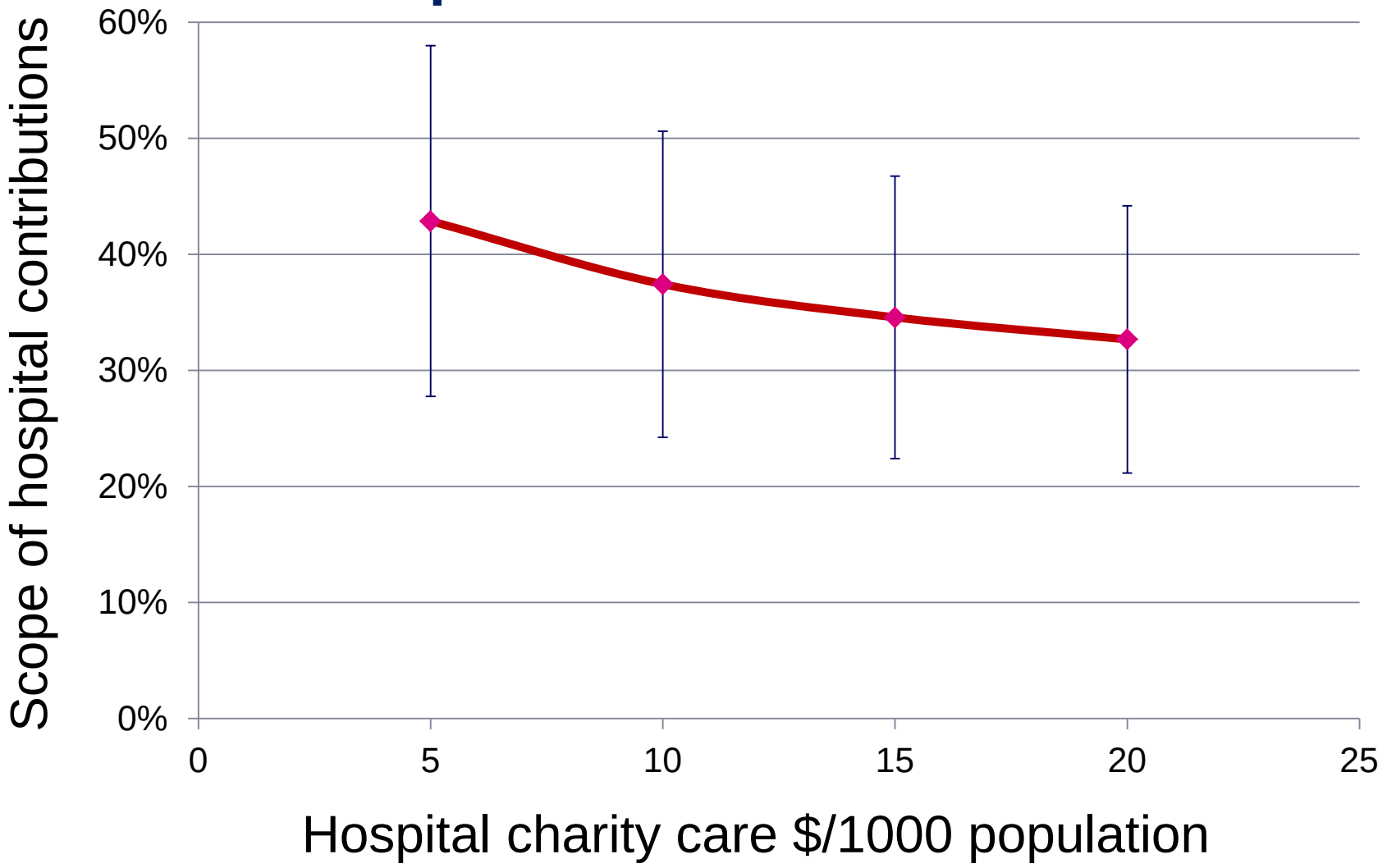
How do other organizations affect the total supply of public health activities?

Results from Multivariate GLLAMM Models



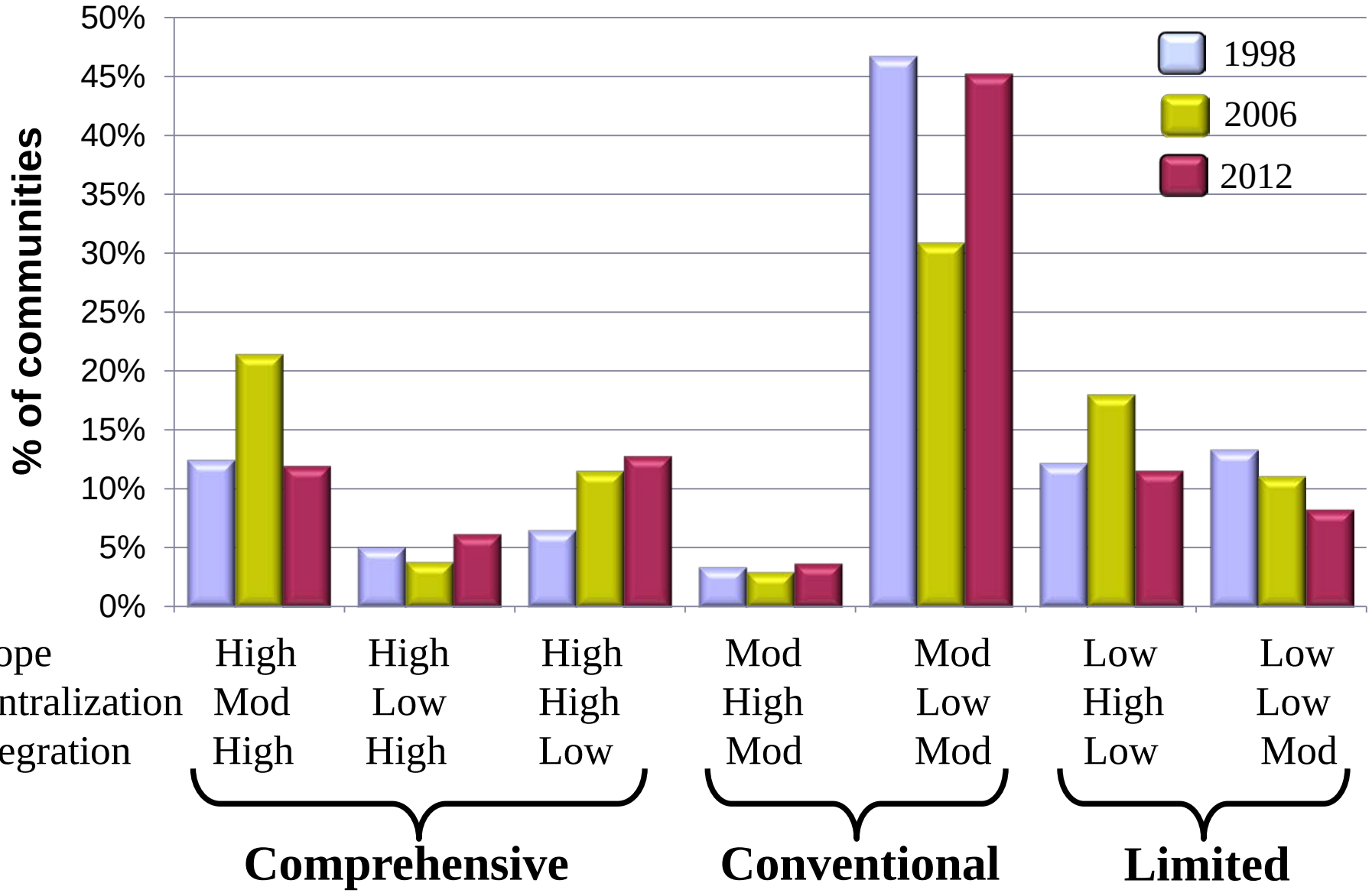
Note: GLLAMM estimates, holding all other variables constant in the model

Estimated crowd-out in hospital contributions to public health activities



Note: GLLAMM estimates, holding all other variables constant in the model

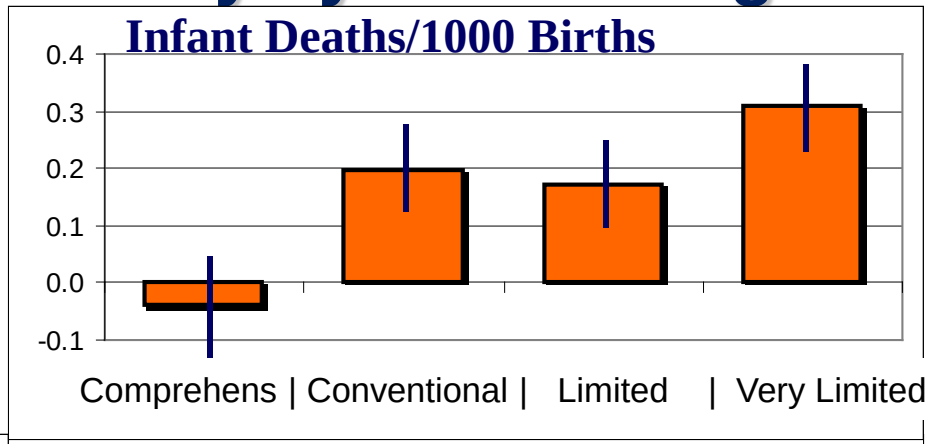
A typology of public health delivery systems

