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From the Selected Works of Glen Mays

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Aligning Health & Social Systems to Improve Population Health: Networks, Governance & Information

Glen P. Mays, *University of Kentucky*



Available at: https://works.bepress.com/glen_mays/336/

Aligning Health & Social Systems to Improve Population Health: Networks, Governance & Information

Systems for Action

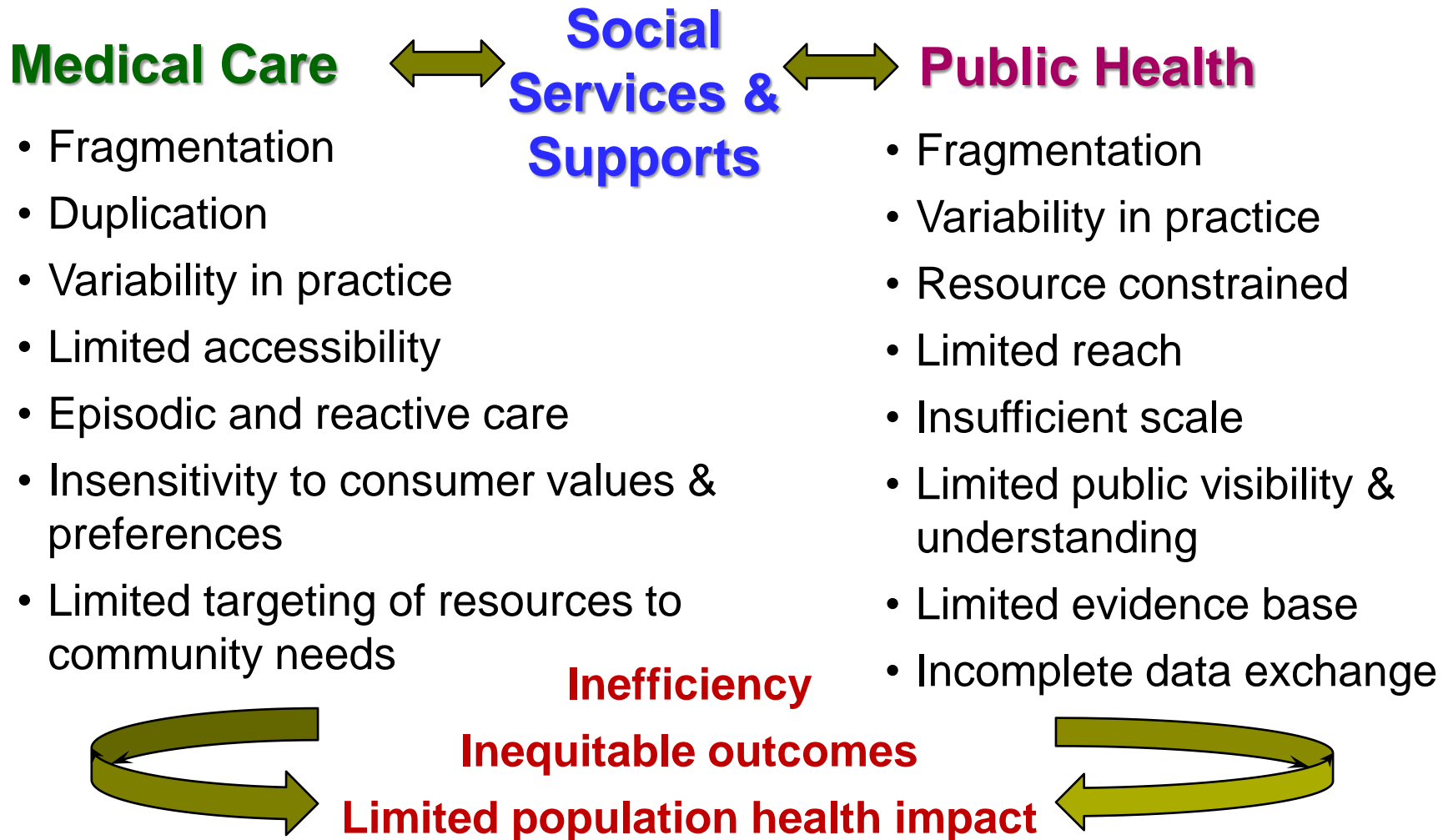
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Delivery & financing systems often fail to connect



