



*Strategies to Achieve Alignment, Collaboration, and  
Synergy across Delivery and Financing Systems*

# **The Economics of Aligning Medical, Social, and Public Health Delivery Systems: Implications for Medicare Spending**

*Research-in-Progress Webinar  
Wednesday, November 14, 2018  
12:00-1:00 pm ET/ 9:00 am-10:00 am PT*

*Funded by the Robert Wood Johnson Foundation*



**College of  
Public Health**

*Center for Public Health Systems  
and Services Research*

# Agenda

**Welcome:**      **CB Mamaril, PhD**  
*Research Faculty*  
RWJF [Systems for Action](#) National Coordinating Center  
University of Kentucky College of Public Health

**Presenters:**    **Glen P. Mays, PhD, MPH**  
*Director*  
RWJF [Systems for Action](#) National Coordinating Center  
*Scutchfield Endowed Professor of Health Services & Systems Research*  
University of Kentucky College of Public Health

**Q & A:**            Moderated by **CB Mamaril, PhD**



## **Glen P. Mays, PhD, MPH**

*Director*

Systems for Action National Program Office

# Economics of Aligning Medical, Social and Public Health Systems: Implications for Medicare Spending

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Center for Public Health  
Systems & Services Research

**Systems for Action**  
**National Coordinating Center**

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

# Questions of interest

- How strongly aligned are the delivery systems that support population health improvement activities?
- How do these delivery systems change over time?

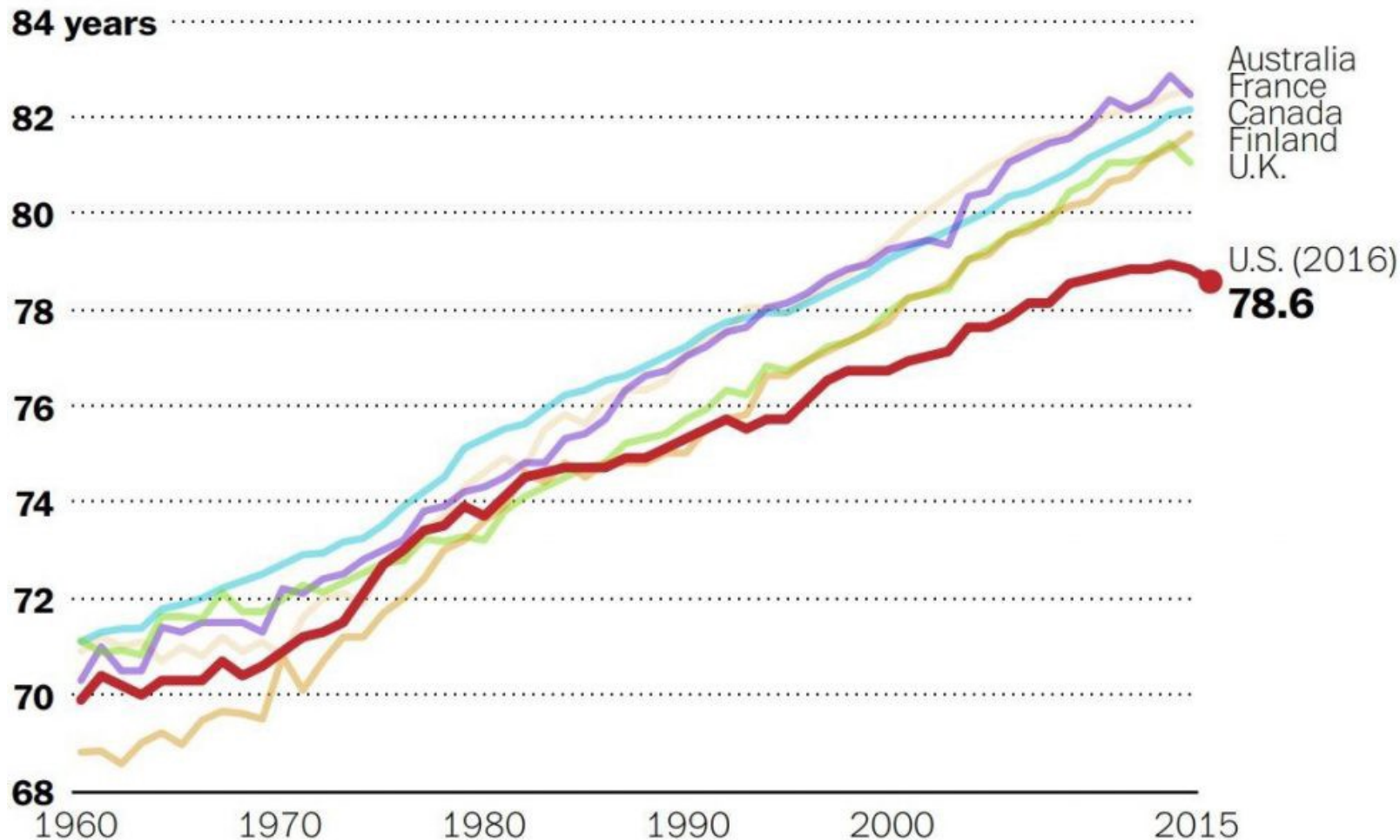
Recession | Recovery | ACA implementation

- How do these delivery systems influence medical spending for seniors in Medicare?