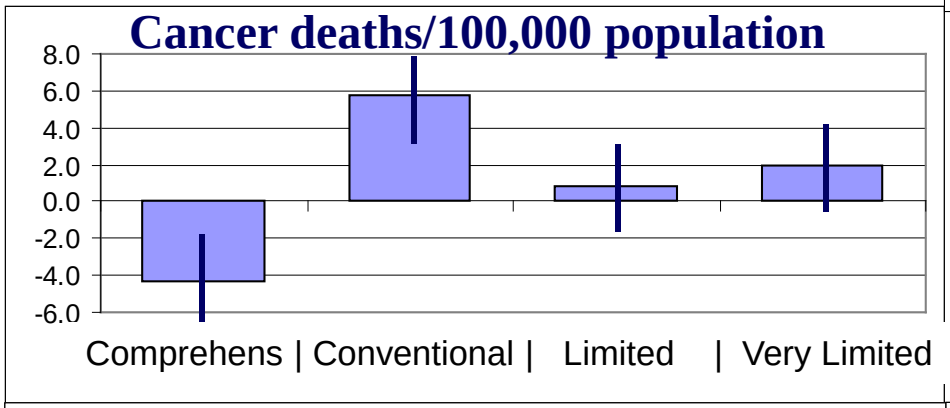


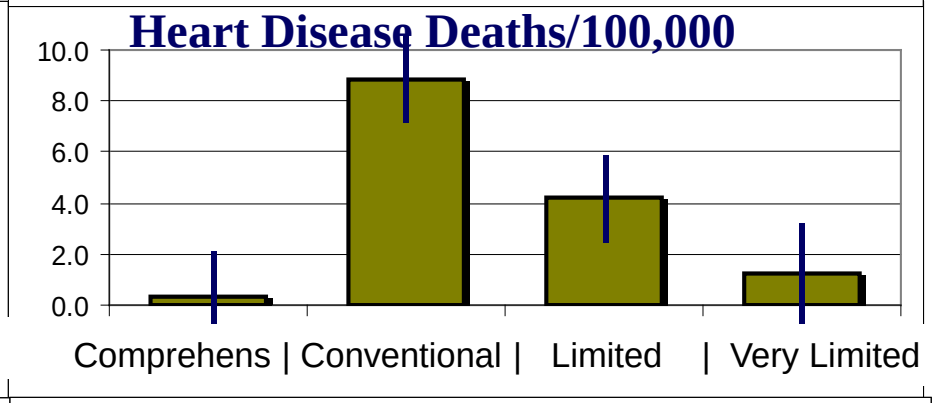
Source: Mays et al. 2010; 2012

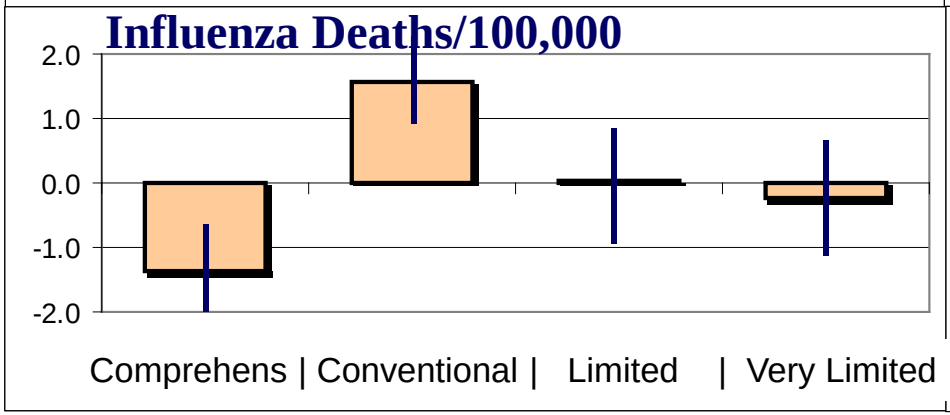
Population health and delivery system change

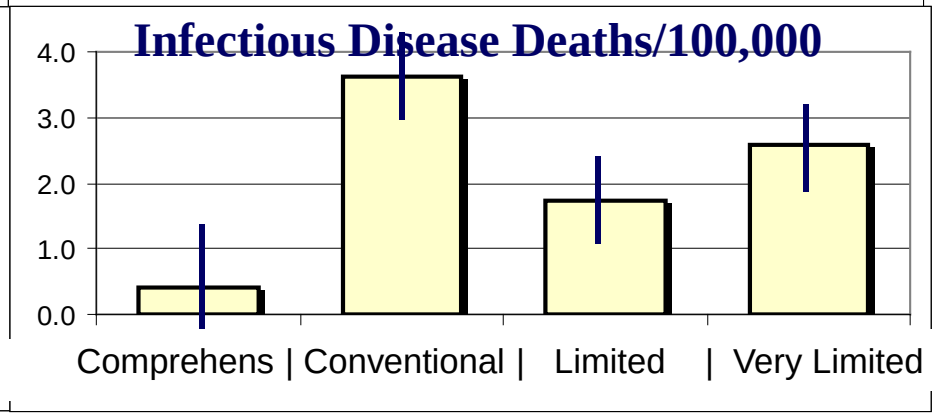
Percent Changes in Preventable Mortality Rates Attributable to Delivery System Type









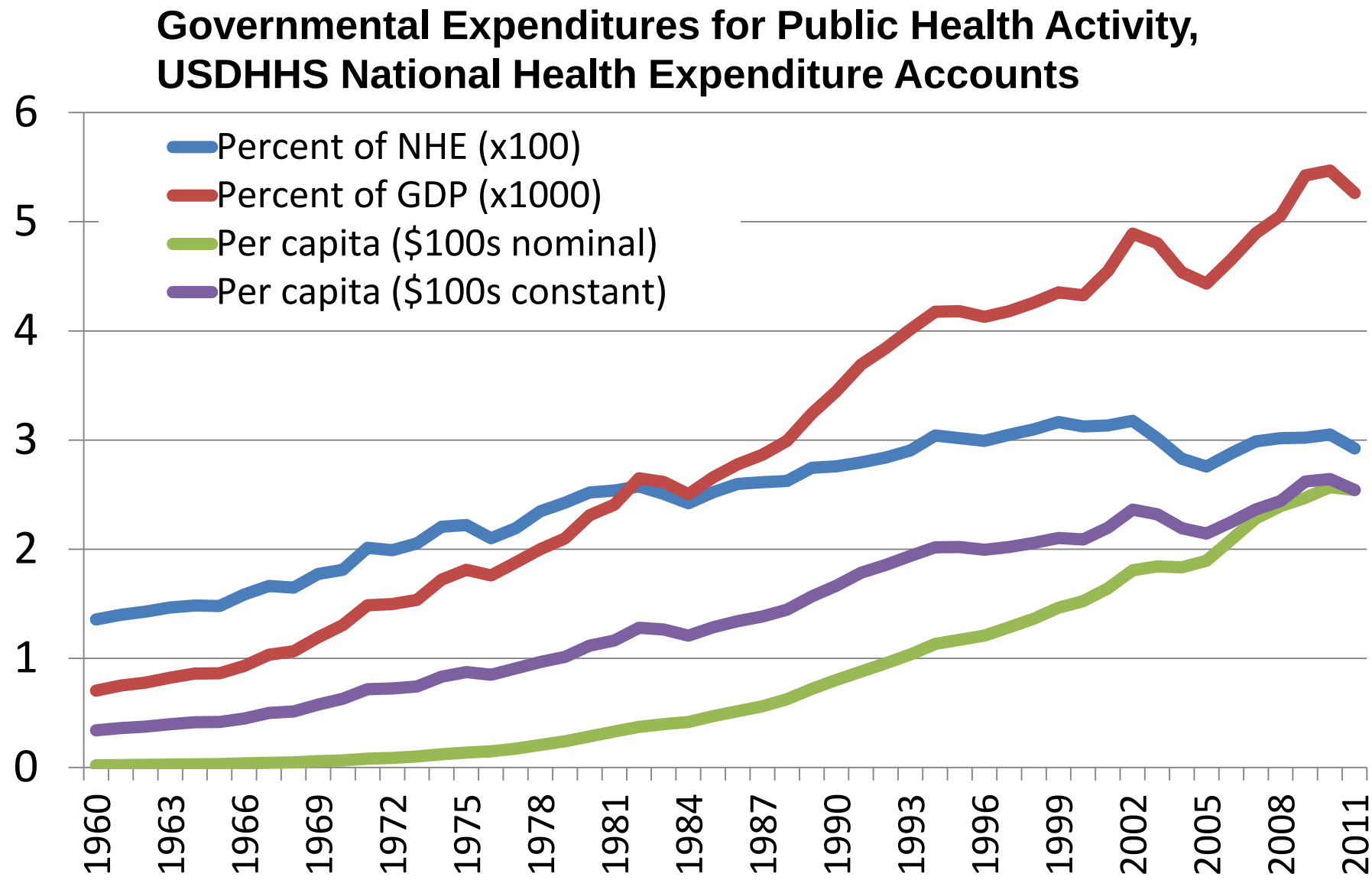


Fixed-effects models control for population size, density, age composition, poverty status, racial composition, and physician supply