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Testing **novel mechanisms** for aligning systems and services across sectors

- New alliances and partnerships
- Inter-governmental and public-private ventures
- New financing and payment arrangements
- Incentives for individuals, organizations & communities
- Cross-sector governance & decision-making structures
- Information exchange and decision support
- New technology: m-health, information exchange
- Community engagement, public values and preferences
- New workforce and staffing models

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Featured S4A Studies

- **Multi-sector Community Networks and their Impact on Medicare Spending.** University of Kentucky (Glen Mays)
- **Assessing the Carrying Capacity of the Local Nonprofit Sector in Supporting Population Health.** Trailhead Institute and University of Kentucky (Rachel Hogg Graham)
- **Testing a Shared Governance Model for Health and Social Service Delivery in East Harlem.** New York City Department of Health and Mental Hygiene (Carl Letamendi)
- **Using Longitudinal Information on Unmet Needs to Target Supports for Vulnerable Seniors.** University of Chicago (David Meltzer)

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Multi-Sector Community Networks and their Impact on Medicare Spending

Glen Mays, PhD, MPH
University of Kentucky

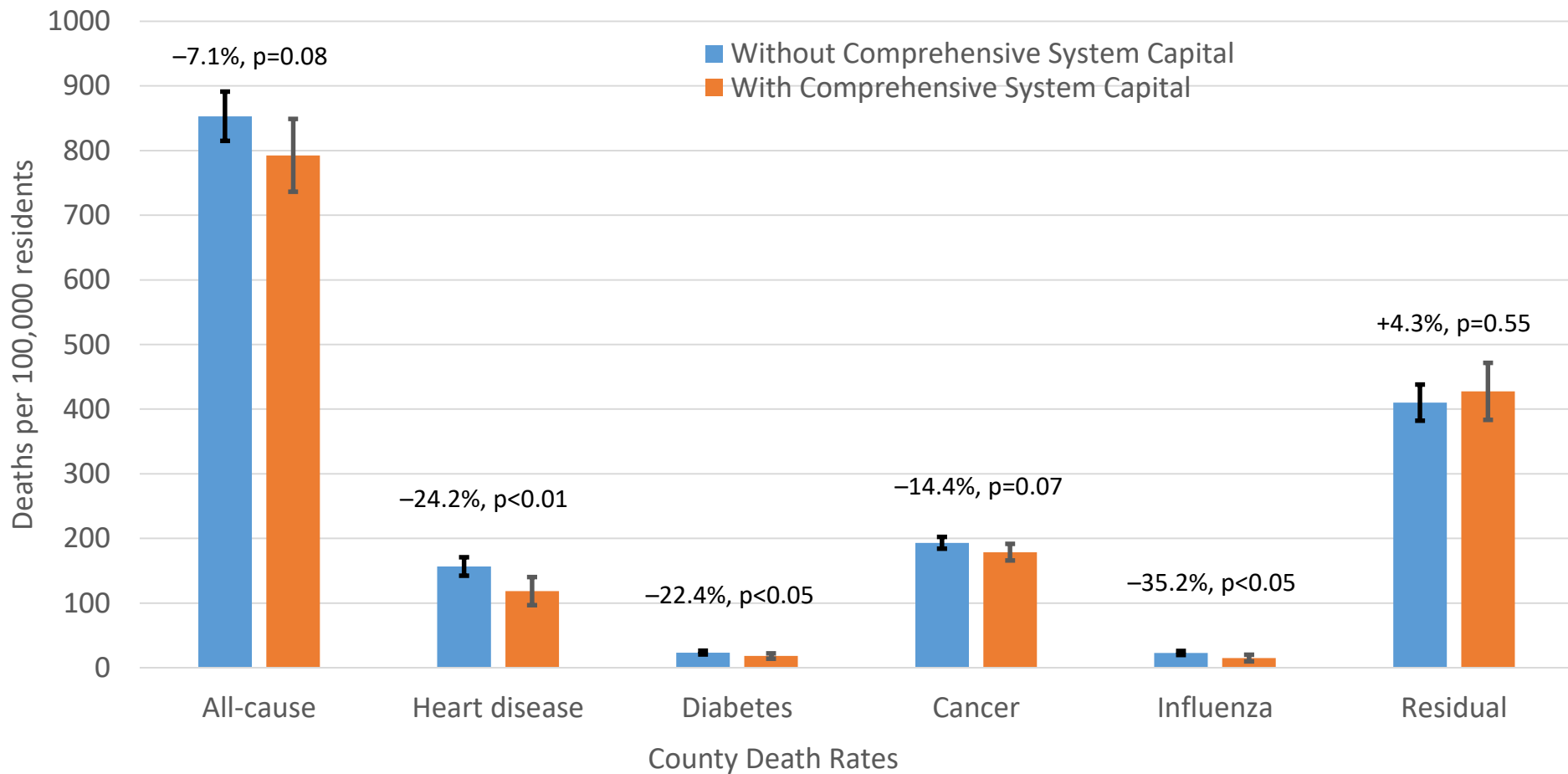
glen.mays@uky.edu

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Questions of interest

- How strong 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?

Motivation: Health effects attributable to strong community 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

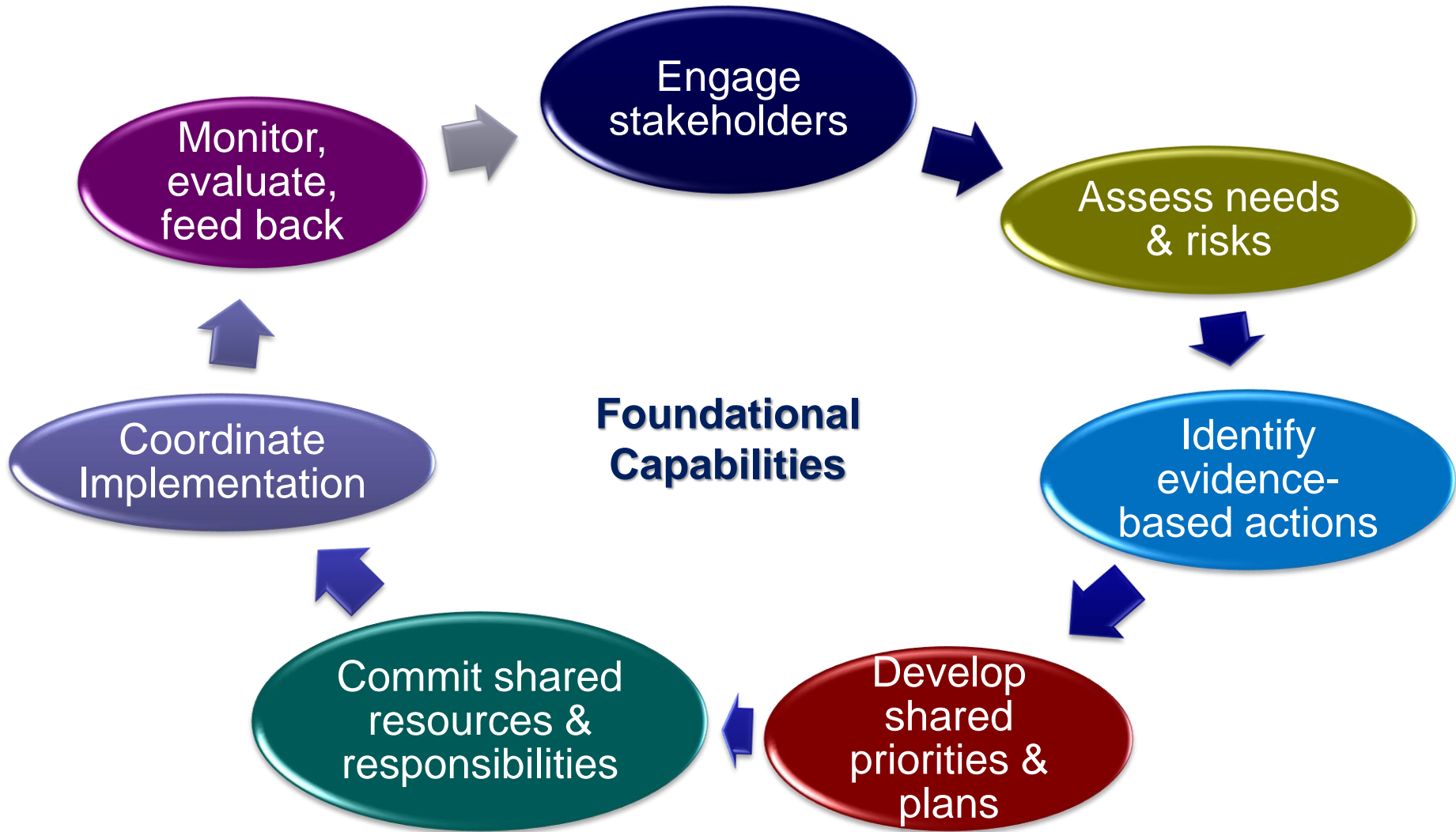
Measuring the strength of community networks