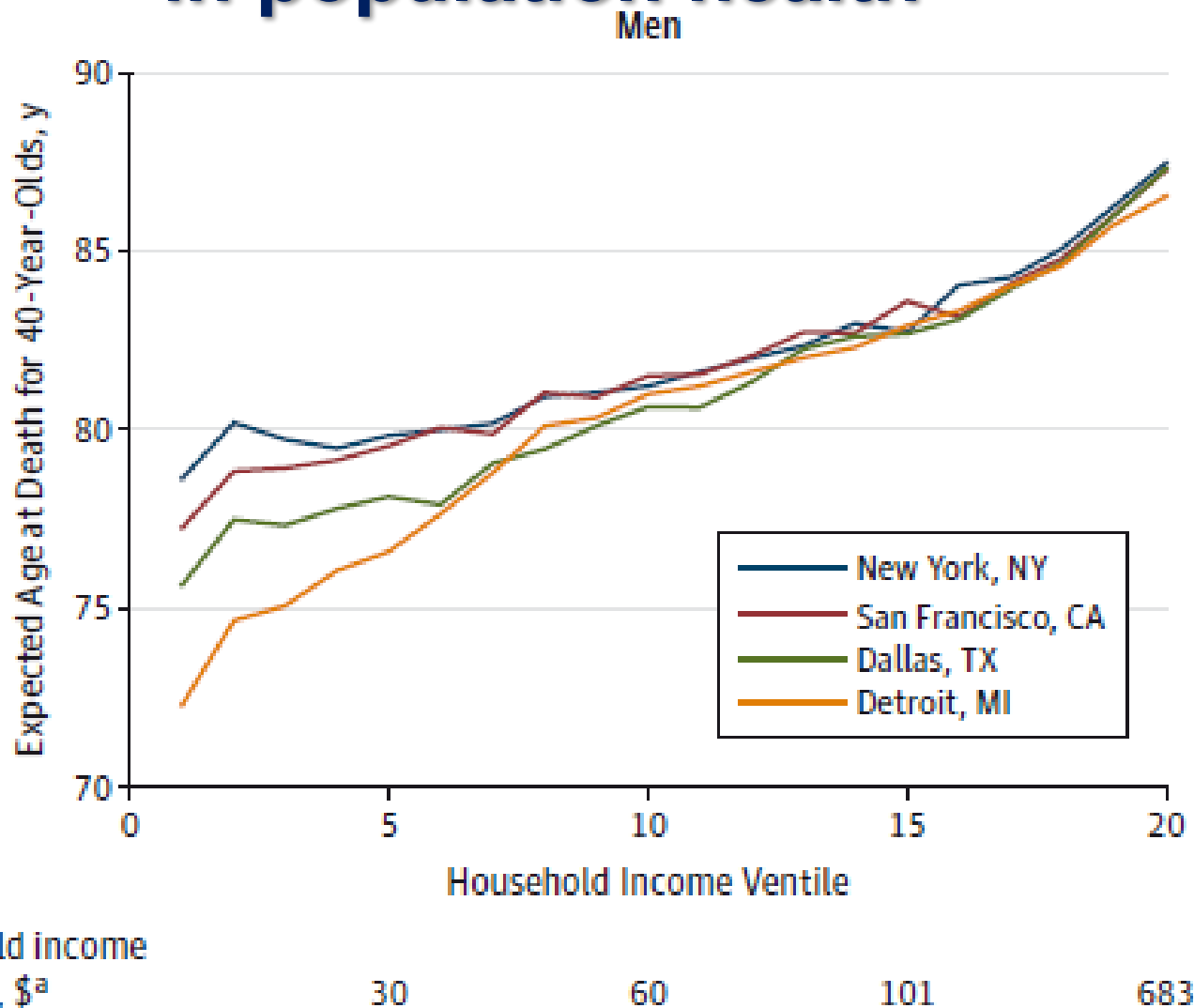
# Losing ground in population health

## American exceptionalism

Life expectancy at birth, selected OECD countries

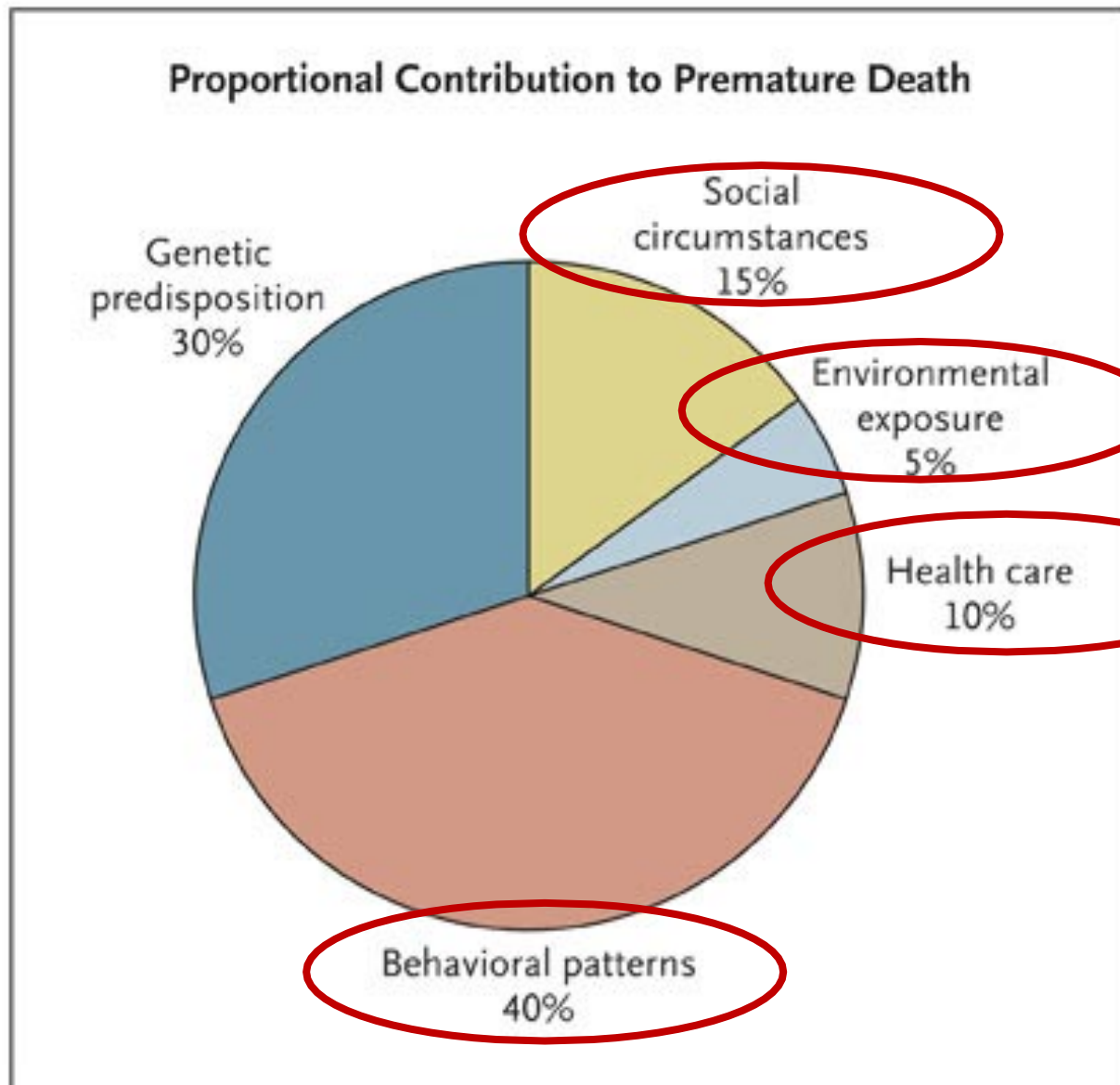


