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Winter February 28, 2017

# Building Delivery Systems for Population Health

Glen P. Mays, *University of Kentucky*



Available at: [https://works.bepress.com/glen\\_mays/302/](https://works.bepress.com/glen_mays/302/)

# Building Delivery Systems for Population Health

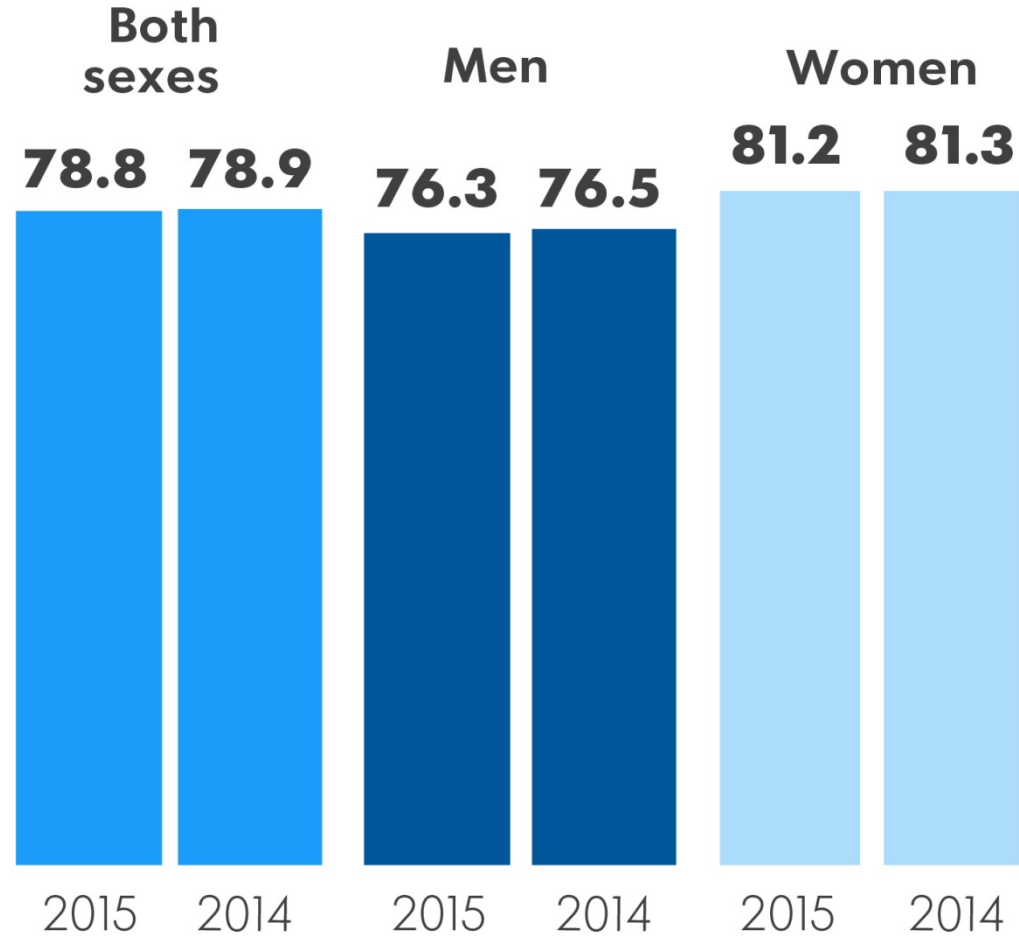
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[publichealtheconomics.org](http://publichealtheconomics.org)

**Q: How to we build robust,  
coordinated systems that  
support population-wide  
improvements in health status?**

# Losing ground in population health

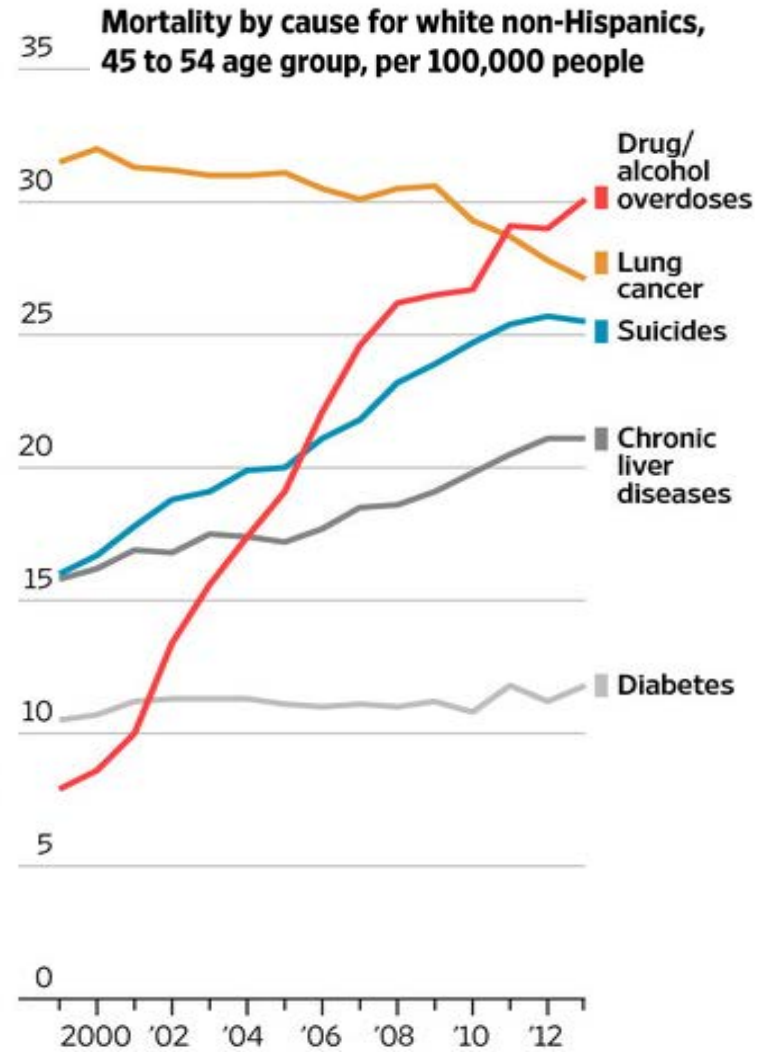
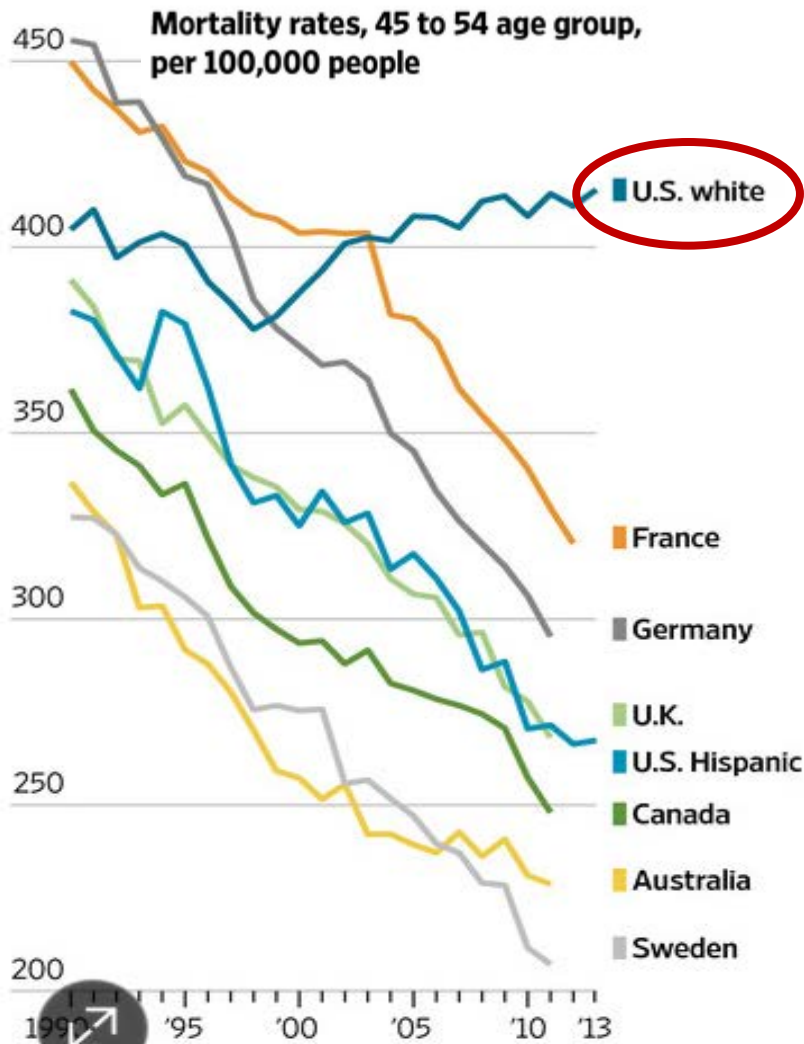
## U.S. LIFE EXPECTANCY FALLS