Reform-relevant research: finance and economics

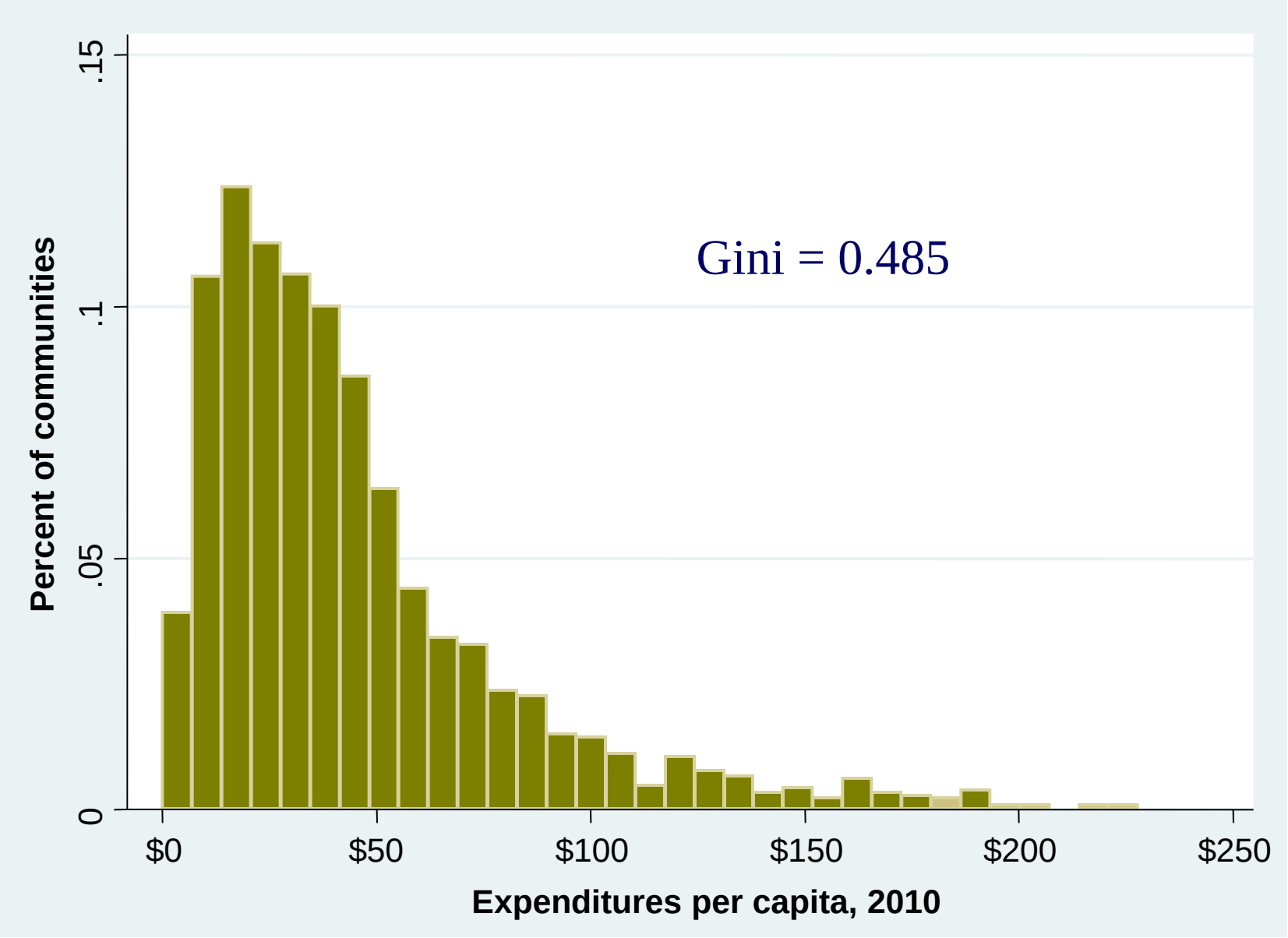
- How does public health spending vary across communities and change over time?
- What are the health effects attributable to changes in public health spending?
- What are the medical cost effects attributable to changes in public health spending?
- What are the opportunities for improving efficiency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

What we know, sort of…

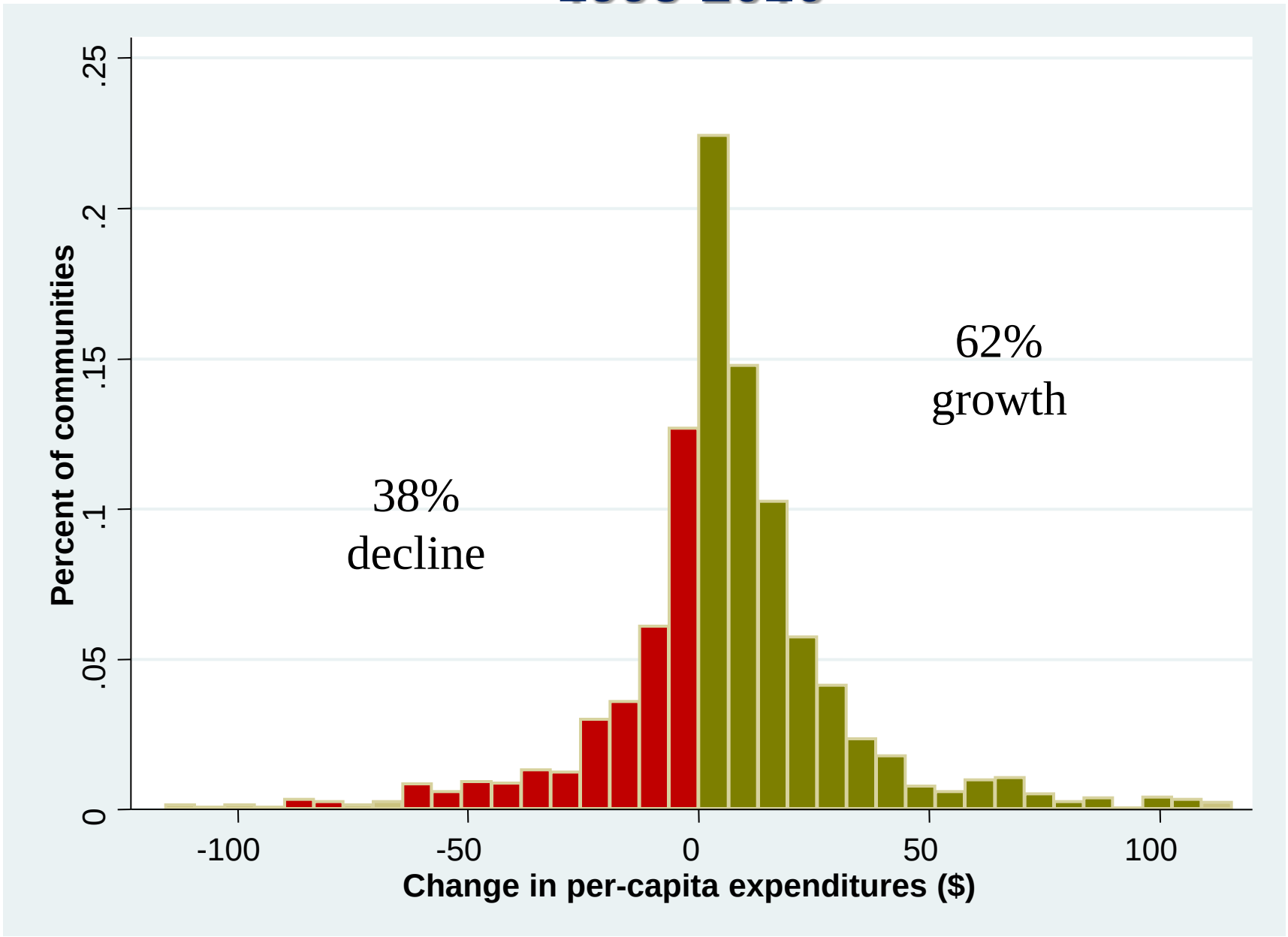


U.S. Centers for Medicare and Medicaid Services, Office of the Chief Actuary

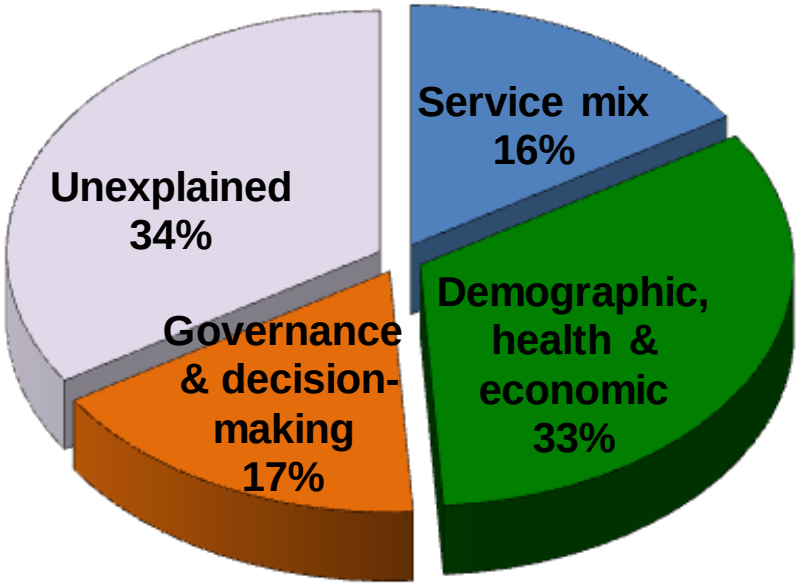
Variation in Local Public Health Spending