# Geographic & socioeconomic inequities in population health



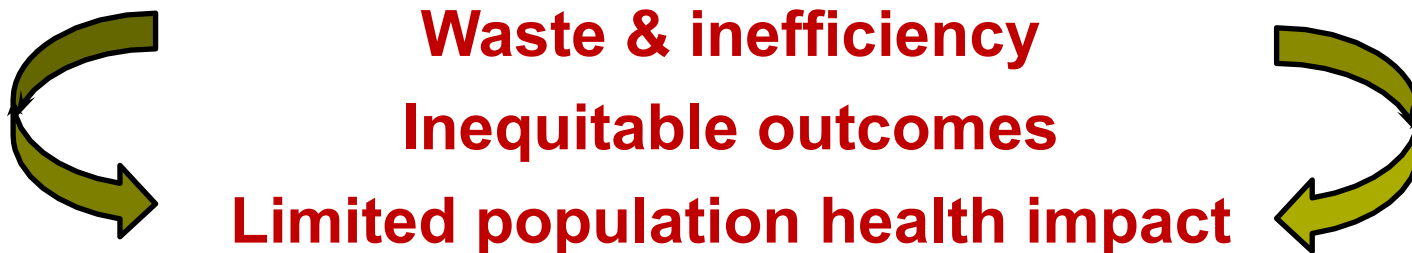
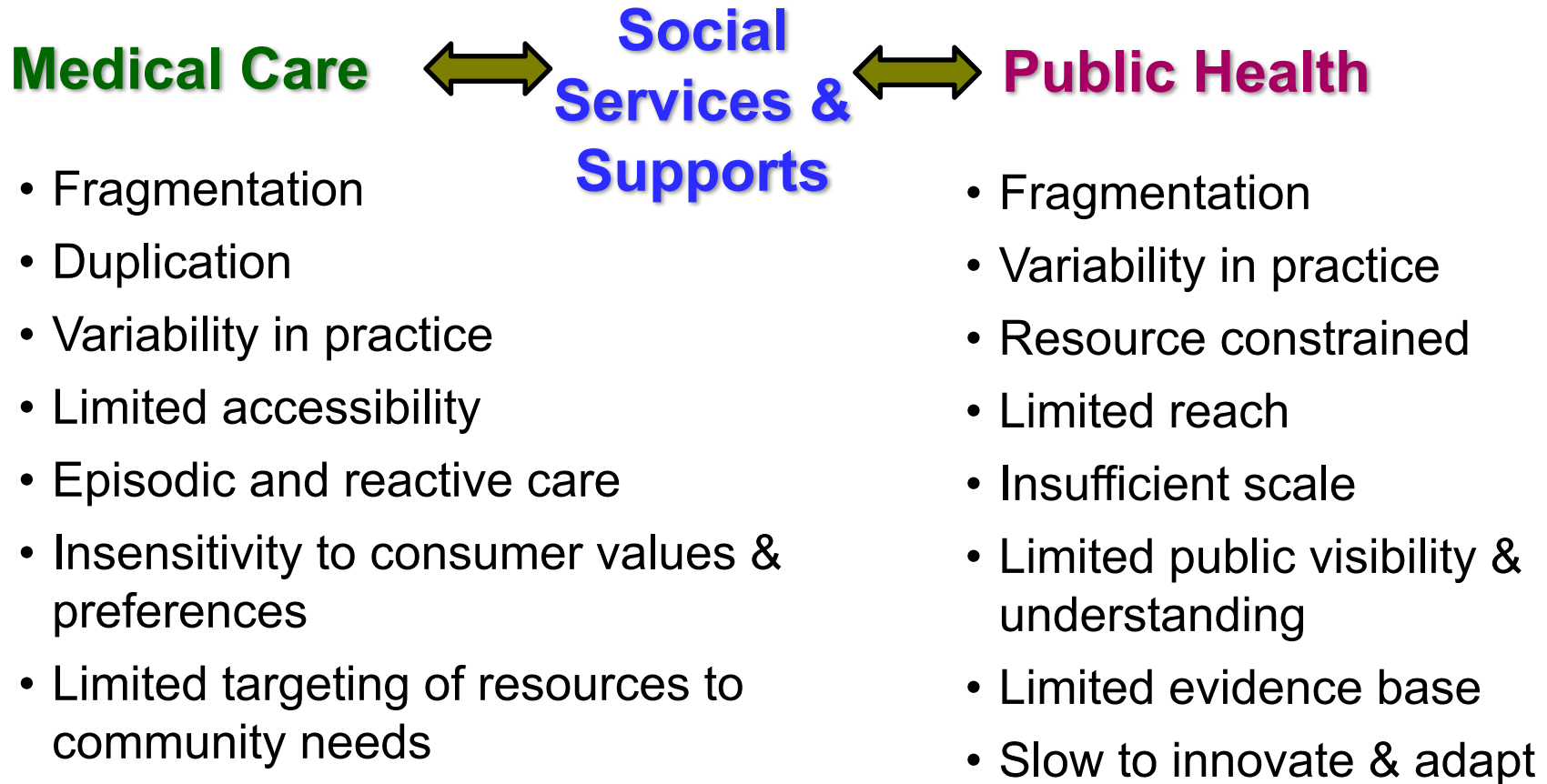
Chetty et al. JAMA 2016