SOURCE CDC  
Jim Sergent, USA TODAY



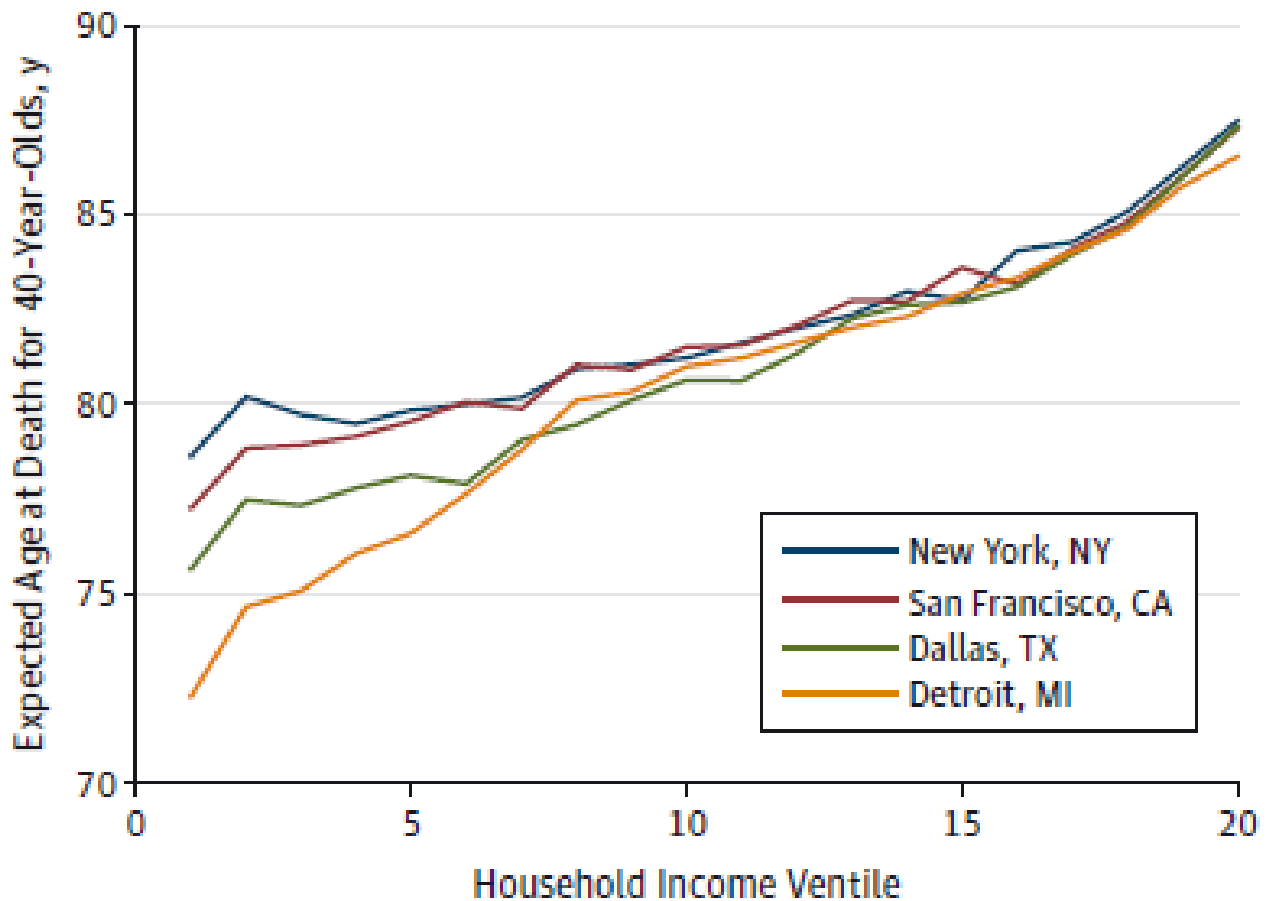
# Losing ground in population health



Case A, Deaton A. Proceedings of the National Academy of Sciences 2015

# But poor health is not uniformly poor among the poor

Men



Mean household income  
in thousands, \$<sup>a</sup>

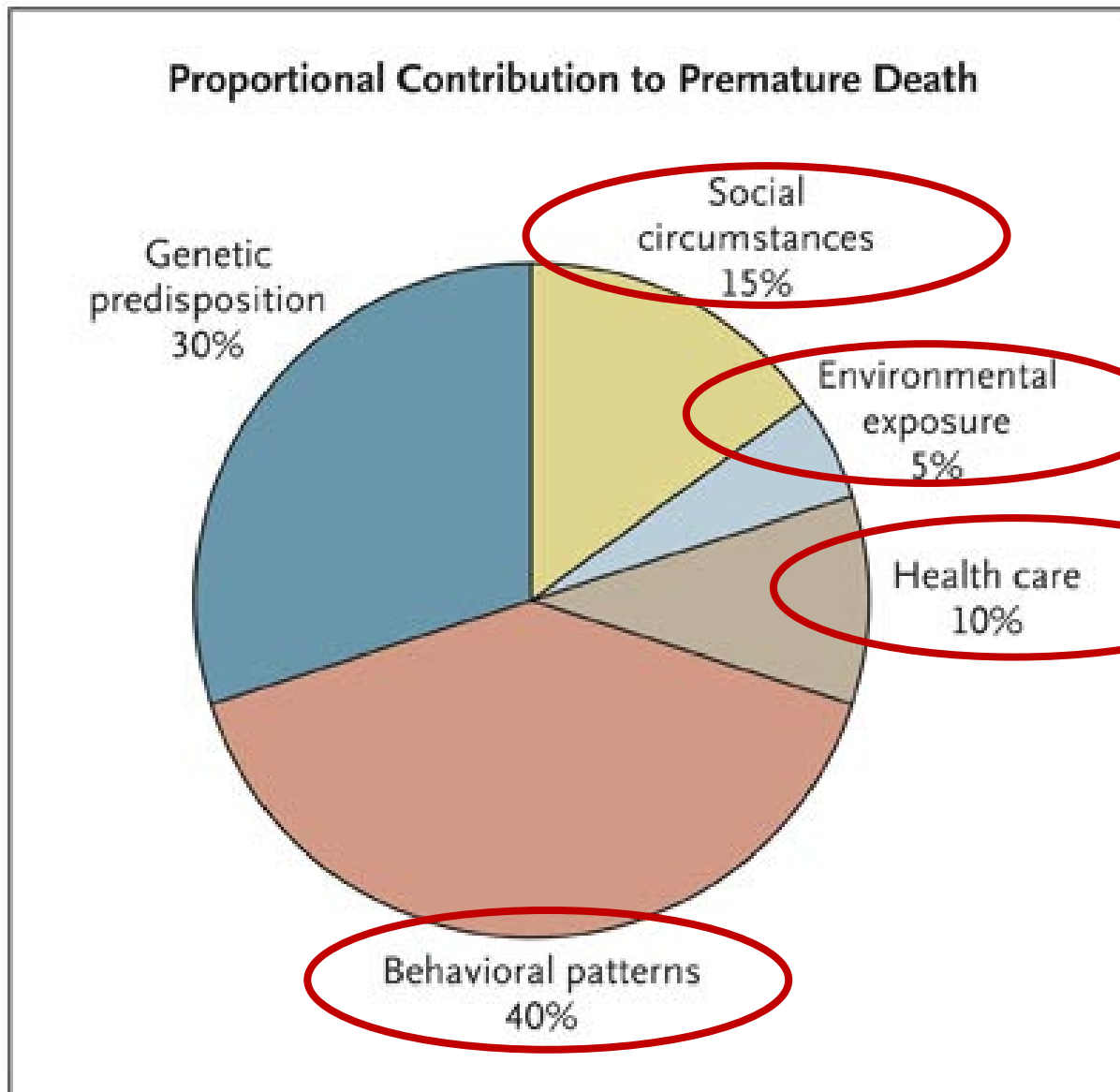
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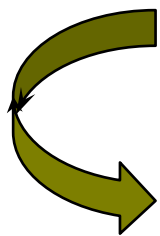
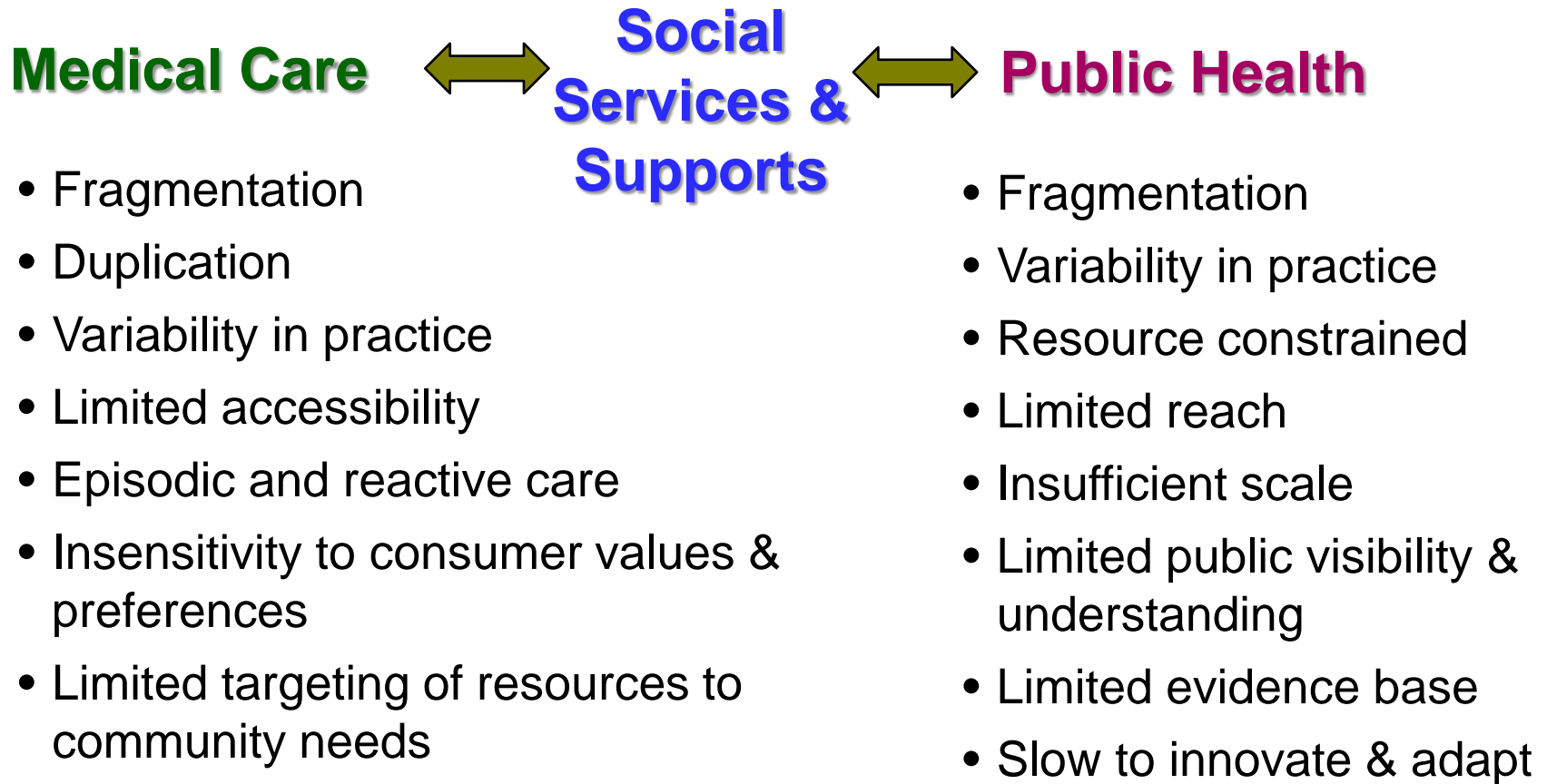
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683

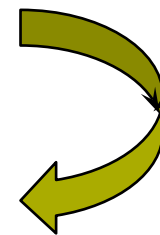
# Multiple systems & sectors drive health...