Changes in Local Public Health Spending 1993-2010



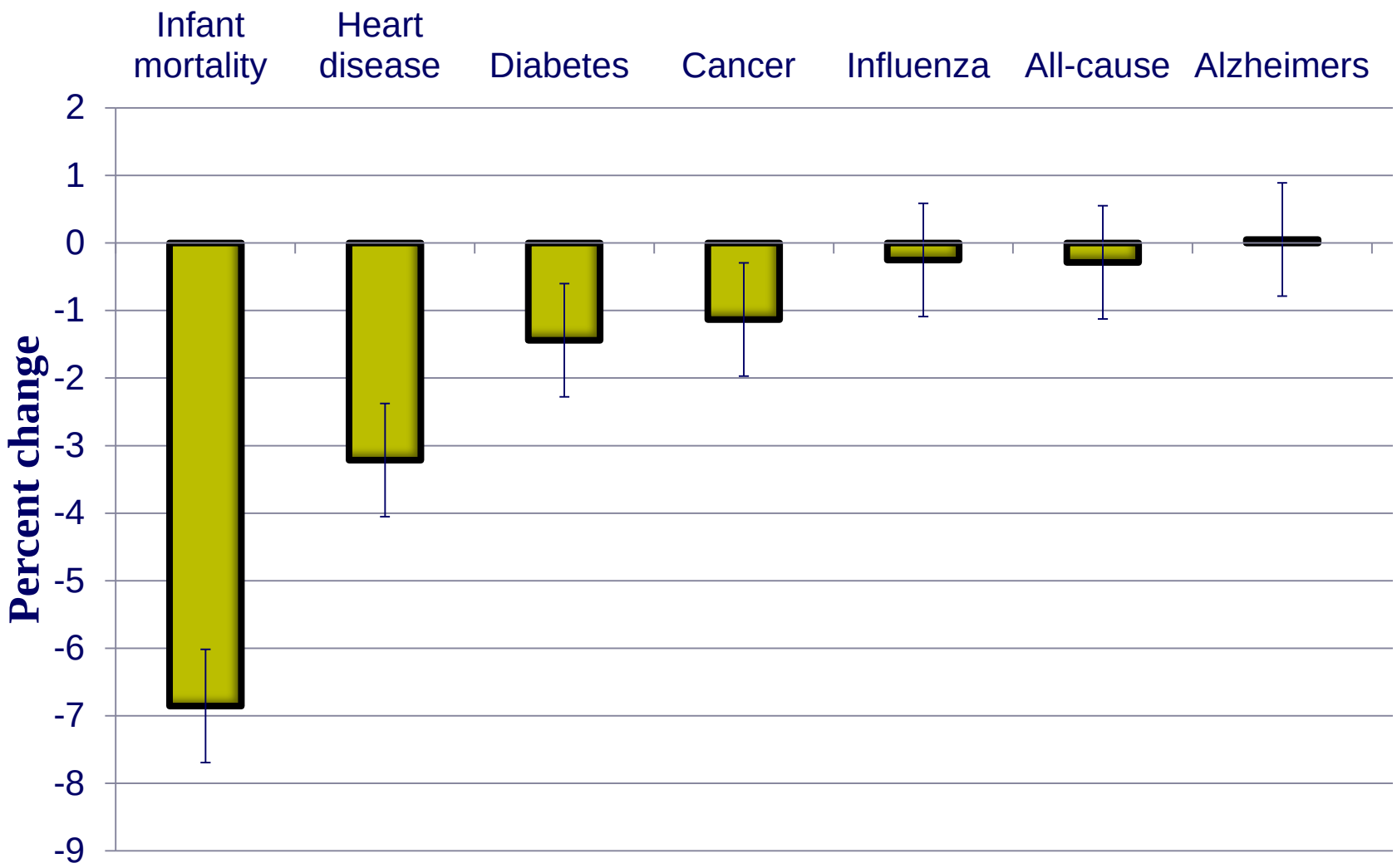
Determinants of Local Public Health Spending Levels



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

Mays et al. 2009

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

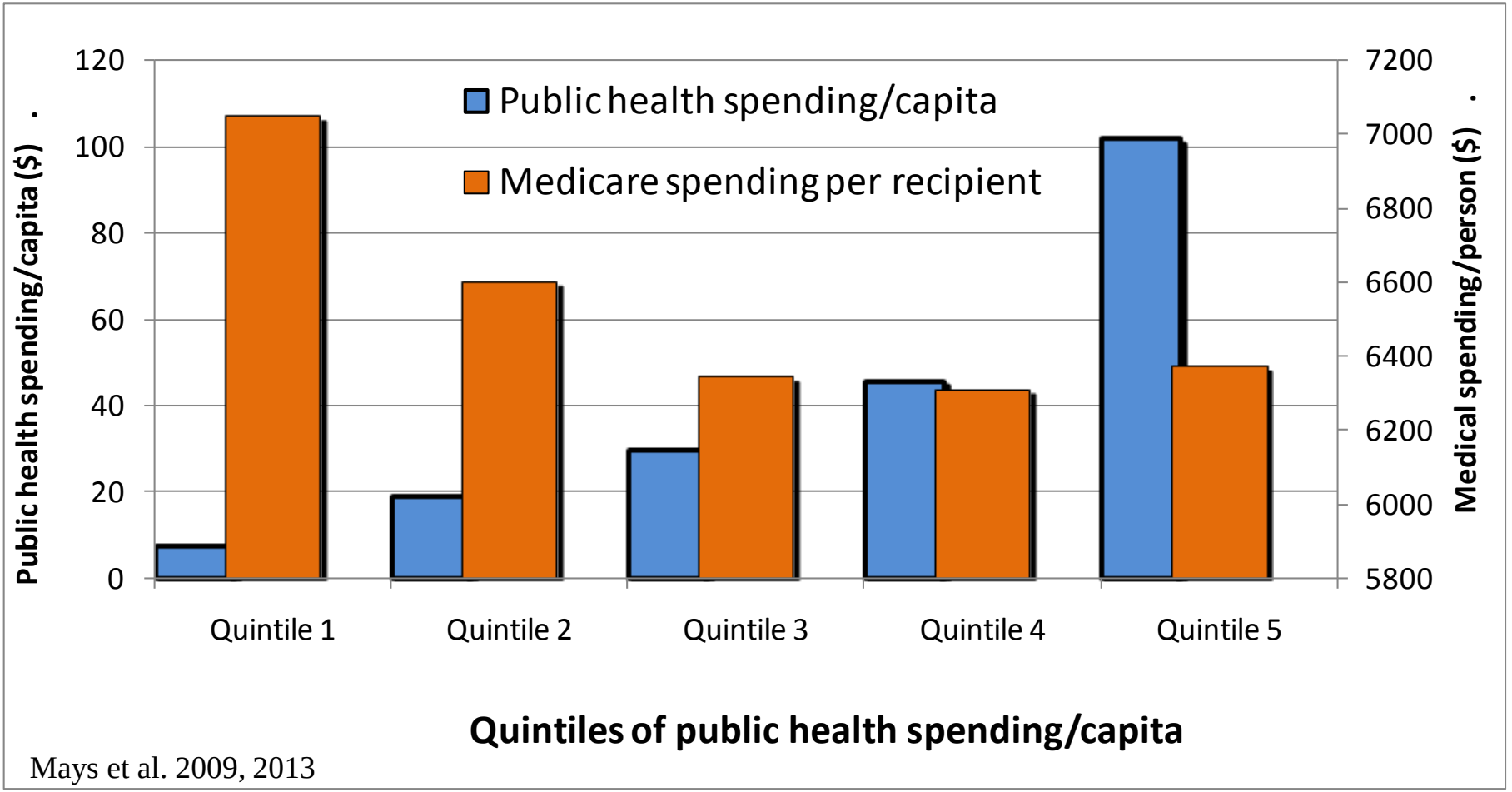


Hierarchical regression estimates with instrumental variables to correct for selection and unmeasured confounding

Mays et al. 2011

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

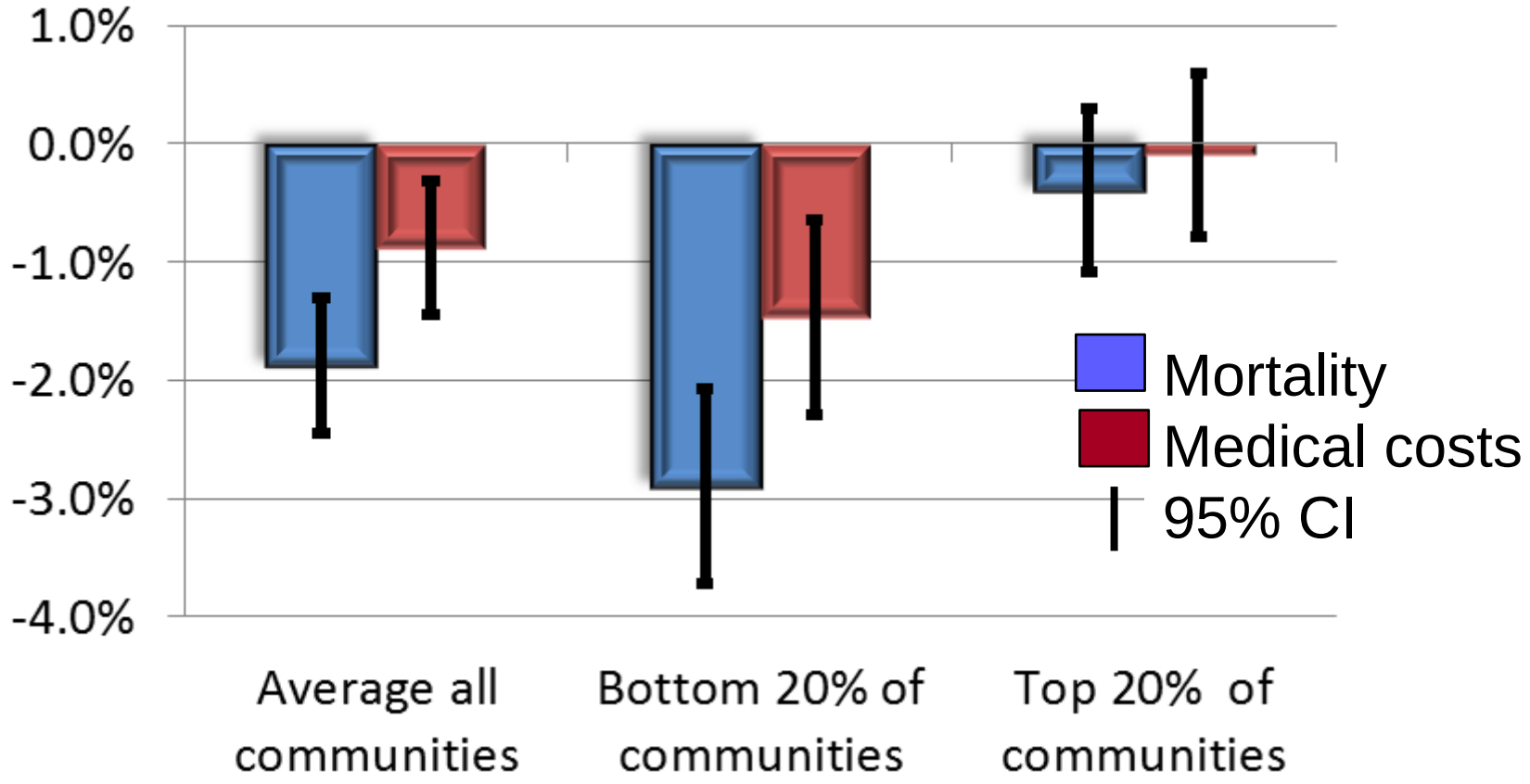


Mays et al. 2009, 2013

Community-specific estimates of public health spending on heart disease mortality