# Multiple systems & sectors drive health...



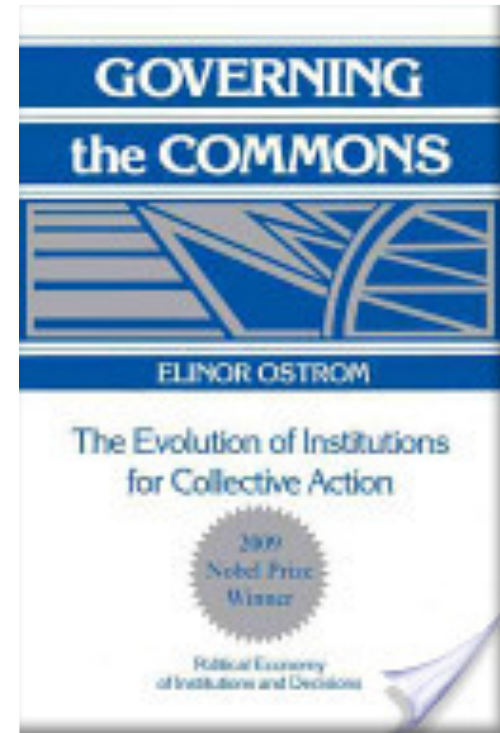


# ...But existing systems often fail to connect



# **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



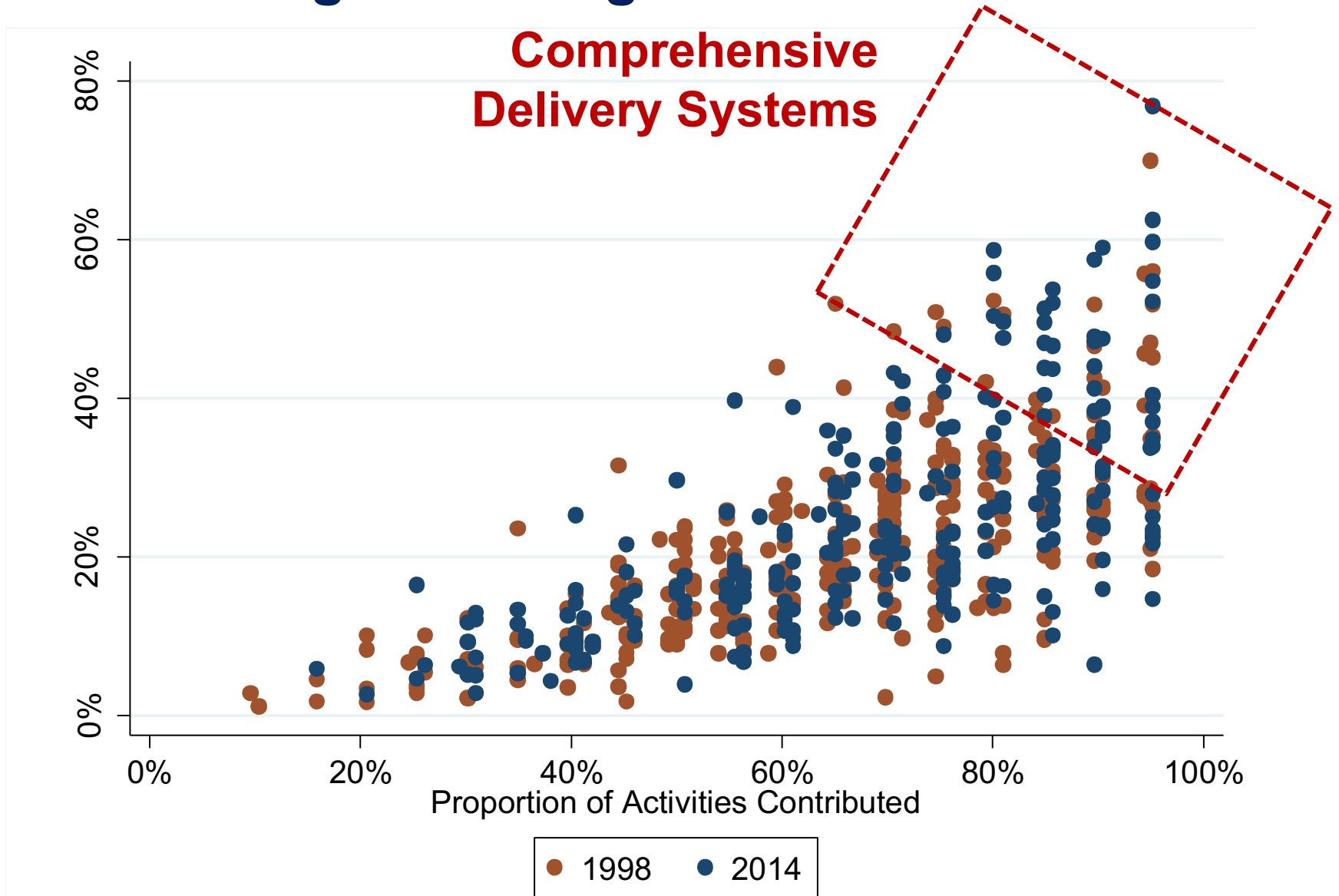
Ostrom E. 1994

# Widely recommended activities to support multi-sector initiatives in population health

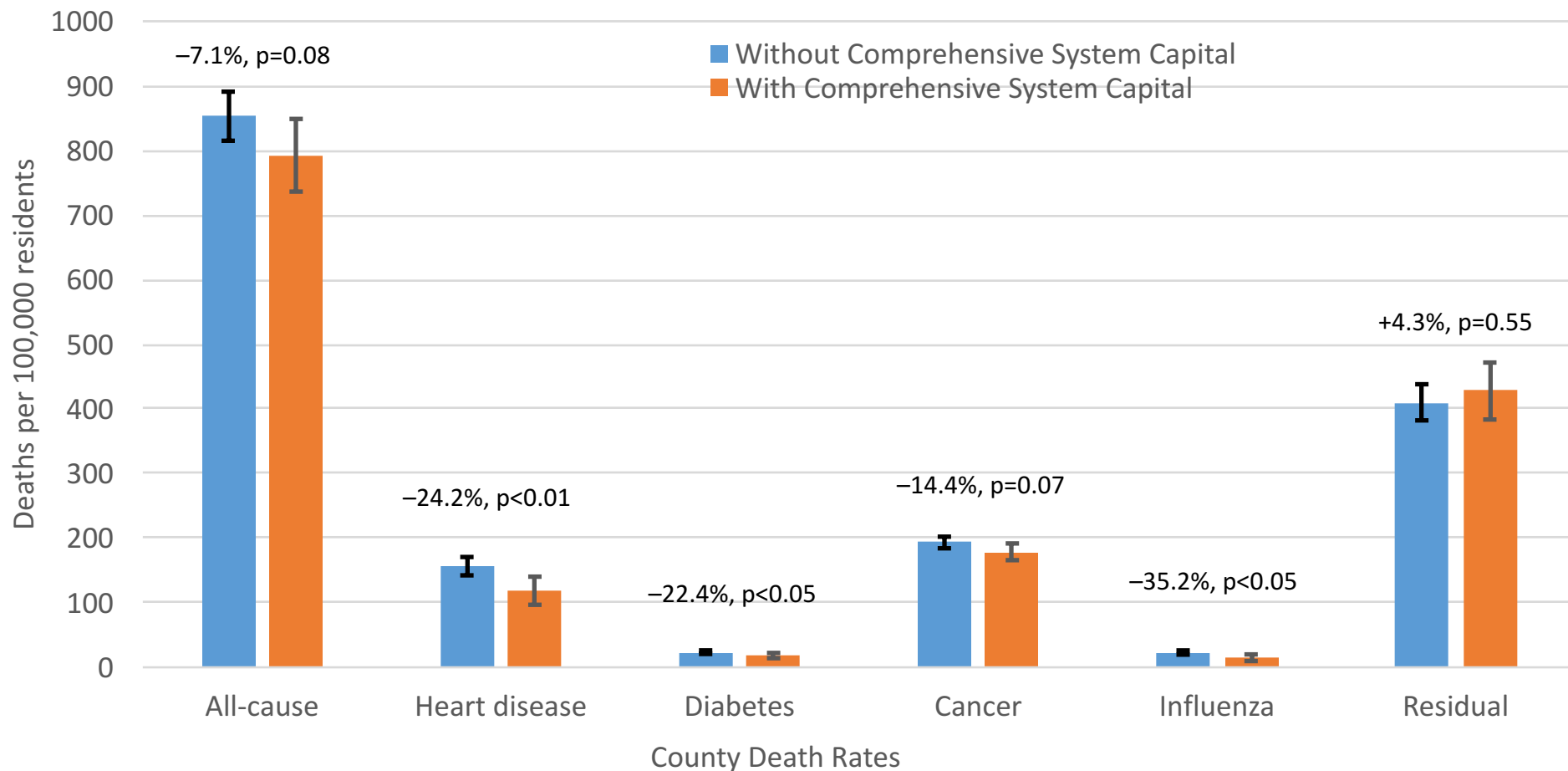


National Academy of Medicine: *For the Public's Health: Investing in a Healthier Future*. Washington, DC: National Academies Press; 2012.