National Longitudinal Survey of Public Health Systems

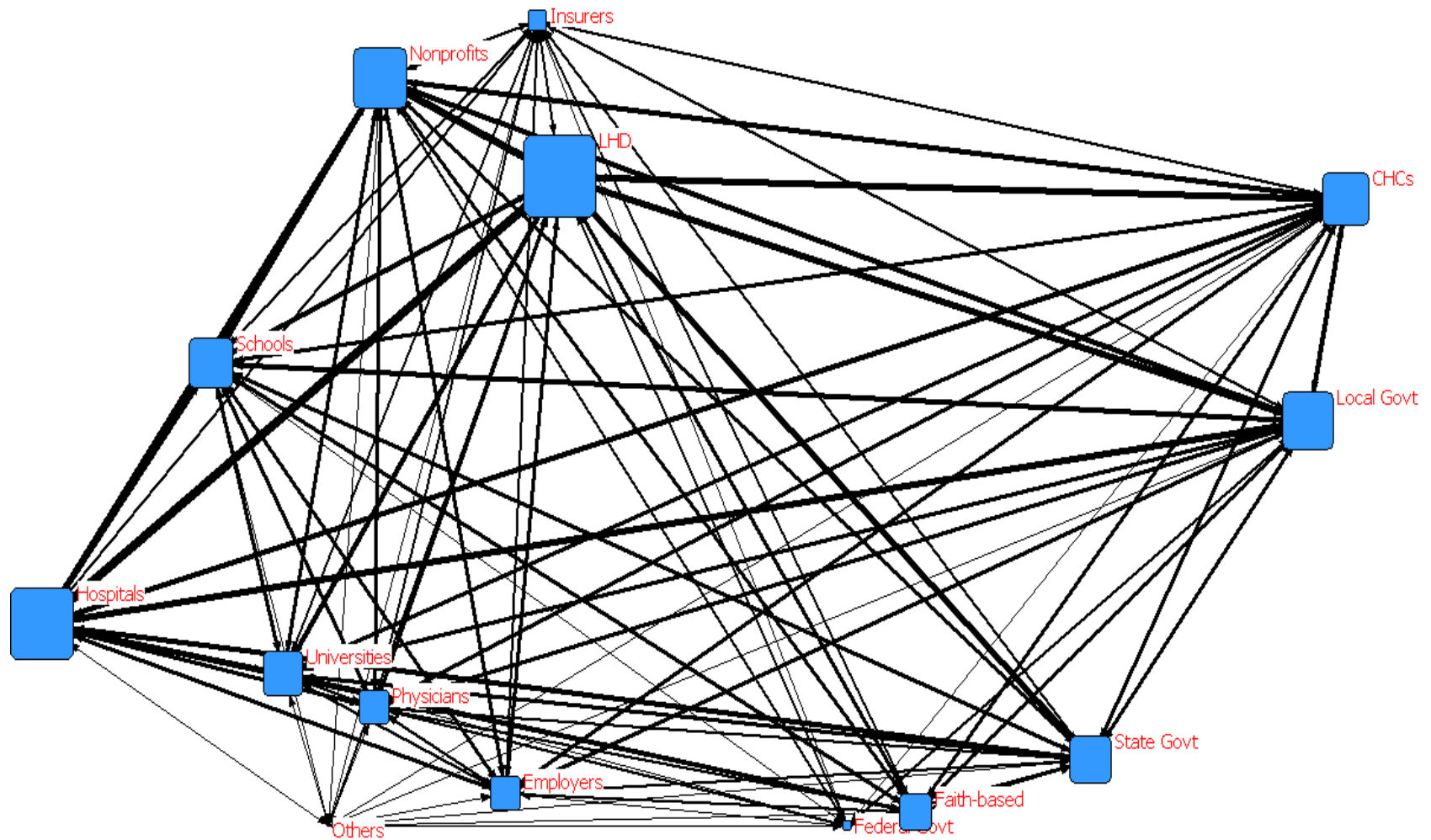
- Cohort of 360 communities with at least 100,000 residents
- Followed over time: 1998, 2006, 2012, 2014,* 2016, 2018
- Local public health officials report:
 - **Scope**: availability of 20 recommended population health activities
 - **Network**: types of organizations contributing to each activity
 - **Perceived effectiveness** of each activity in meeting community needs