Impact of 10% Increase in Public Health Spending/Capita

Based on Income Per Capita in Communities



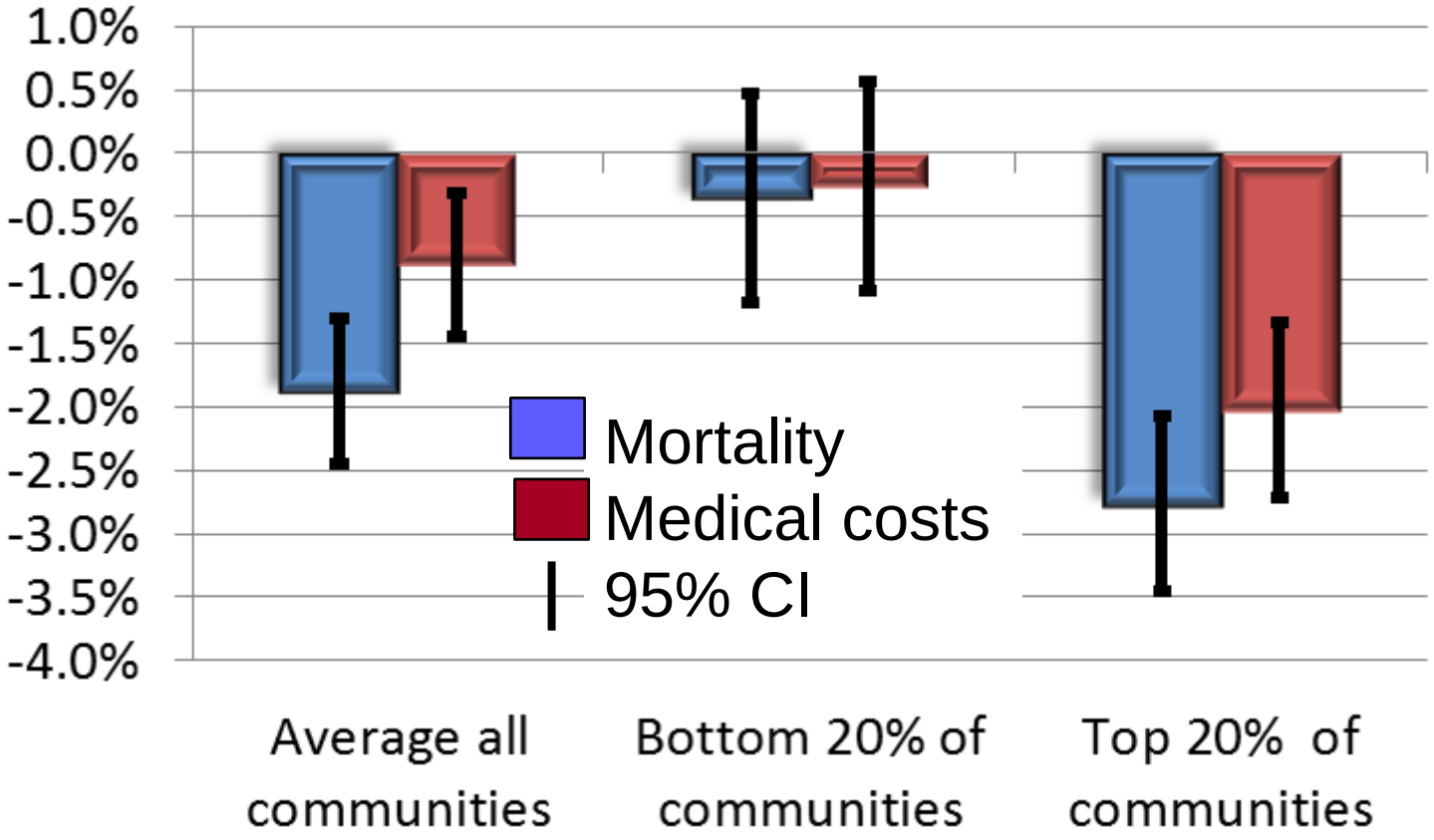
Log IV regression estimates controlling for community-level and state-level characteristics

Mays et al. forthcoming 2014

Community-specific estimates of public health spending on heart disease mortality

Impact of 10% Increase in Public Health Spending/Capita

Based on Scope of Public Health Services Delivered

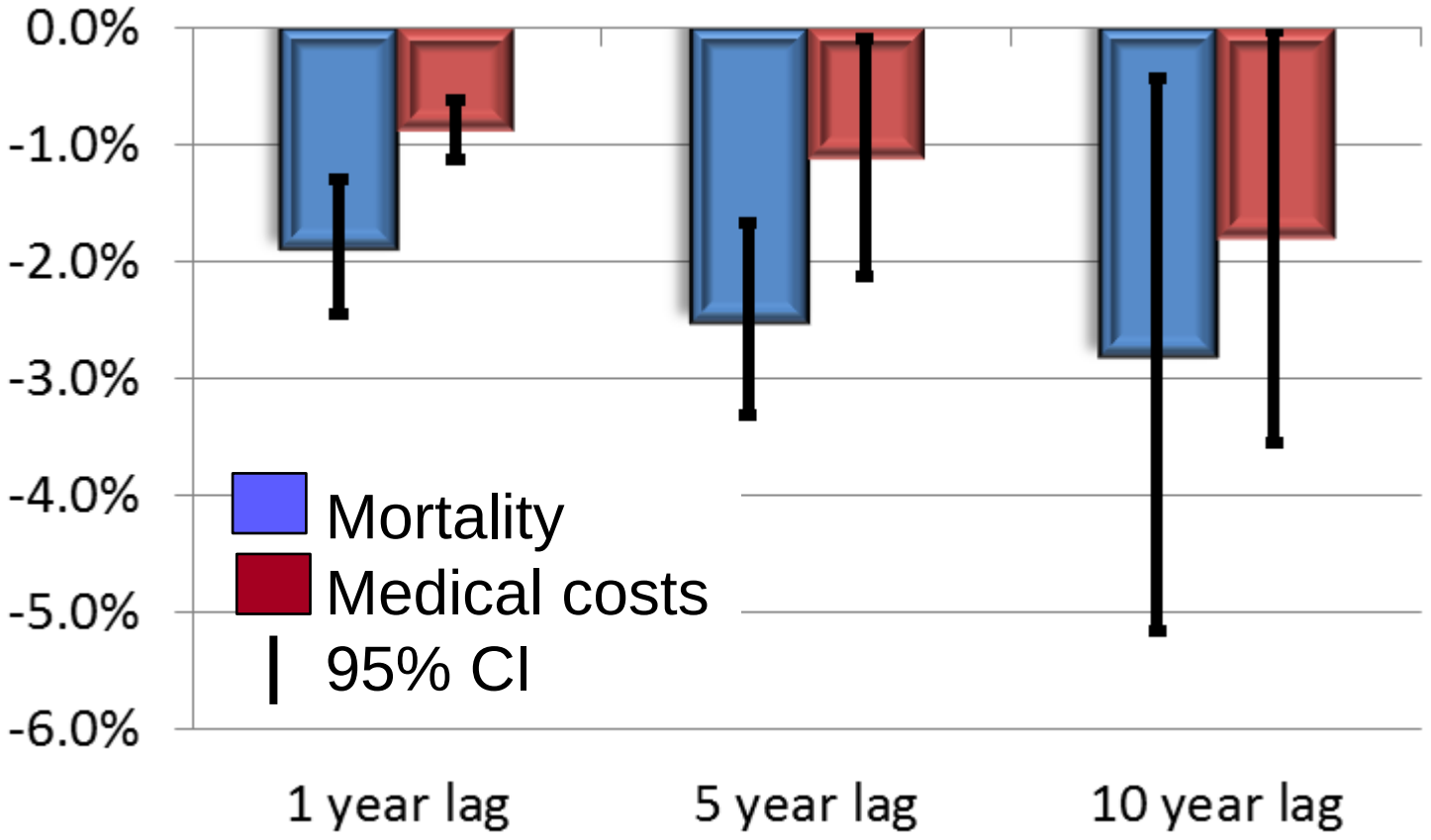


Log IV regression estimates controlling for community-level and state-level characteristics