# ...But existing systems often fail to connect



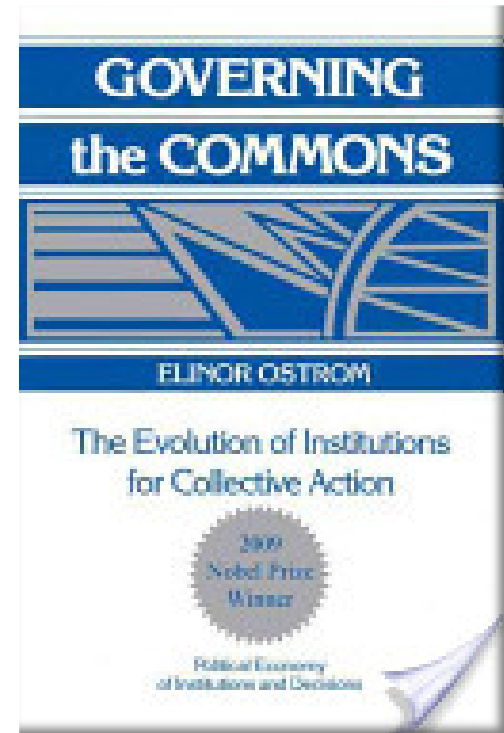
**Waste & inefficiency**  
**Inequitable outcomes**  
**Limited population health impact**





# Challenge: overcoming collective action problems across systems & sectors

- 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

# How do we support effective population health improvement 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
  - Infrastructure
  - Information
  - Incentives

Mays GP. Governmental public health and the economics of adaptation to population health strategies. *National Academy of Medicine Discussion Paper*. 2014.

<http://nam.edu/wp-content/uploads/2015/06/EconomicsOfAdaptation.pdf>

# Public health provides the catalytic functions to fuel multi-sector actions in health



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

# Comprehensive Public Health Systems

## One of RWJF's Culture of Health National Metrics

- Implement a ***broad scope*** of population health activities
- Through ***dense networks*** of multi-sector relationships
- Including ***central actors*** to coordinate actions

### Access to public health

Overall, 47.2 percent of the population is covered by a comprehensive public health system. Individuals are more likely to have access if they are non-White (51.5 percent vs. 45.5 percent White) or live in a metropolitan area (48.7 percent vs. 34.1 percent in nonmetropolitan areas).

47.2%

of population served by a  
comprehensive public  
health system

# What do we know about multi-sector work in population health?

## National Longitudinal Survey of Public Health Systems

- Cohort of 360 communities with at least 100,000 residents
- Followed over time: 1998, 2006, 2012, 2014\*\*, 2016
- Local public health officials report:
  - **Scope**: availability of 20 recommended population health activities
  - **Network**: organizations contributing to each activity
  - **Centrality of effort**: contributed by governmental public health agency
  - **Quality**: perceived effectiveness of each activity

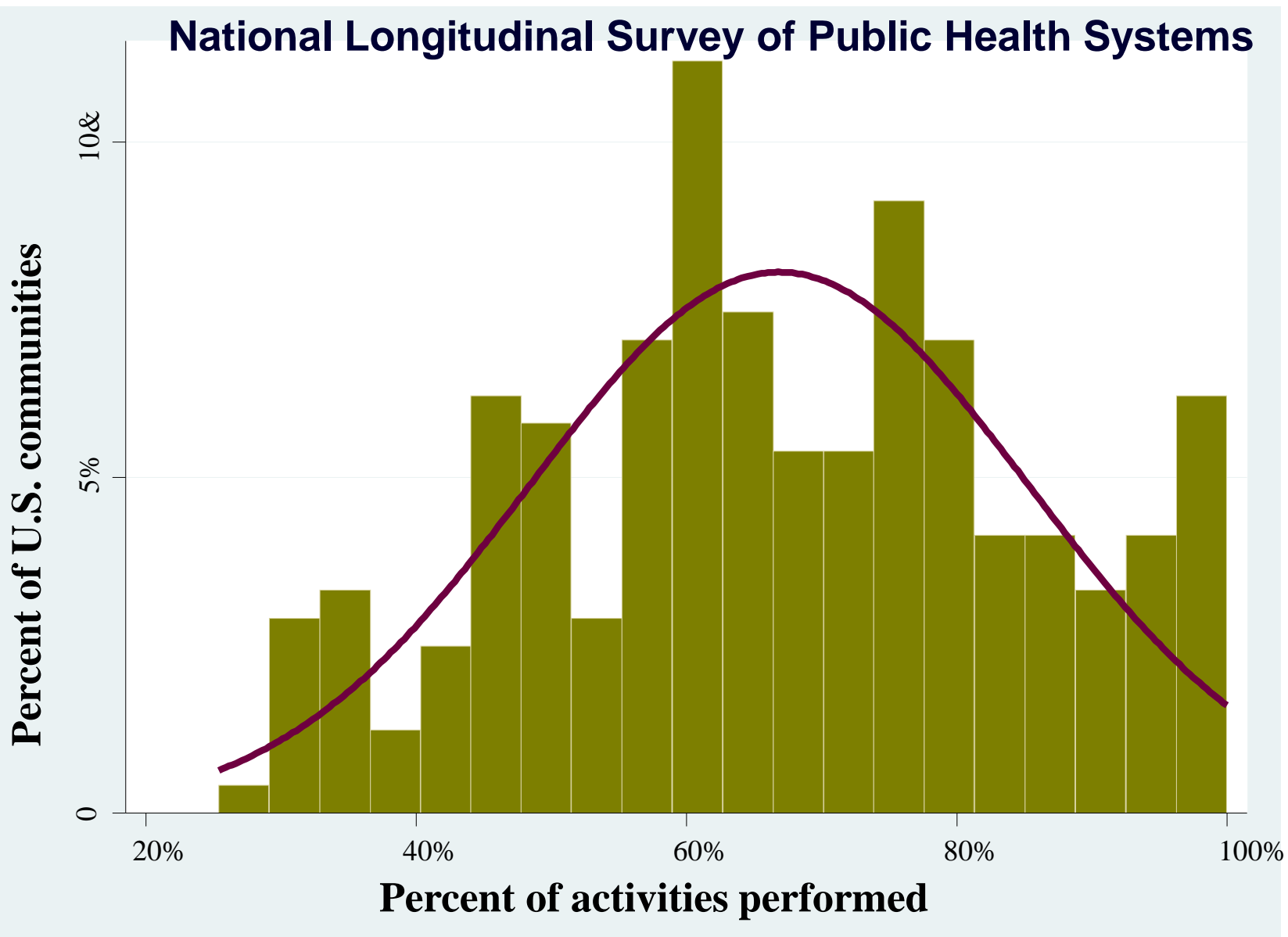
\*\* Expanded sample of 500 communities < 100,000 added in 2014 wave

# Data linkages

- **Area Health Resource File:** health resources, demographics, socioeconomic status, insurance coverage
- **NACCHO Profile data:** public health agency institutional and financial characteristics
- **PHAB:** public health agency accreditation status
- **CMS Impact File & Cost Report:** hospital ownership, market share, uncompensated care
- **Dartmouth Atlas:** Area-level medical spending (Medicare)
- **CDC Compressed Mortality File:** Cause-specific death rates by county
- **Equality of Opportunity Project (Chetty):** local estimates of life expectancy by income
- **Federal health surveys:** National Health Interview Survey, Medical Expenditure Panel Survey

# Variation in implementing foundational public health activities

National Longitudinal Survey of Public Health Systems



# Implementation of public health activities, 1998-2014

	<b>Activity</b>	<b>1998</b>	<b>2014</b>	<b>% Change</b>
Assessment	1. Conduct periodic assessment of community health status and needs	71.5%	87.1%	21.8%
	2. Survey community for behavioral risk factors	45.8%	71.1%	55.2%
	3. Investigate adverse health events, outbreaks and hazards	98.6%	100.0%	1.4%
	4. Conduct laboratory testing to identify health hazards and risks	96.3%	96.1%	-0.2%
	5. Analyze data on community health status and health determinants	61.3%	72.7%	18.6%
	6. Analyze data on preventive services use	28.4%	39.0%	37.3%
Policy/Planning	7. Routinely provide community health information to elected officials	80.9%	84.0%	3.8%
	8. Routinely provide community health information to the public	75.4%	82.3%	9.1%
	9. Routinely provide community health information to the media	75.2%	89.0%	18.3%
	10. Prioritize community health needs	66.1%	83.6%	26.5%
	11. Engage community stakeholders in health improvement planning	41.5%	68.8%	65.7%
	12. Develop a community-wide health improvement plan	81.9%	87.9%	7.3%
	13. Identify and allocate resources based on community health plan	26.2%	41.9%	59.9%
	14. Develop policies to address priorities in community health plan	48.6%	56.8%	16.9%
	15. Maintain a communication network among health-related organizations	78.8%	85.3%	8.2%
Assurance	16. Link people to needed health and social services	75.6%	50.0%	-33.8%
	17. Implement legally mandated public health activities	91.4%	92.4%	1.1%
	18. Evaluate health programs and services in the community	34.7%	37.9%	9.4%
	19. Evaluate local public health agency capacity and performance	56.3%	56.1%	-0.3%
	20. Monitor and improve implementation of health programs and policies	47.3%	46.4%	-1.9%
	Mean performance of assessment activities (#1-6)	67.0%	77.7%	15.9%
	Mean performance of policy and planning activities (#7-15)	63.9%	75.5%	18.3%
	Mean performance of implementation and assurance activities (#16-20)	61.1%	56.6%	-7.3%
	Mean performance of all activities	63.8%	67.6%	6.0%