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

Measures: recommended capabilities that support **implementation** of multi-sector health initiatives



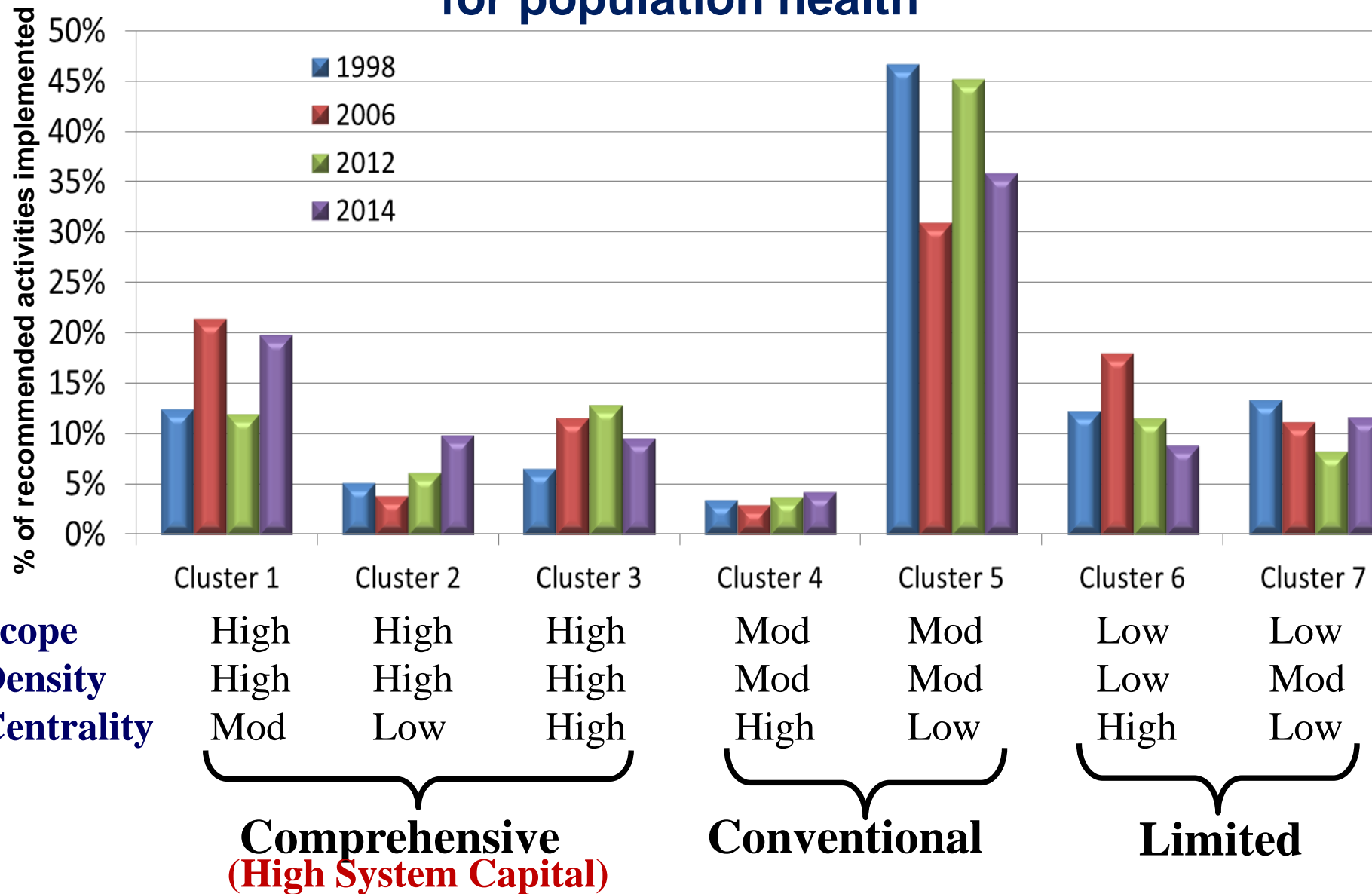
Average network structure in 2016