Mays et al. forthcoming 2014

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

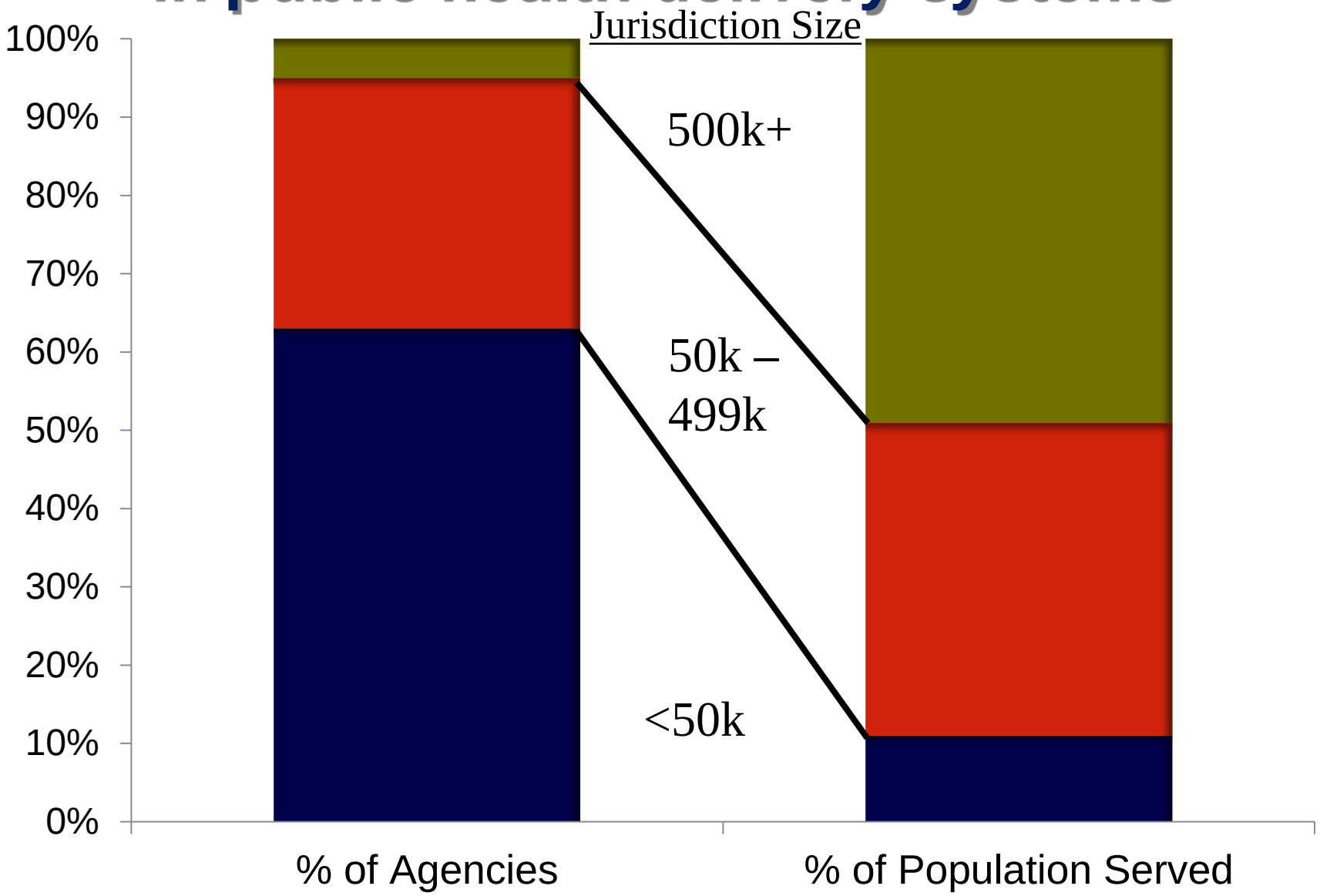
Changes in Mortality and Medical Care Spending Attributable to 10% Increase in Public Health Spending /Capita



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

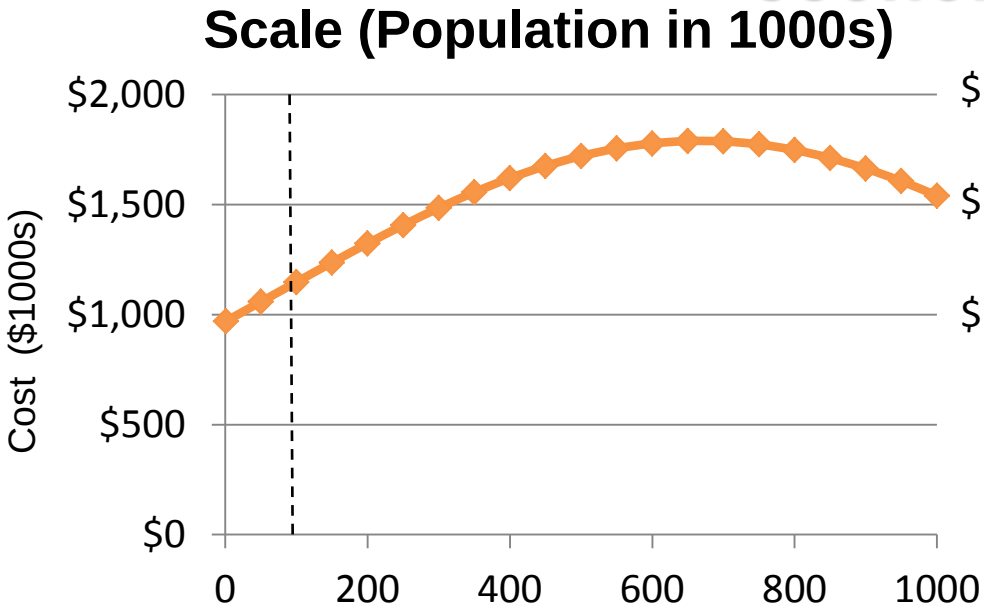
Mays et al. forthcoming 2014

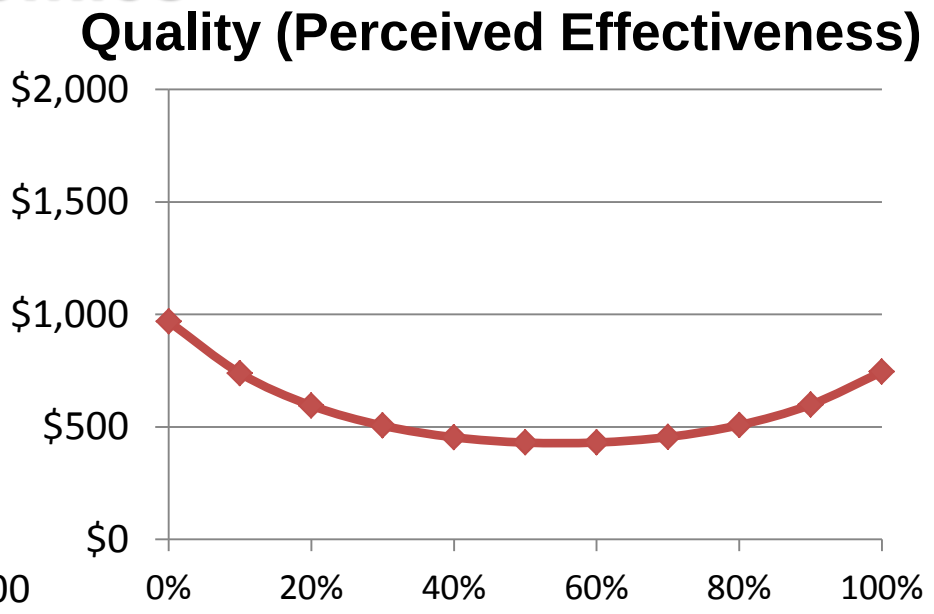
Economies of scale and scope in public health delivery systems