# Measuring the strength of multi-sector work



# Motivation: Health effects attributable to strong multi-sector networks



**Models also control for racial composition, unemployment, health insurance coverage, educational attainment, age composition, and state and year fixed effects.**

**N=1019 community-years**

Mays GP et al. *Health Affairs* 2016

# Measuring the strength of multi-sector networks

## 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, 2018
- Local public health officials report:
  - **Scope**: availability of 20 recommended population health activities
  - **Network**: types of organizations contributing to each activity
  - **Perceived effectiveness** of each activity in meeting community needs

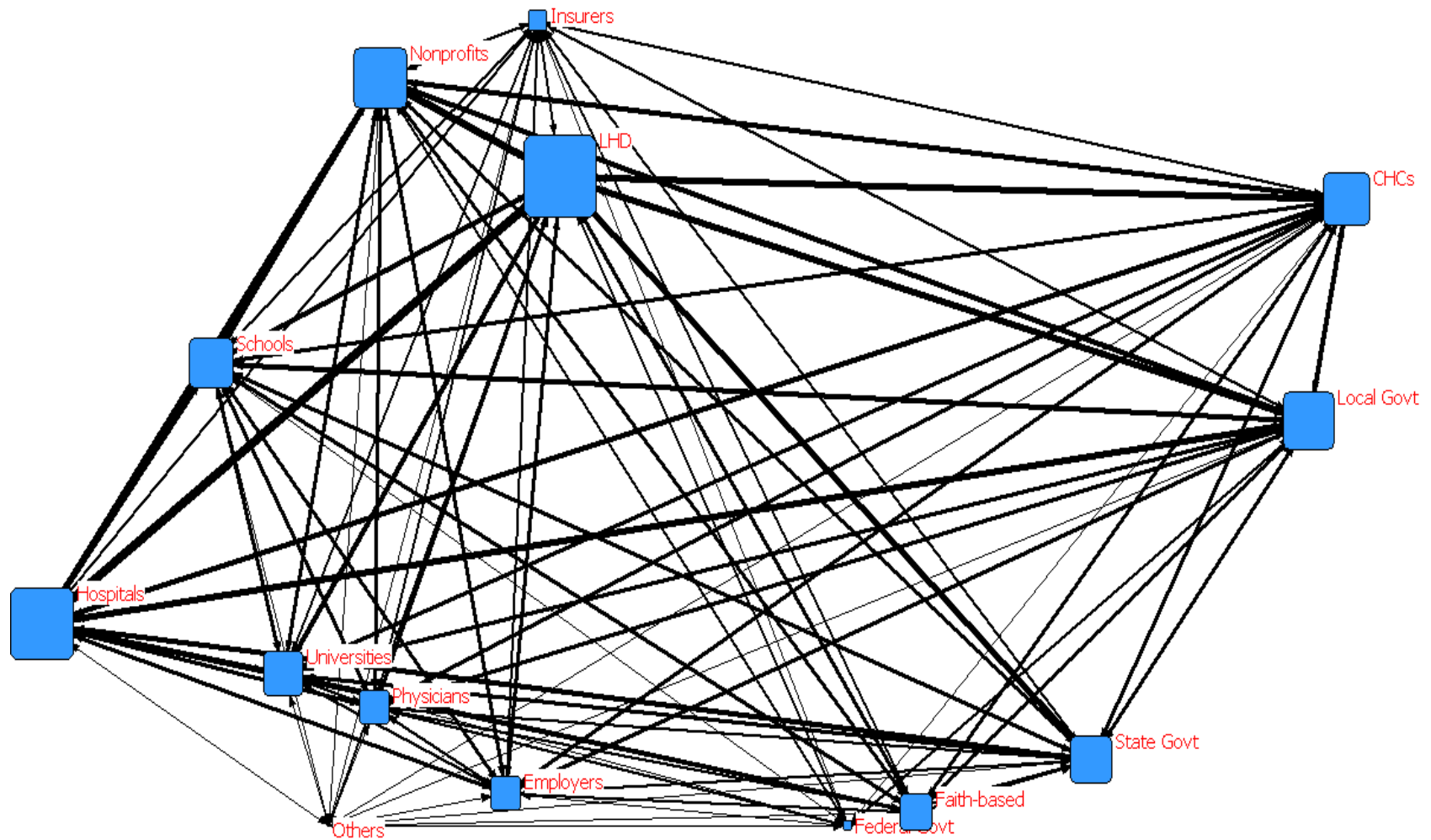
\* Stratified sample of 500 communities with <100,000 residents added beginning in 2014 wave

# Network analytic approach

- Two-mode networks (organization types X activities) transformed to one-mode networks with **tie strength** indicated by number of activities jointly produced

Organization Type/Sector	Activities							
	1	2	3	4	5	6	7	...20
Local public health agency	X	X		X		X		
State public health agency		X	X		X			X
Hospitals		X	X	X			X	
Physician practices					X		X	
CHCs	X		X		X			
Insurers					X	X		X
Employers								
Social service organizations		X		X			X	
Schools			X		X	X		
.....								