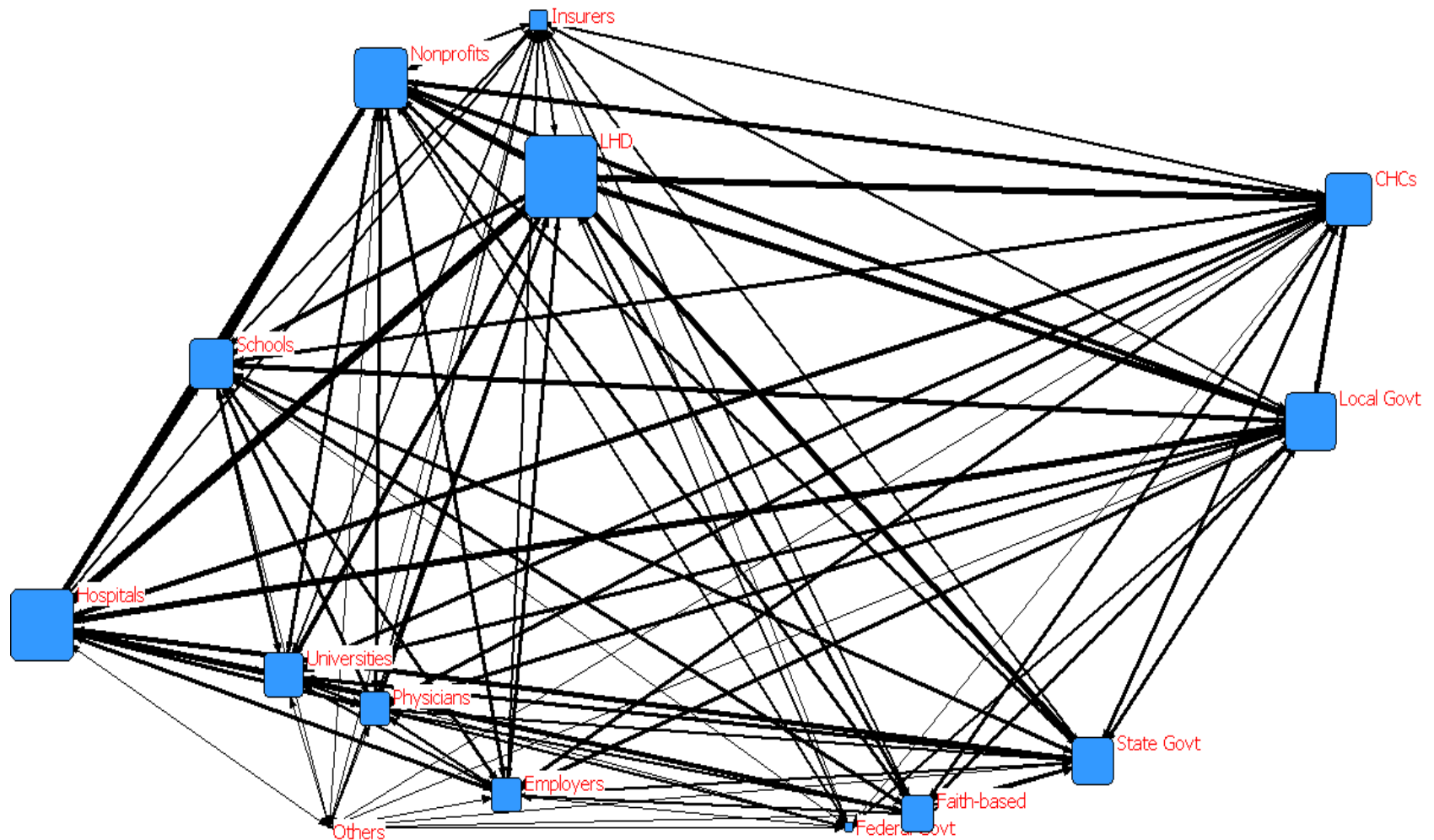


# Organizational contributions to public health activities, 1998-2014

## % of Recommended Activities Implemented

<u>Type of Organization</u>	<u>1998</u>	<u>2014</u>	<u>Percent Change</u>
Local public health agencies	60.7%	67.5%	11.1%
Other local government agencies	31.8%	33.2%	4.4%
State public health agencies	46.0%	34.3%	-25.4%
Other state government agencies	17.2%	12.3%	-28.8%
Federal government agencies	7.0%	7.2%	3.7%
Hospitals	37.3%	46.6%	24.7%
Physician practices	20.2%	18.0%	-10.6%
Community health centers	12.4%	29.0%	134.6%
Health insurers	8.6%	10.6%	23.0%
Employers/businesses	16.9%	15.3%	-9.6%
Schools	30.7%	25.2%	-17.9%
Universities/colleges	15.6%	22.6%	44.7%
Faith-based organizations	19.2%	17.5%	-9.1%
Other nonprofit organizations	31.9%	32.5%	2.0%
Other	8.5%	5.2%	-38.4%