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

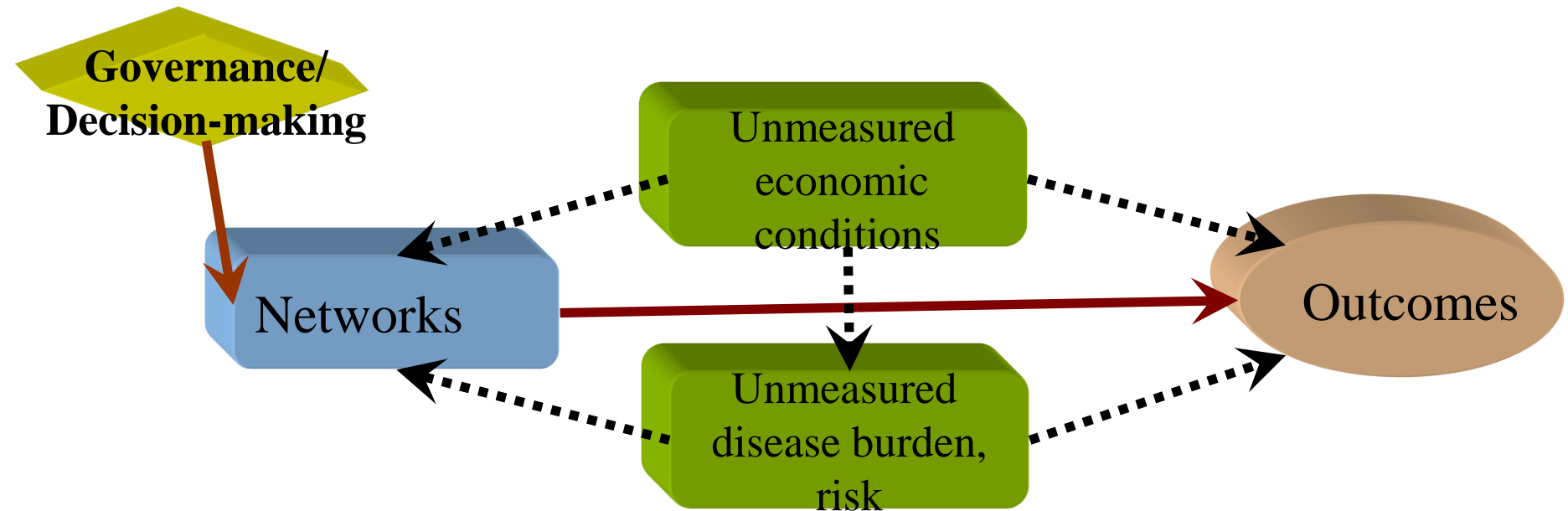
$$\text{Prob}(\text{System}_{ijt}=\text{Comprehensive}) = f(\text{Governance}, \text{Agency}, \text{Community})_{ijt} \\ + \text{State}_j + \text{Year}_t$$