# Average network structure in 2016

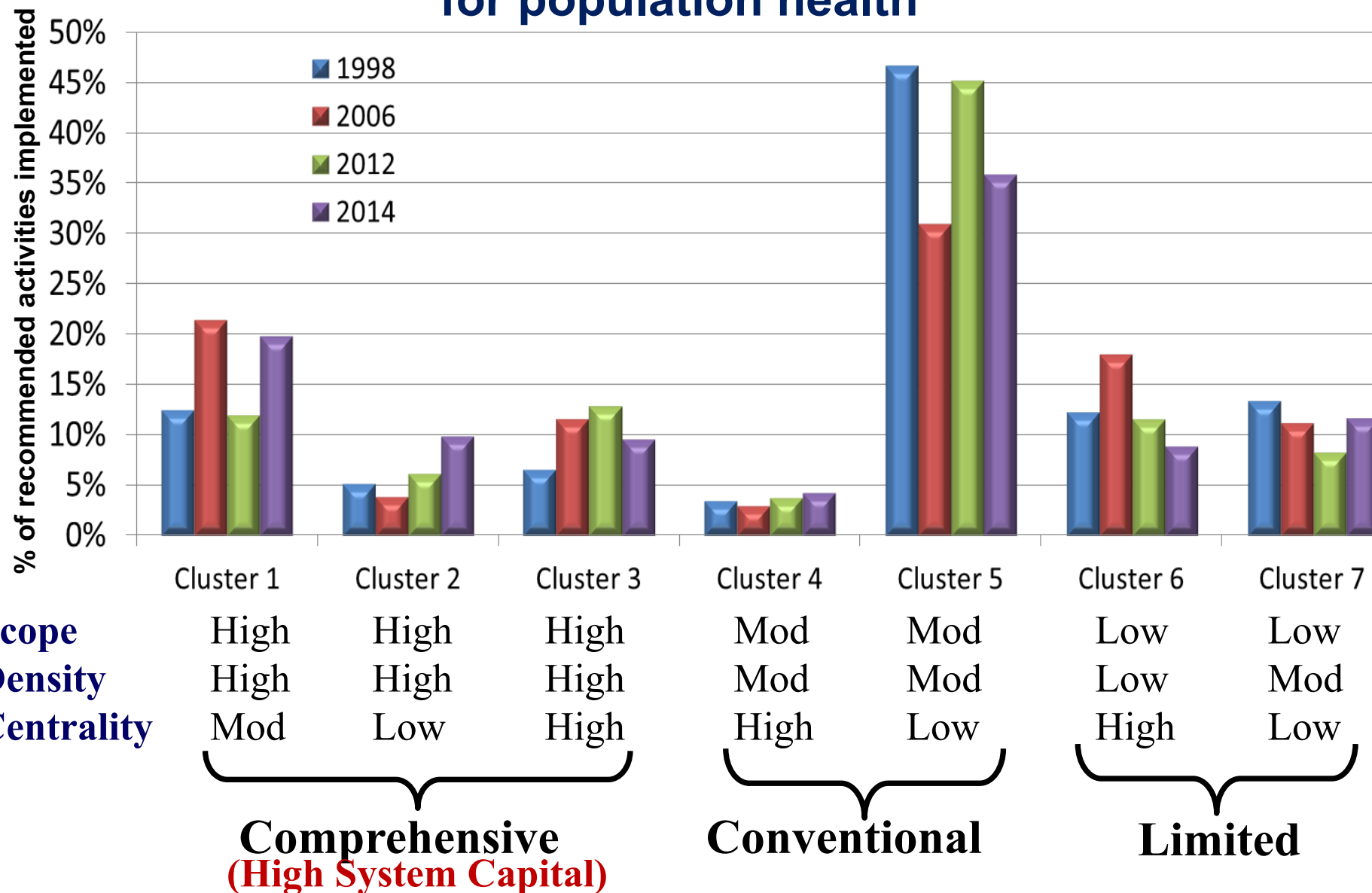


**Node size = degree centrality**

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



# Classifying multi-sector delivery systems for population health



# Data linkages expand analytic possibilities

- **Area Health Resource File:** health resources, demographics, socioeconomic status, insurance coverage
- **NACCHO Profile data:** public health agency institutional and financial characteristics
- **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
- **National Health Interview Survey:** individual-level health
- **HCUP:** area-level hospital and ED use, readmissions

# Design and Methods

- Follow cohort of 300 urban communities over 18 years
- Measure strength of delivery system supporting population health activities
- Panel regression estimation with fixed and random effects to account for repeated measures and clustering of communities within states
- Two-stage IV model to estimate effect of system changes on Medicare spending

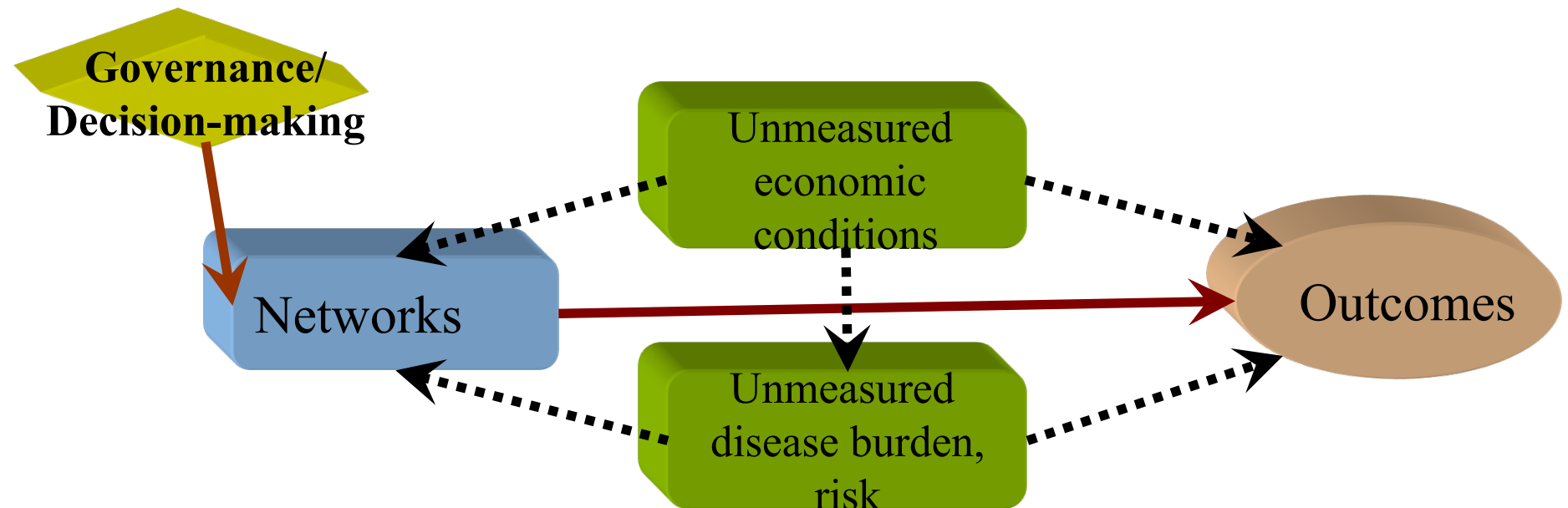
$$\text{Prob}(\text{System}_{ijt}=\text{Comprehensive}) = f(\text{Governance}, \text{Agency}, \text{Community})_{ijt} + \text{State}_j + \text{Year}_t$$

$$\text{Ln}(\text{Spending}_{ijt}) = f(\text{System}+\text{resid}, \text{Agency}, \text{Community})_{ijt} + \text{State}_j + \text{Year}_t + \varepsilon_{ijt}$$