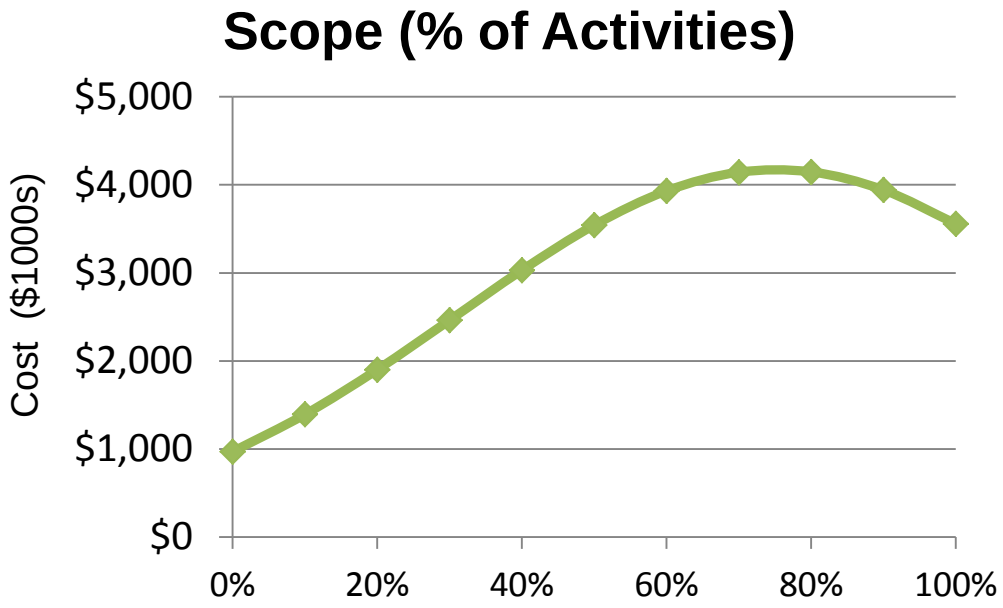


Source: 2010 NACCHO National Profile of Local Health Departments Survey

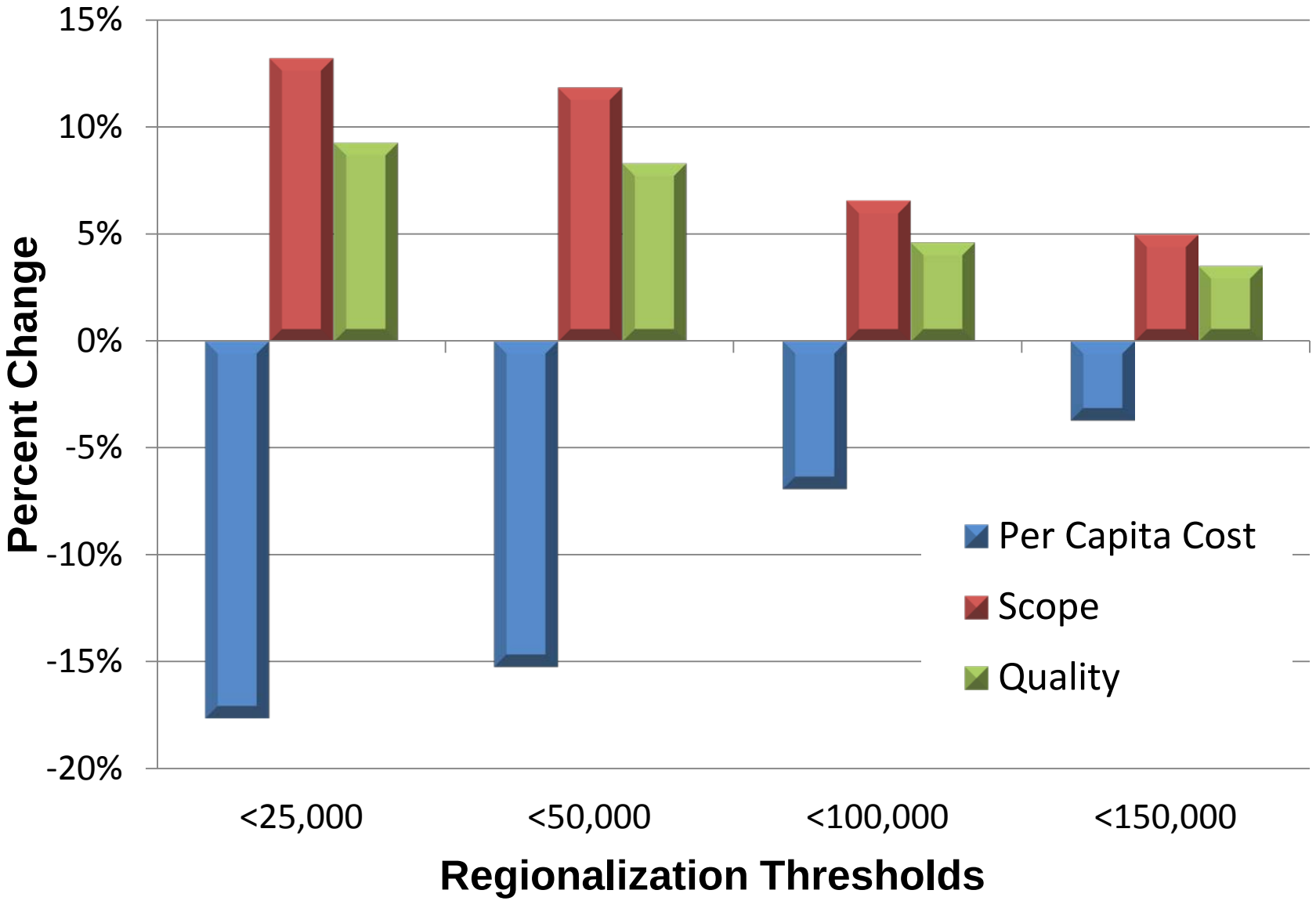
Empirical estimates of scale and scope economies







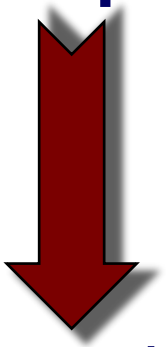
Simulated Effects of Regionalization



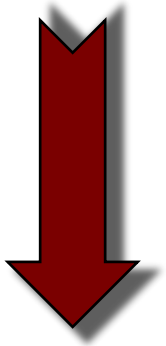
Pathways for research and learning about public health value

- Measuring practice & performance
- Detecting variation in practice
- Examining determinants of variation
  - Organization
  - Financing
  - Workforce
  - Law & policy
  - Information
  - Preference
- Determining consequences of variation
  - Health outcomes
  - Economic outcomes
  - Medical care use
  - Disparities
- Testing strategies to reduce **harmful**, **wasteful**, & **inequitable** variation in practice and outcomes

Descriptive



Inferential



Translational

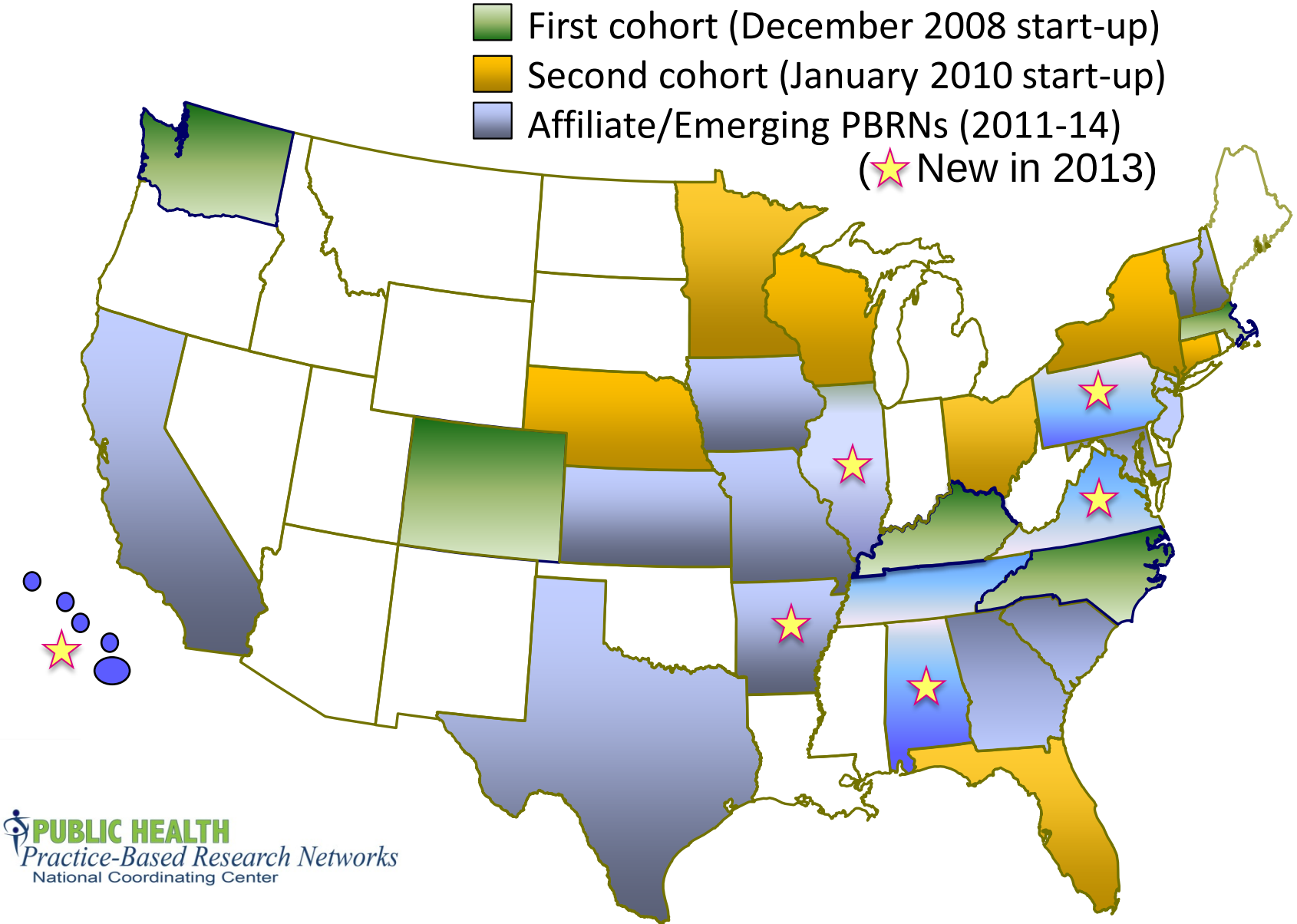
PBRNs and Research Translation

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

Activity	PBRN Agencies Percent/Mean		National Sample Percent/Mean		
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		

Mays et al. American Journal of Preventive Medicine 2013.