# Mapping who contributes to public health

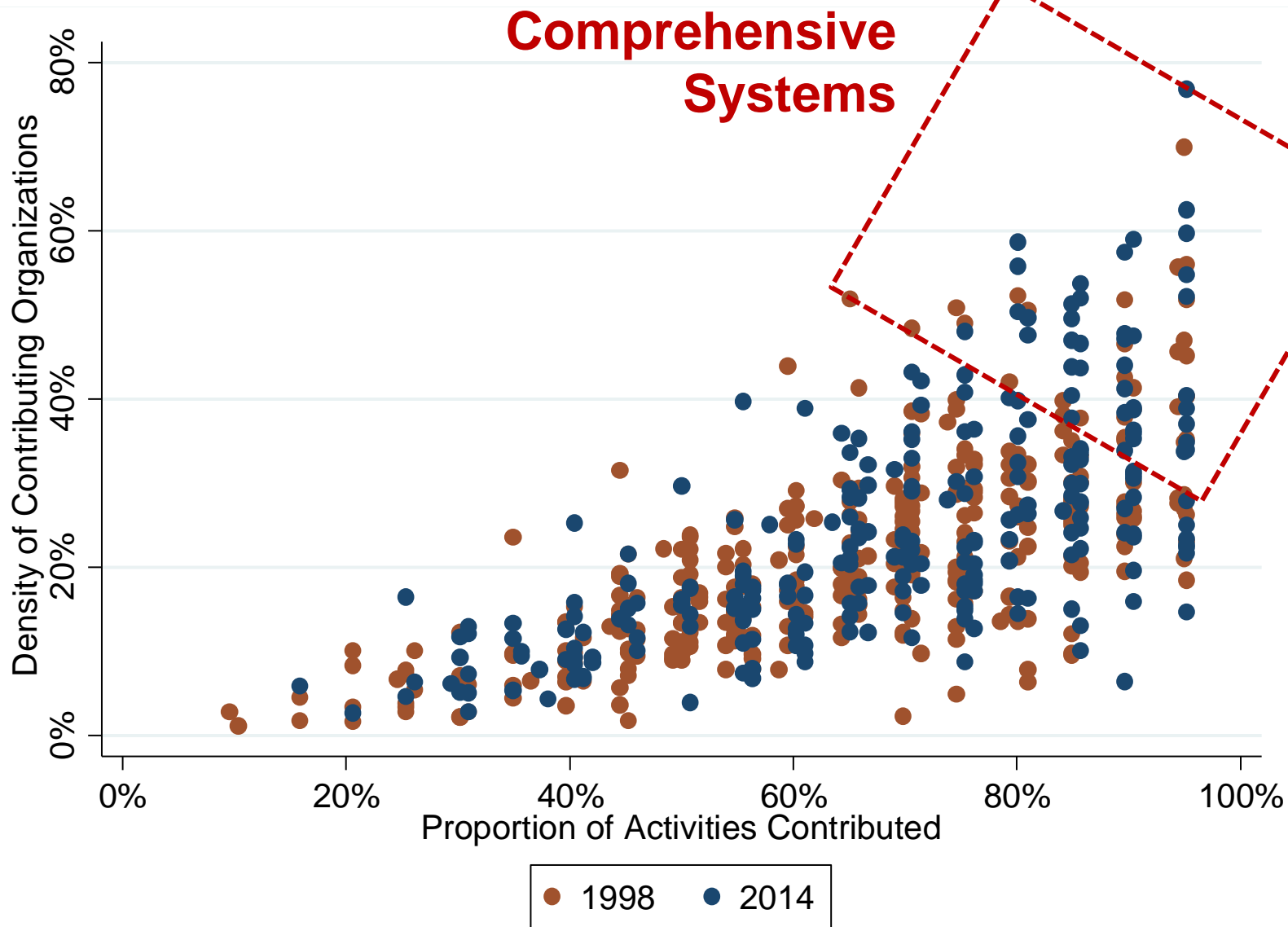


**Node size = degree centrality**

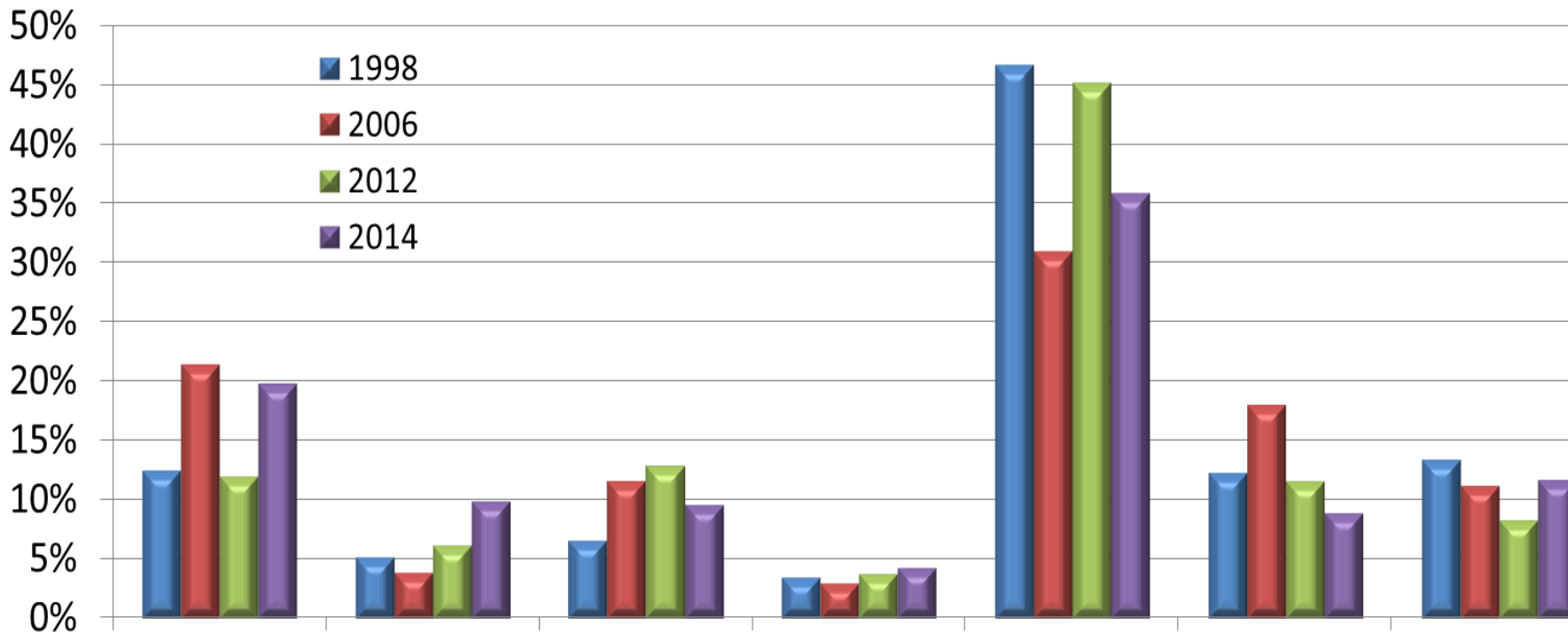
**Line size = % activities jointly contributed (tie strength)**

Mays GP et al. Understanding the organization of public health delivery systems: an empirical typology. *Milbank Q.* 2010;88(1):81–111.

# Network density and scope of activities



# Classifying multi-sector delivery systems for public health 1998-2014



Cluster 1      Cluster 2      Cluster 3      Cluster 4      Cluster 5      Cluster 6      Cluster 7

**Scope**  
**Centrality**  
**Density**

High	High	High	Mod	Mod	Low	Low
Mod	Low	High	High	Low	High	Low
High	High	Mod	Mod	Mod	Low	Mod

**Comprehensive**  
**(High System Capital)**

**Conventional**

**Limited**

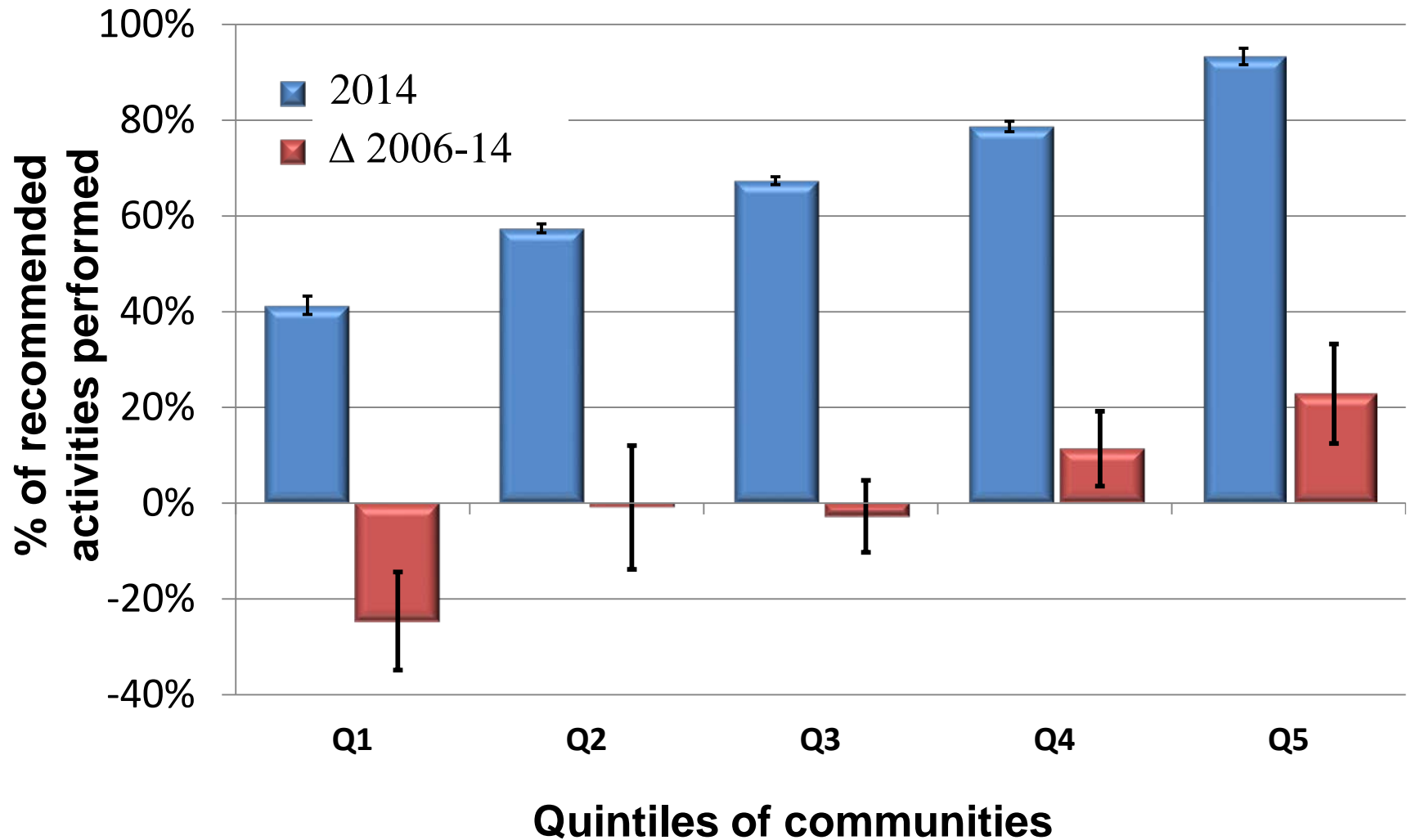
# Changes in system prevalence and coverage

System Capital Measures	1998	2006	2012	2014	2014 (<100k)
<b>Comprehensive systems</b>					
% of communities	24.2%	36.9%	31.1%	32.7%	25.7%
% of population	25.0%	50.8%	47.7%	47.2%	36.6%
<b>Conventional systems</b>					
% of communities	50.1%	33.9%	49.0%	40.1%	57.6%
% of population	46.9%	25.8%	36.3%	32.5%	47.3%
<b>Limited systems</b>					
% of communities	25.6%	29.2%	19.9%	20.6%	16.7%
% of population	28.1%	23.4%	16.0%	19.6%	16.1%

Mays GP, Hogg RA. Economic shocks and public health protections in US metropolitan areas. *Am J Public Health*. 2015;105 Suppl 2:S280-7.