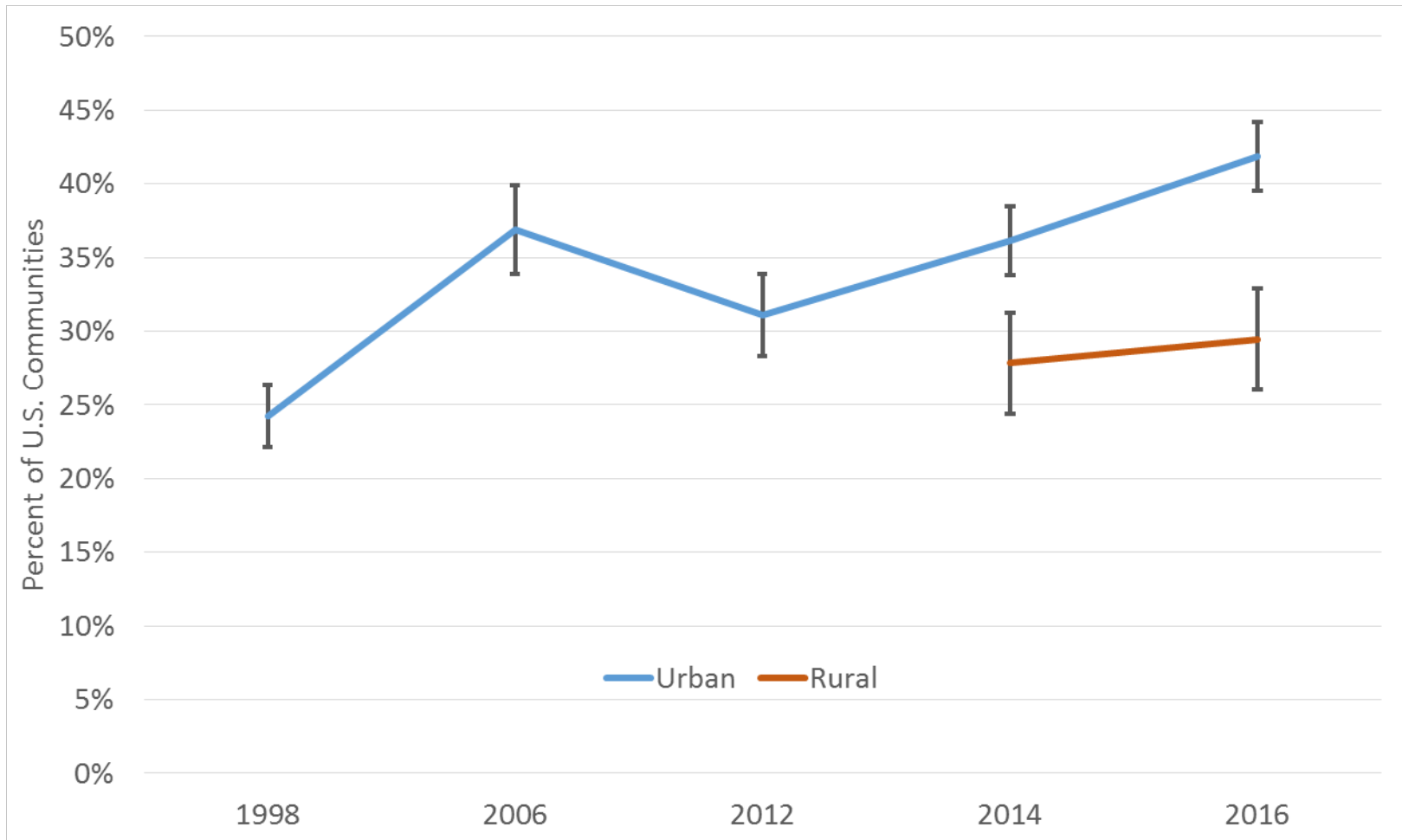
All models control for type of jurisdiction, population size and density, metropolitan area designation, income per capita, unemployment, poverty rate, racial composition, age distribution, physician and hospital availability, insurance coverage, and state and year fixed effects.

# Analytical approach: IV estimation

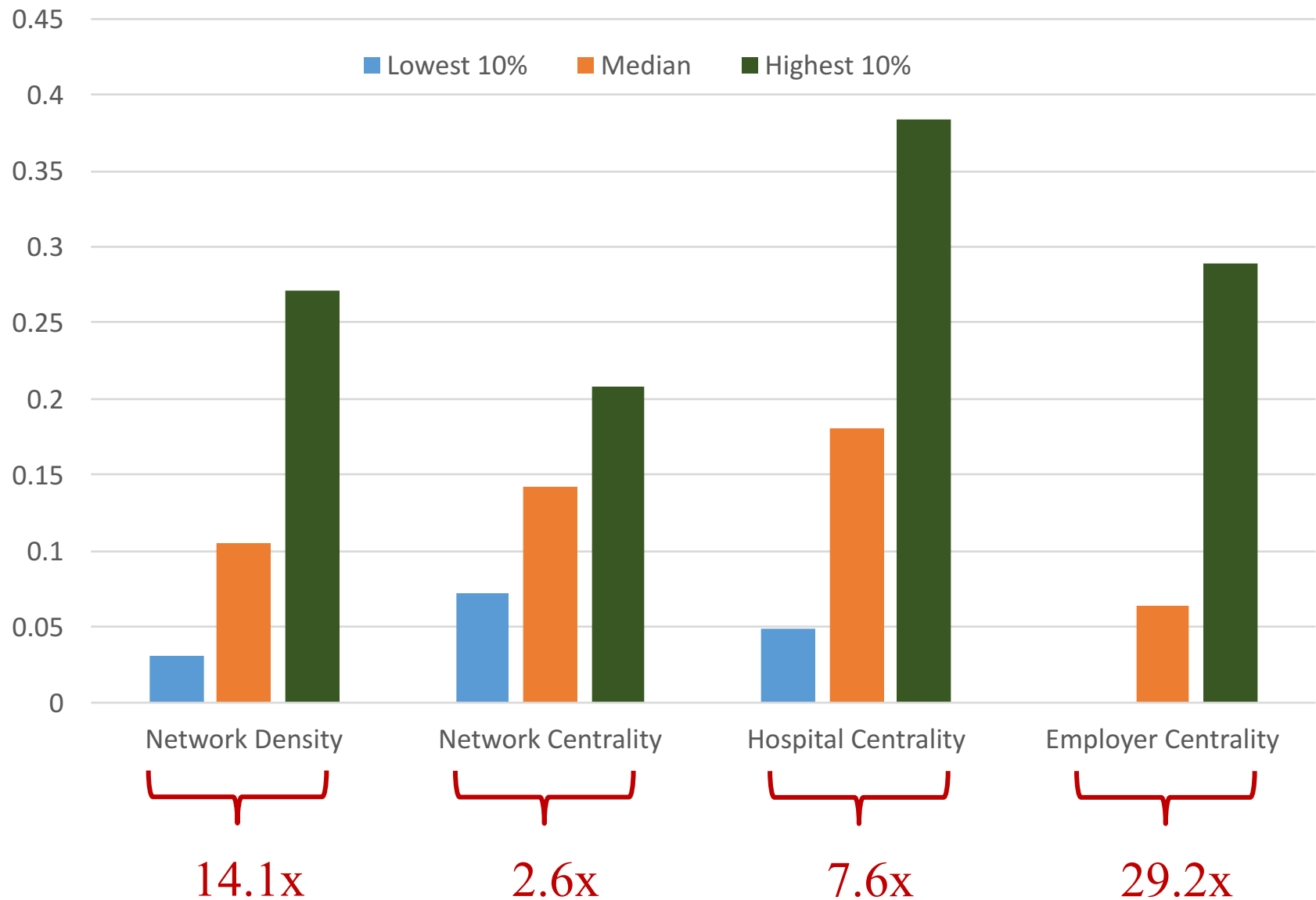
- ◆ Identify exogenous sources of variation in system strength that are unrelated to outcomes
  - Governance structures: local boards of health
  - Decision-making authority: agency, board, local, state
- ◆ Controls for unmeasured factors that jointly influence systems and outcomes