Diffusion of Public Health PBRNs



PUBLIC HEALTH
Practice-Based Research Networks
National Coordinating Center

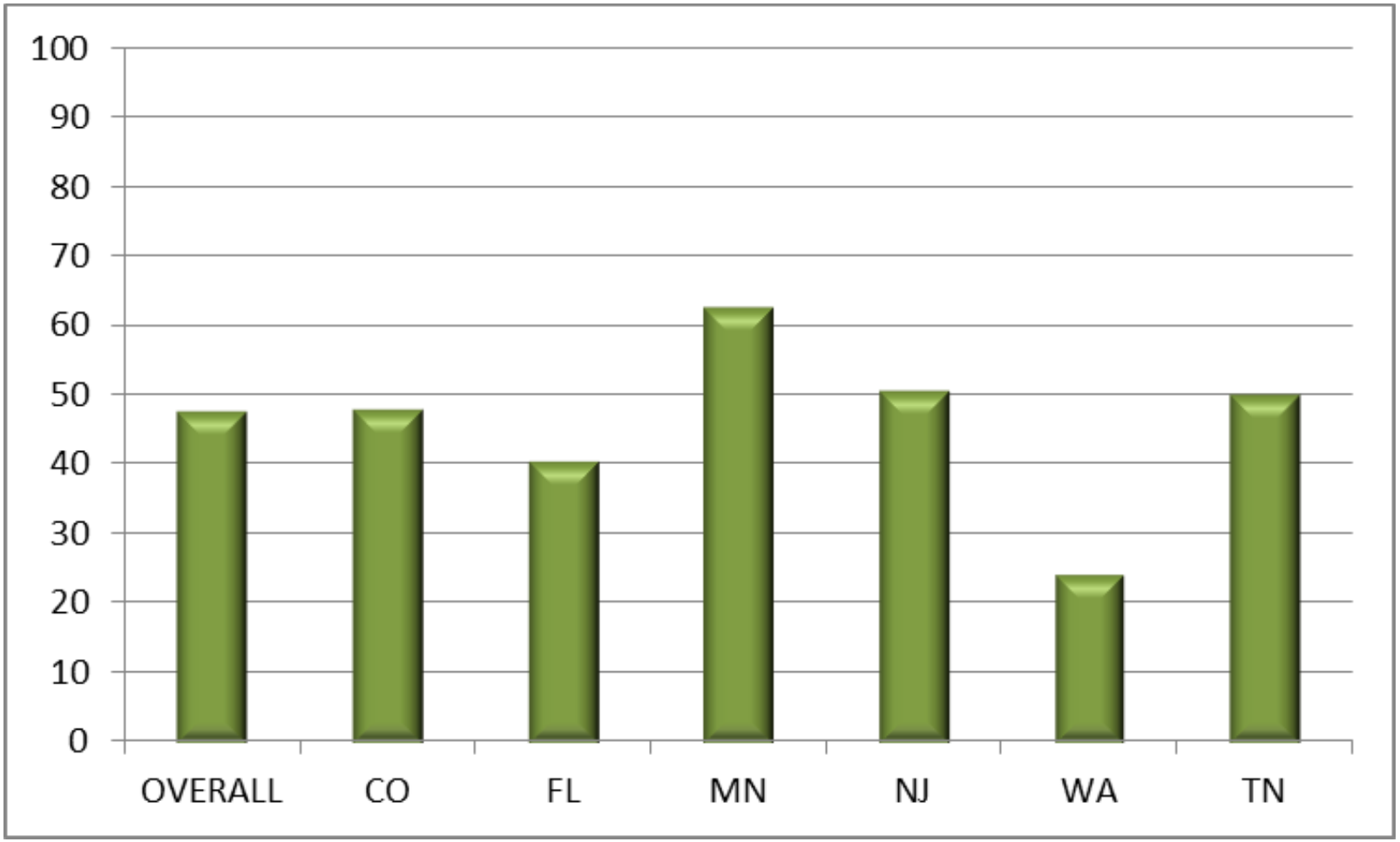
Studying Production Processes

Multi-Network Practice and Outcome Variation (MPROVE) Study, 2013-14

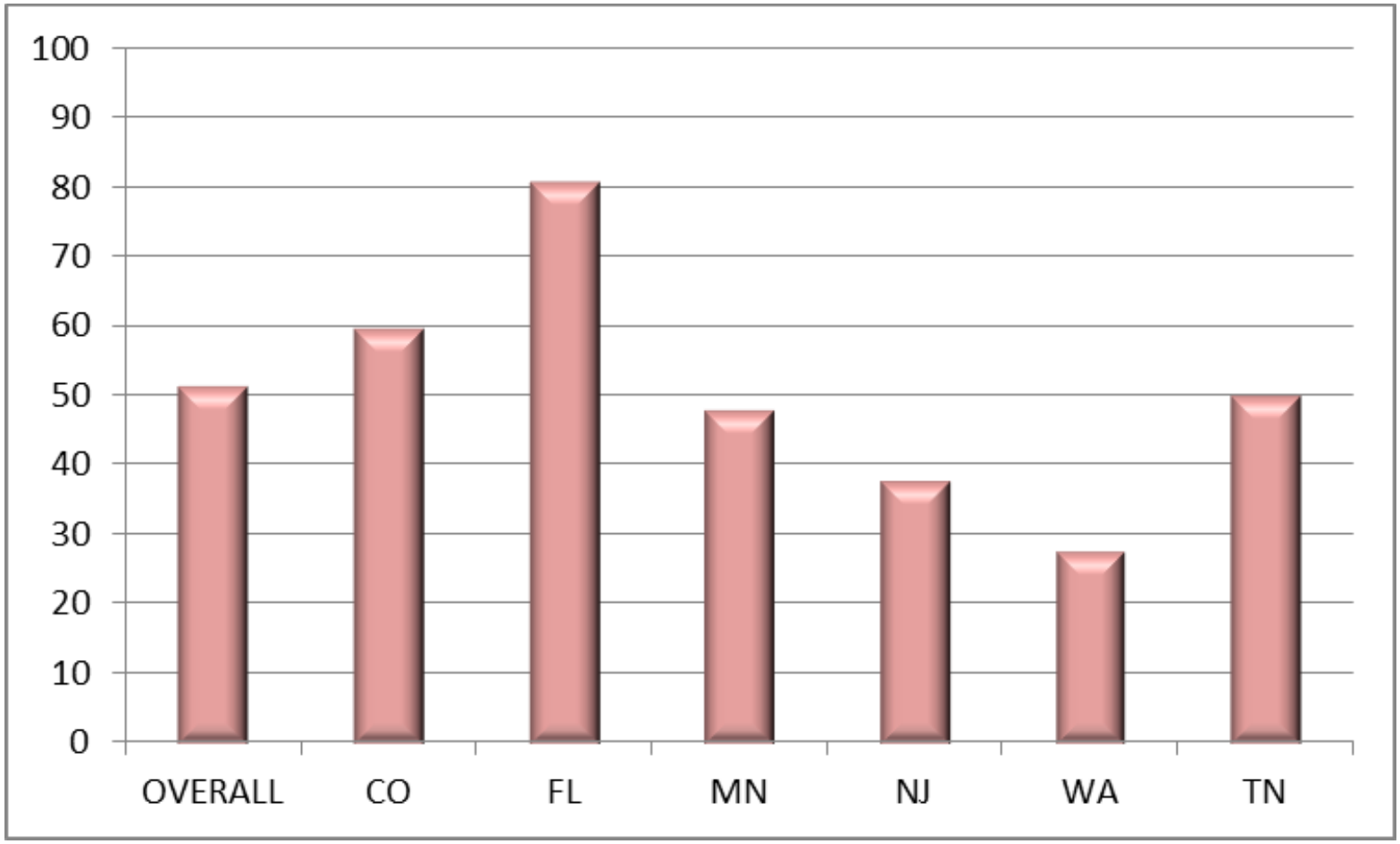
Measures of Interest

- ***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

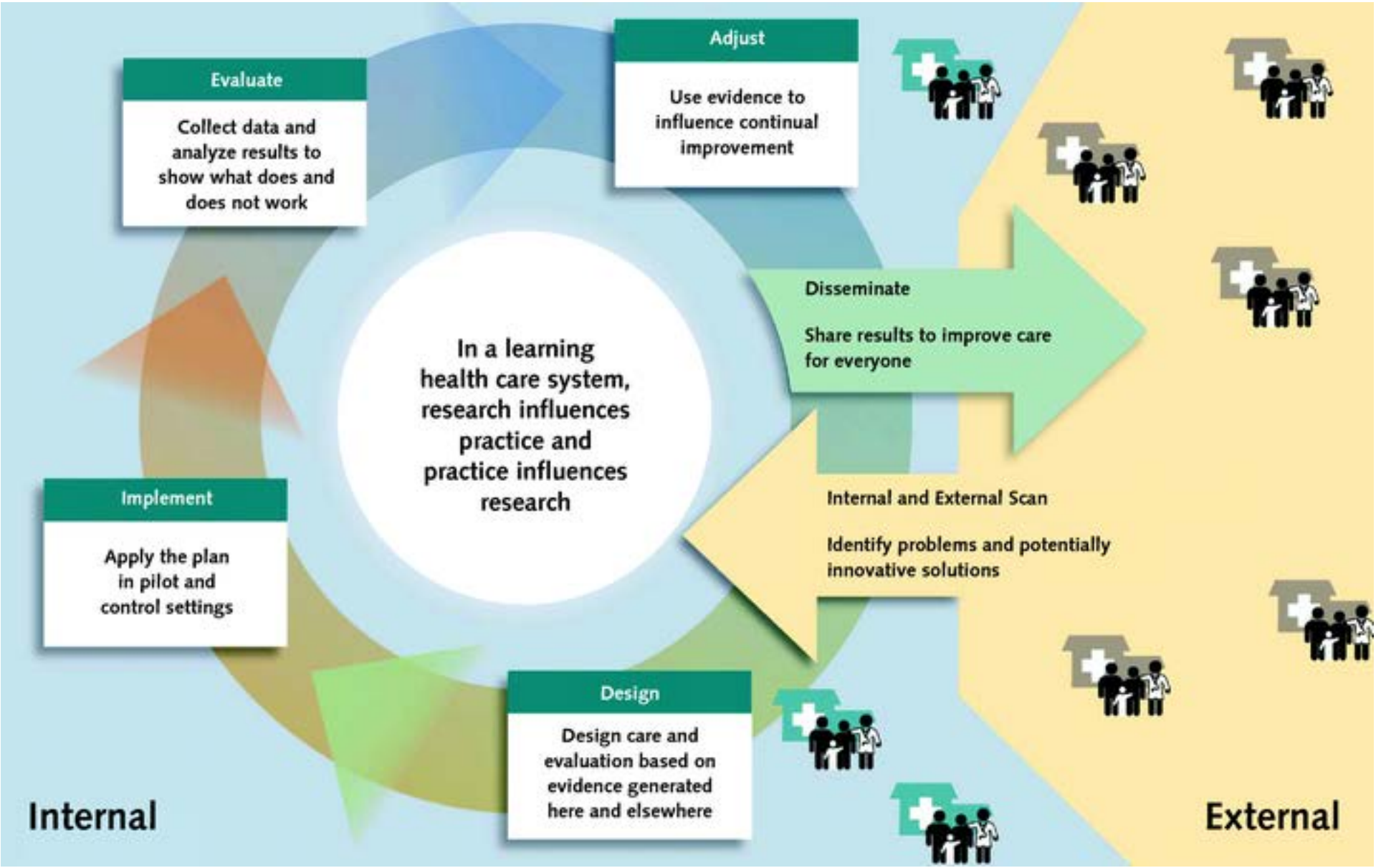
MPROVE Example: Implementation of community-wide health education campaigns to promote physical activity



MPROVE Example: Implementation of educational interventions to reduce tobacco use and/or exposure



Toward a “rapid-learning system” in public health



Green SM et al. *Ann Intern Med*. 2012;157(3):207-210

Always Open

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National Coordinating Center

Supported by The Robert Wood Johnson Foundation

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Journal: www.FrontiersinPHSSR.org
Archive: works.bepress.com/glen_mays
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