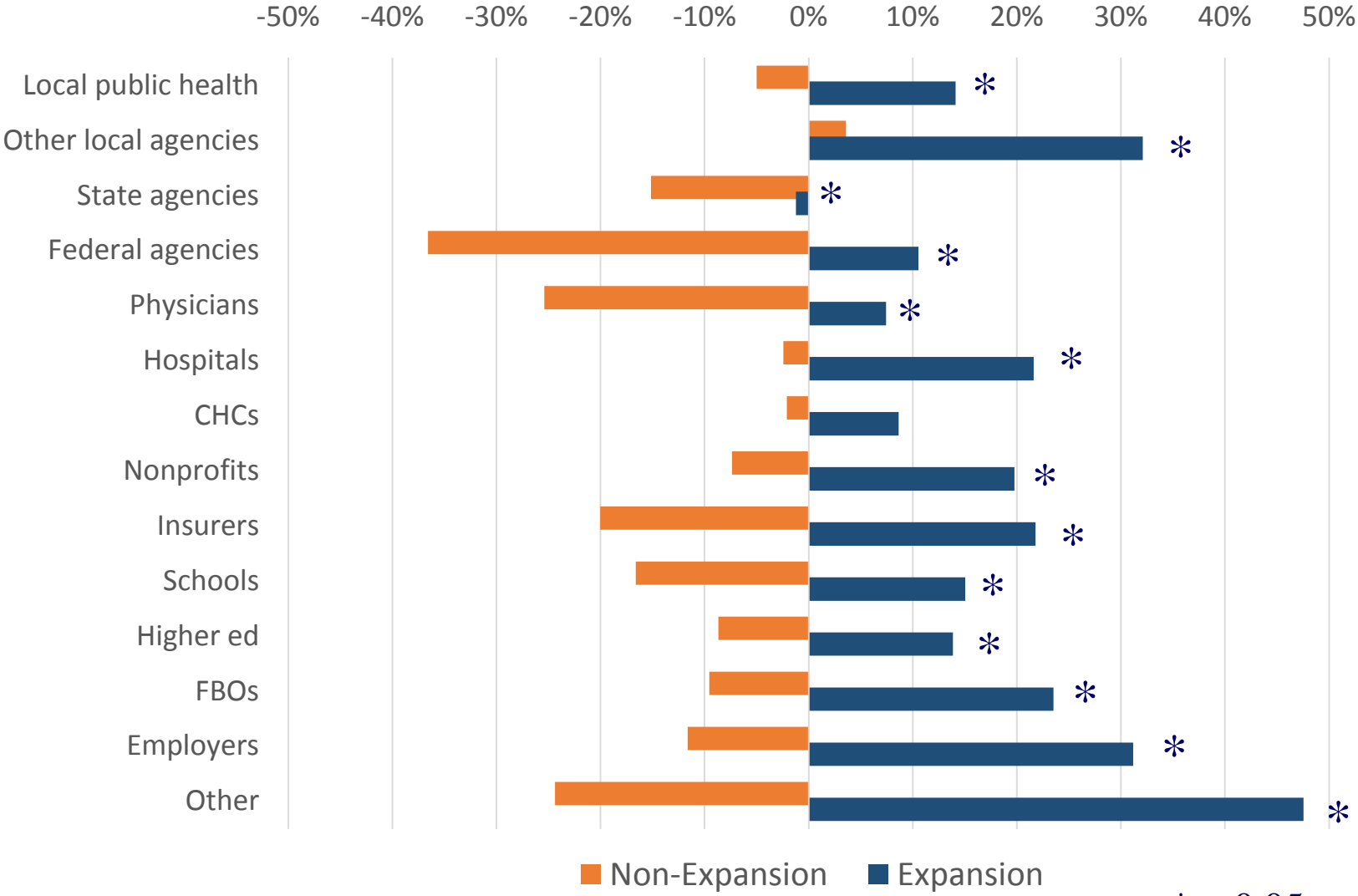
# Equity in public health delivery systems

## Delivery of recommended activities



Mays GP, Hogg RA. Economic shocks and public health protections in US metropolitan areas. *Am J Public Health*. 2015;105 Suppl 2:S280-7.

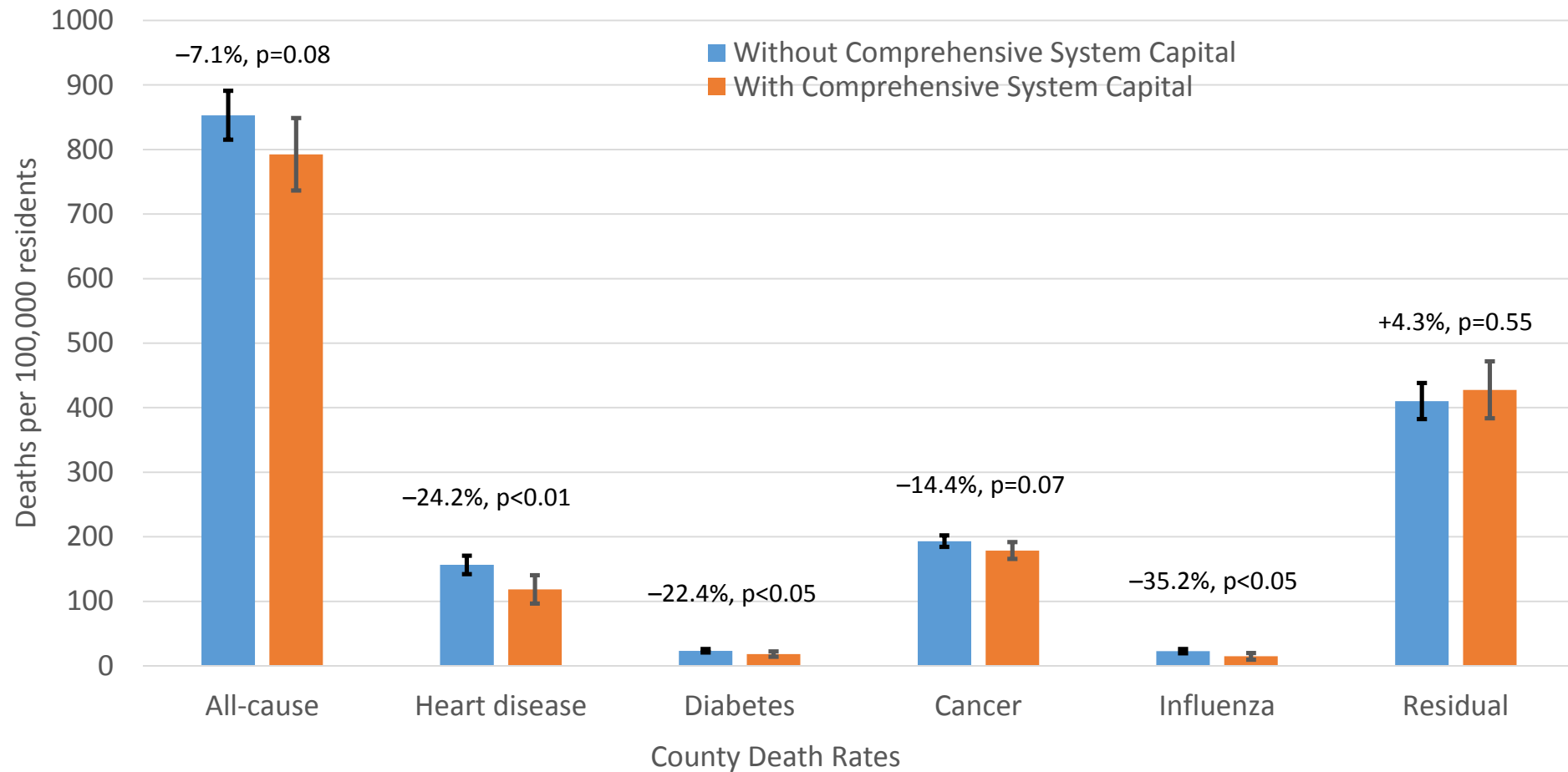
# Changes in organizational centrality by ACA Medicaid expansion status, 2012-2014



\*p<0.05

# Health effects attributable to multi-sector work

## Impact of Comprehensive Systems on **Mortality**, 1998-2014

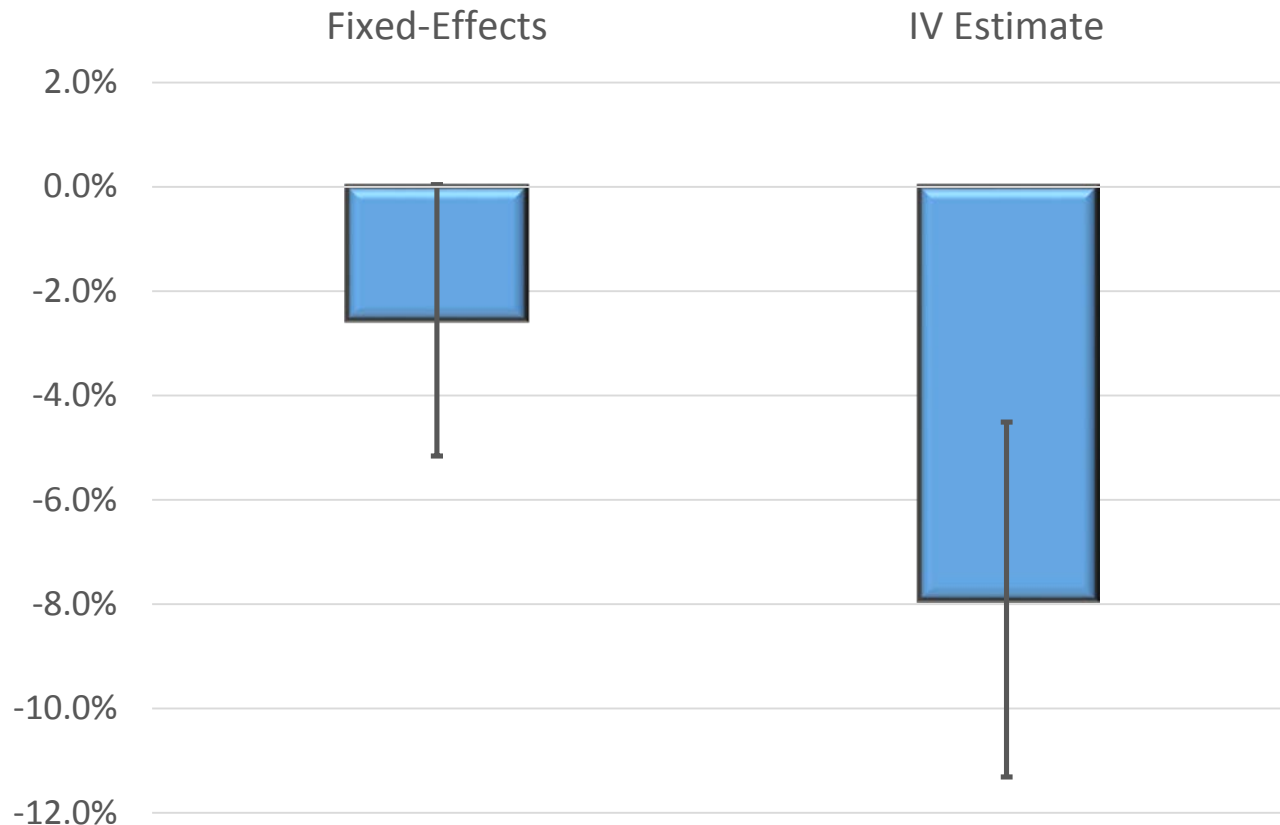


Fixed-effects instrumental variables estimates controlling for racial composition, unemployment, health insurance coverage, educational attainment, age composition, and state and year fixed effects. N=1019 community-years