# Variation and change in comprehensive systems



# Variation in network structure in 2016



# Predictors of Comprehensive Systems

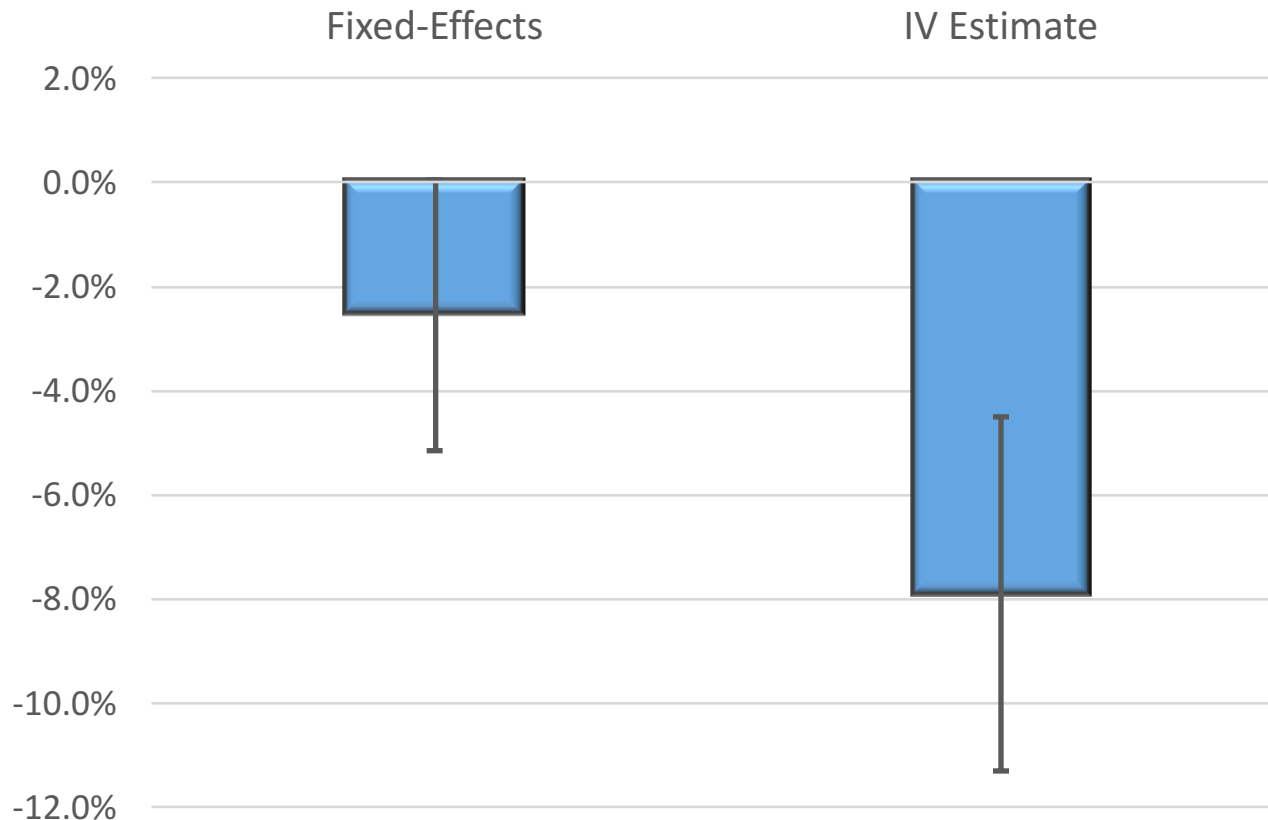
## First Stage Probit Results

Variable		Marginal Effect	S.E.	
IVs {	Population size (10,000s)	0.033	0.009	***
	Poverty rate (10%)	-0.033	0.016	**
	Policy-making local BOH (0,1)	0.046	0.016	***
	Centralized local health agency (0,1)	-0.087	0.036	**
	Local control of health budget (0,1)	0.043	0.022	*
	Local health tax/fee authority (0,1)	0.028	0.011	**

Models also control for racial composition, unemployment, health insurance coverage, educational attainment, age composition, and year fixed effects.

# Economic effects attributable to network structure

## Impact of Comprehensive Systems on Medicare Spending



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



# Conclusions

- Population health activities are produced through highly inter-organizational and multi-sectoral efforts (62% of contributions from outside governmental public health sector)
- Structure of population health networks varies widely and changes over time.
- Stronger networks are associated with improved health and lower Medicare spending
- Network structure is endogenous – ignoring this can understate its relationship with health & economic outcomes

# **Caveats: methodological trade-offs in systems science**

In order to follow large numbers of community networks over long periods of time:

- Single respondent in each community
- Low-resolution measures of population health activities
- Networks defined by organization sectors, not individual organizations

# Coming up next...

- Data for 2018
- Rural-urban differences
- State-specific estimates & state initiatives
- Heterogeneity in trajectories
- Deeper dives into sector dynamics:  
hospitals, insurers, employers, schools

# For More Information

## Systems for Action

National Coordinating Center

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**Supported by The Robert Wood Johnson Foundation**

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

# Upcoming Webinars

## Archives

<http://systemsforaction.org/research-progress-webinars>

## Upcoming

**December 5, 2018, 12 p.m. ET**

*Systems for Action Collaborating Research Center*

[Financing and Service Delivery Integration for Mental Illness & Substance Abuse](#)

*William J. Riley, PhD, School for the Science of Health Care Delivery, and*

*Michael Shafer, PhD, Center for Applied Behavioral Health Policy, School of Social Work, Arizona State University*

**December 19, 2018, 12 p.m. ET**

*Systems for Action Intramural Research Project*

[Sector Specialization in the Provision of Public Health Services](#)

*John Poe, PhD, Systems for Action National Program Office, University of Kentucky College of Public Health*

**January 09, 2019, 12 p.m. ET**

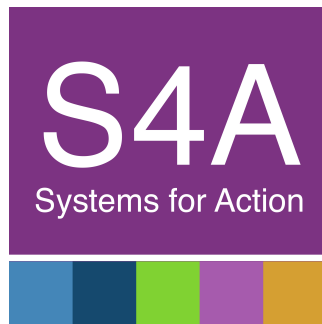
*Systems for Action Collaborating Research Center Project*

[Improving Population and Clinical Health with Integrated Services and Decision Support](#)

*Joshua R. Vest, PhD, MPH, Health Policy and Management, Indiana University Richard M. Fairbanks School of Public Health*

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# Questions?



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# Acknowledgements

***Systems for Action*** is a National Program Office of the Robert Wood Johnson Foundation and a collaborative effort of the Center for Public Health Systems and Services Research in the College of Public Health, and the Center for Poverty Research in the Gatton College of Business and Economics, administered by the University of Kentucky, Lexington, Ky.



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