# Economic effects attributable to multi-sector work

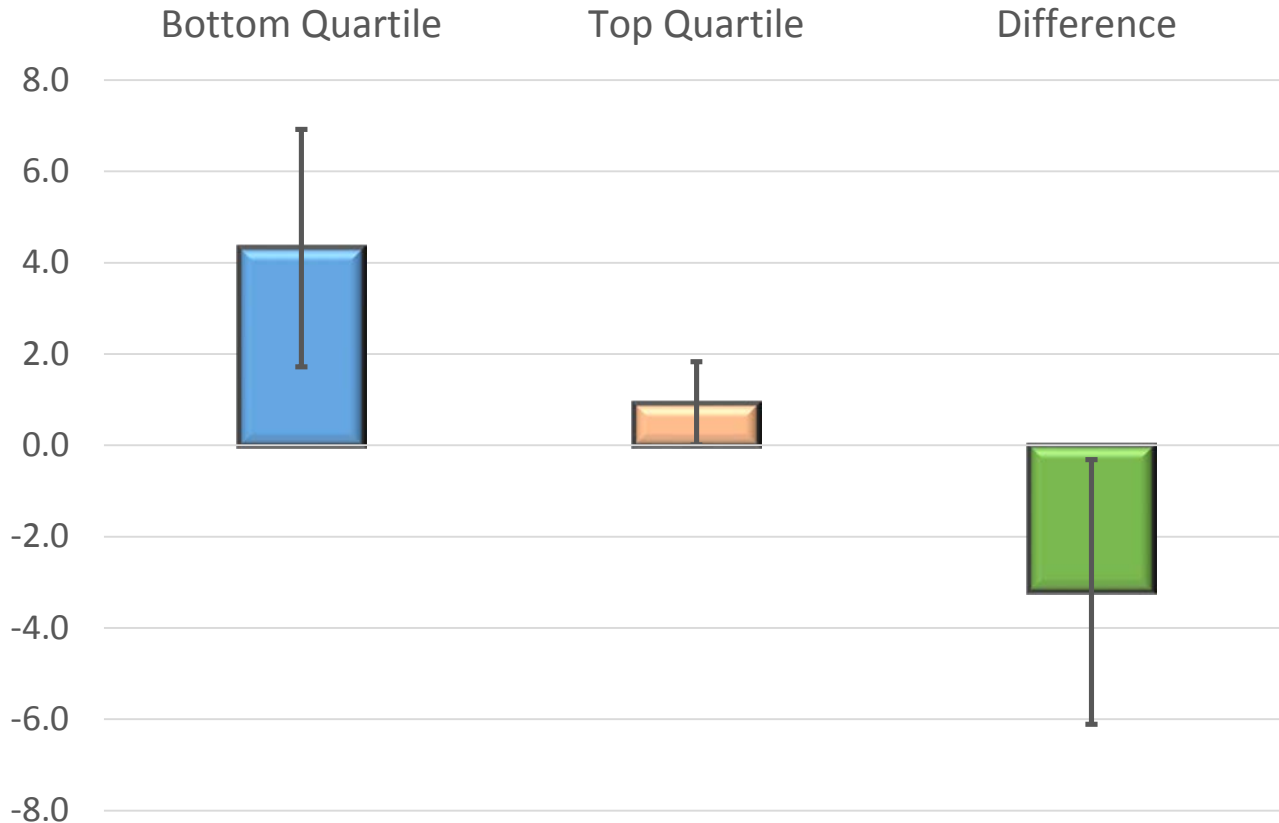
## Impact of Comprehensive Systems on **Medical Spending** (Medicare) 1998-2014



Models also control for racial composition, unemployment, health insurance coverage, educational attainment, age composition, and state and year fixed effects. N=1019 community-years. Vertical lines are 95% confidence intervals

# Economic effects attributable to multi-sector work

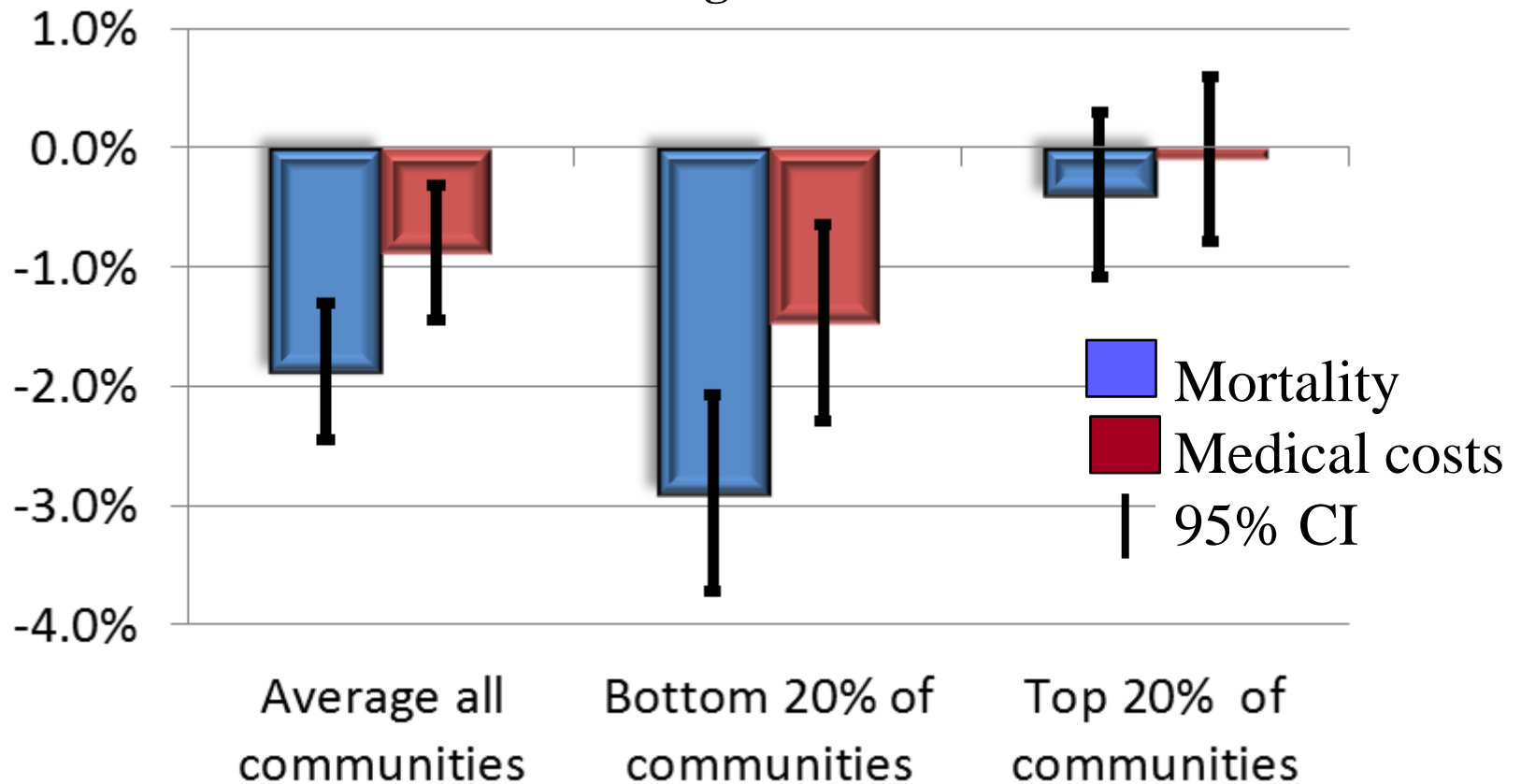
## Impact of Comprehensive Systems on **Life Expectancy by Income** (Chetty), 2001-2014



Models also control for racial composition, unemployment, health insurance coverage, educational attainment, age composition, and state and year fixed effects. N=1019 community-years. Vertical lines are 95% confidence intervals

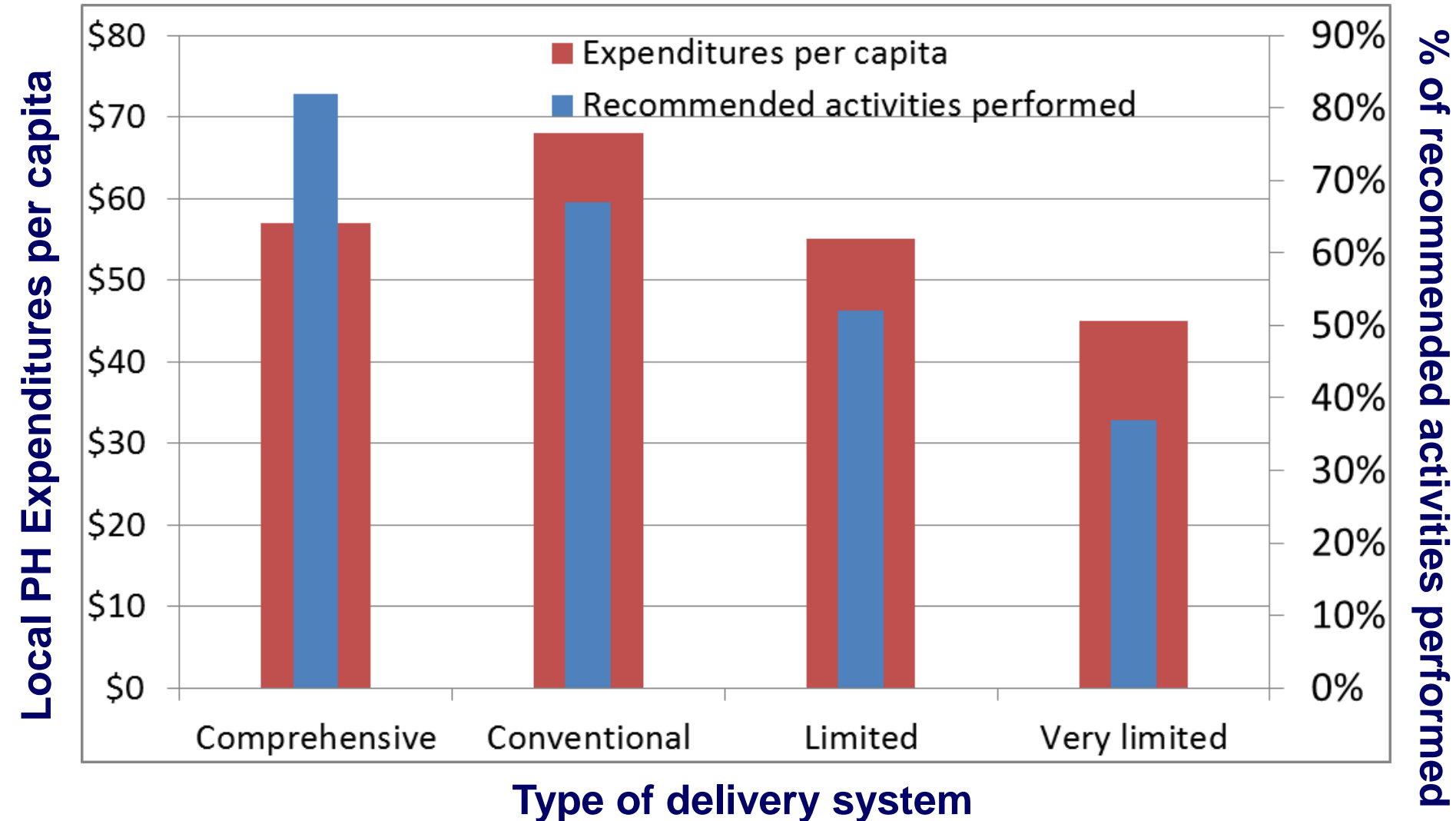
# Making the case for equity: larger gains in low-resource communities

## Effects of Comprehensive Population Health Systems in Low-Income vs. High-Income Communities



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

# Comprehensive systems do more with less



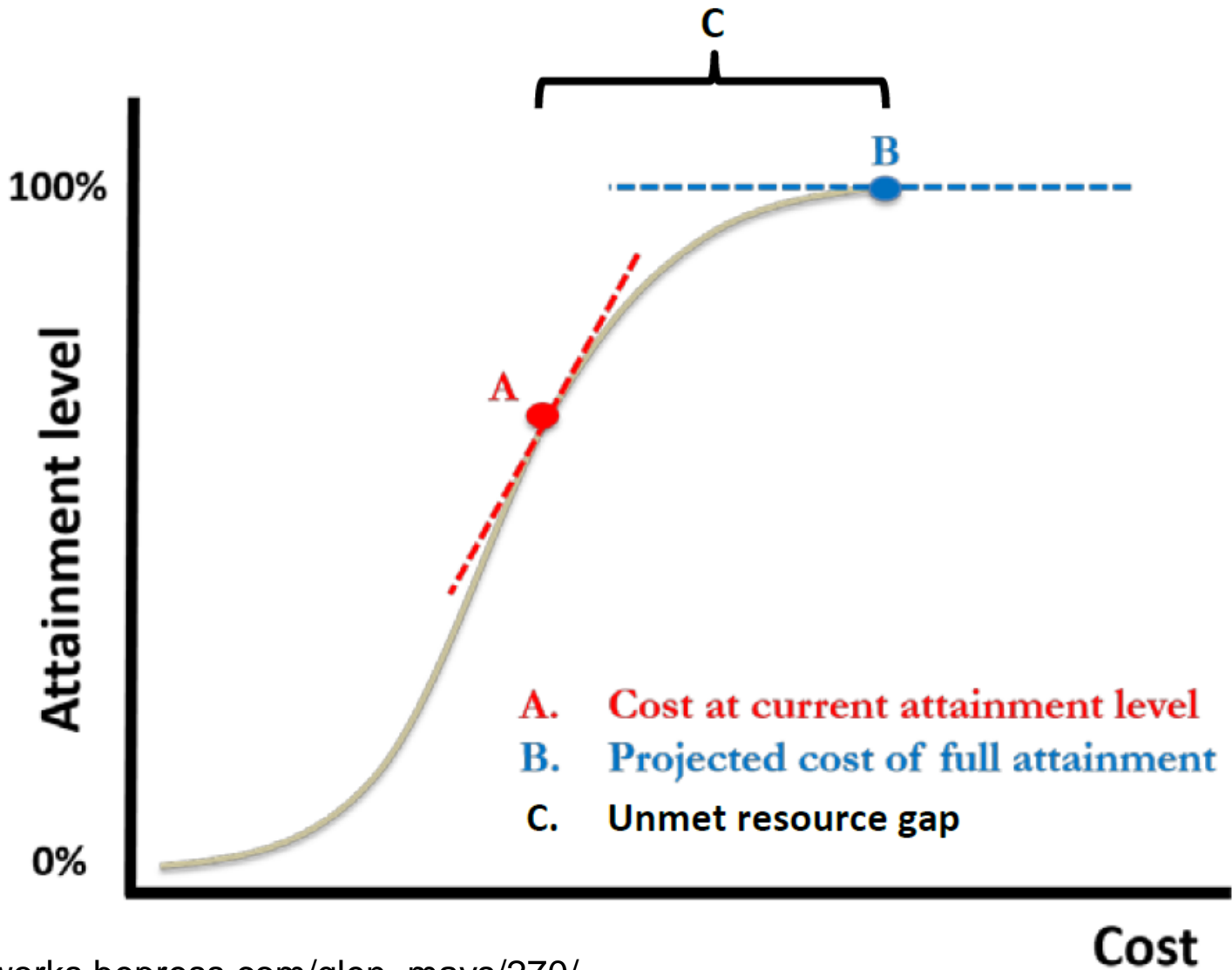
# Toward a deeper understanding of implementation costs in public health

## 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



# How much do foundational capabilities cost?



# How much do foundational capabilities cost?

FPHS Domain	Current Resource Use				Expected Costs of Full Attainment			
	Percentile			Coef. Var.	Percentile			Coef. Var.
	Mean	5th	95th		Mean	5th	95th	
<b><i>Foundational Capabilities</i></b>								
Assessment	1.70	0.45	3.18	48.8%	3.40	0.79	3.18	53.2%
Emergency Preparedness	2.57	0.66	4.91	50.6%	5.46	1.12	11.31	57.5%
Communication	0.63	0.02	0.22	50.8%	0.98	0.28	1.80	46.7%
Policy Development	1.52	0.35	3.00	53.3%	3.21	0.83	6.31	52.6%
Community Partnerships	2.22	0.52	4.37	53.2%	3.85	0.98	7.42	51.2%
Org. Competencies	9.82	4.38	15.39	34.1%	14.91	4.68	27.17	46.1%
Total Foundational Capabilities	18.46	11.99	25.20	21.7%	31.82	19.18	45.94	25.8%
<b><i>Foundational Areas</i></b>								
Communicable Disease	3.40	1.11	5.94	43.2%	5.53	1.81	9.59	42.9%
Chronic Disease/Injury Prevention	3.30	0.85	6.26	50.0%	6.72	1.70	13.02	51.6%
Environmental/Occupational Health	7.49	2.92	13.34	42.7%	10.85	4.42	17.92	37.9%
Maternal Child Health	10.93	3.03	20.16	47.8%	19.08	4.15	38.27	54.9%
Access/Linkage to Clinical Care	4.56	1.10	8.82	51.8%	8.42	1.71	17.26	56.8%
Total Foundational Areas	29.68	18.84	41.37	23.2%	50.60	30.84	73.56	25.6%
<b>TOTAL FPHS</b>	<b>48.14</b>	35.32	61.50	16.4%	<b>82.43</b>	58.54	108.62	18.6%

# Estimating ROI

Establishing strong PH systems across the U.S.:

- Produce 1.5M additional life-years
- Require \$10.9B in additional spending
- Cost \$7335 per life-year gained
- Offset by reductions in medical care spending
  - 1.6 percentage point reduction in hospital uncompensated care costs = \$2B in offsets



# Getting to sustainable financing

Structural element	Function
1. Strong multi-sector governance model	Do I have a seat at the table?
2. Clear goals, activities, division of responsibility	What are we buying?
3. Clarity on implementation costs	What is the investment?
4. Credible estimates of health & economic outcomes	What are the returns?
5. Robust evaluation and monitoring systems	How will we know success?



**Public & Private  
Willingness to Pay**

# Financing sources & models

- Dedicated state and local government allocations
- Medicaid administrative match/claiming
- Hospital community benefit allocations
- AHC/ACO shared savings models
- Community health trusts
- Public/private joint ventures

# Conclusions: What we know and still need to learn

- Large potential benefits of system integration
- Inequities in integration are real & problematic
- Integration requires support
  - Infrastructure
  - Institutions
  - Incentives
- Sustainability and resiliency are not automatic

# Finding the connections



- Act on aligned incentives
- Exploit the disruptive policy environment
- Innovate, prototype, study – then scale
- Pay careful attention to shared governance, decision-making, and financing structures
- Demonstrate value and accountability to the public

# New research program focuses on delivery and financing system alignment

A Robert Wood Johnson Foundation program

## Systems for Action

*Systems and Services Research to Build a Culture of Health*



## Research Agenda

*Delivery and Financing System Innovations  
for a Culture of Health*

September 2015

<http://www.systemsforaction.org>

# For More Information

## Systems for Action

National Coordinating Center

*Systems and Services Research to Build a Culture of Health*

**Supported by The Robert Wood Johnson Foundation**

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**Journal:** [www.FrontiersinPHSSR.org](http://www.FrontiersinPHSSR.org)

**Archive:** [works.bepress.com/glen\\_mays](http://works.bepress.com/glen_mays)

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