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

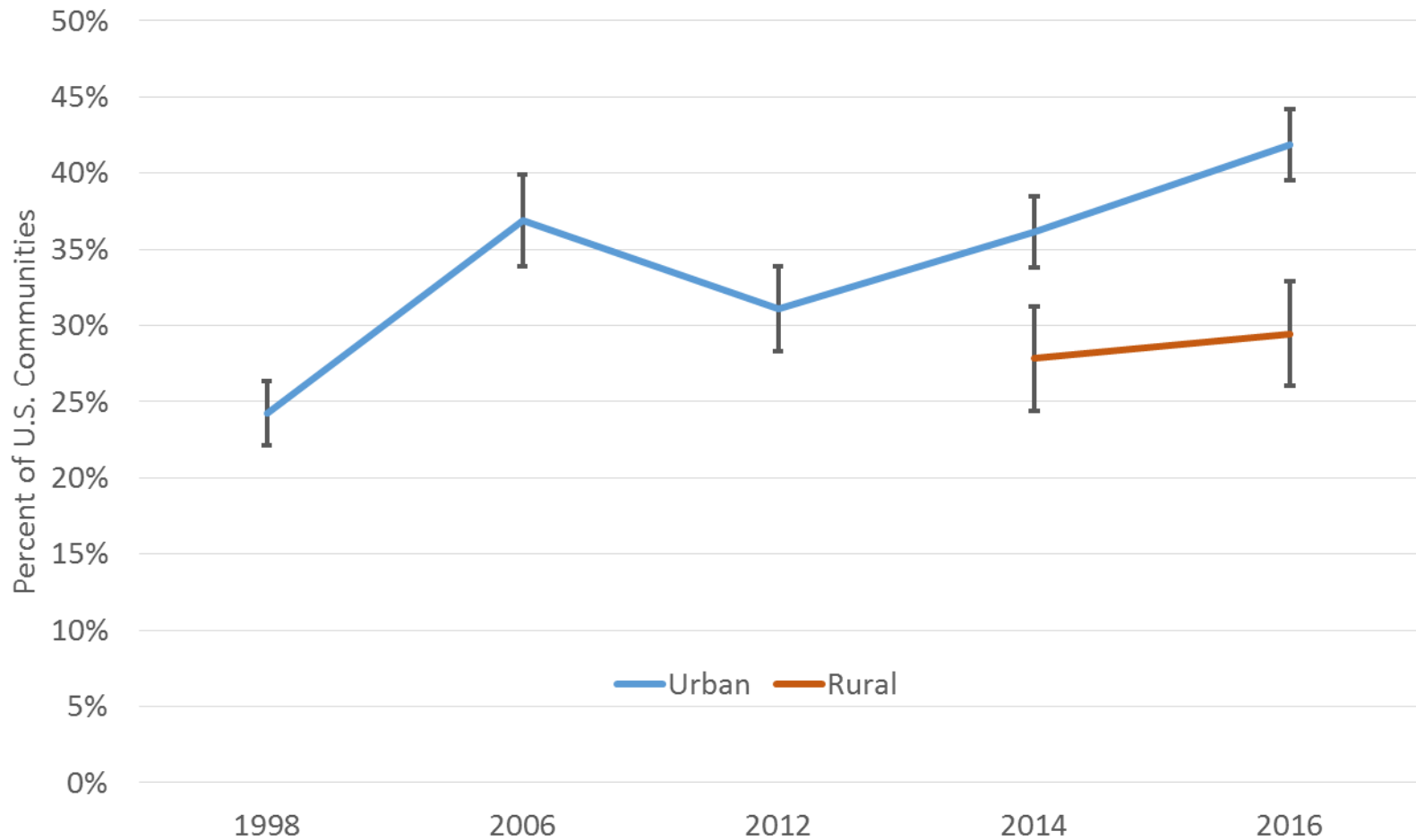
All models control for type of jurisdiction, population size and density, metropolitan area designation, income per capita, unemployment, poverty rate, racial composition, age distribution, physician and hospital availability, insurance coverage, and state and year fixed effects.

Analytical approach: IV estimation

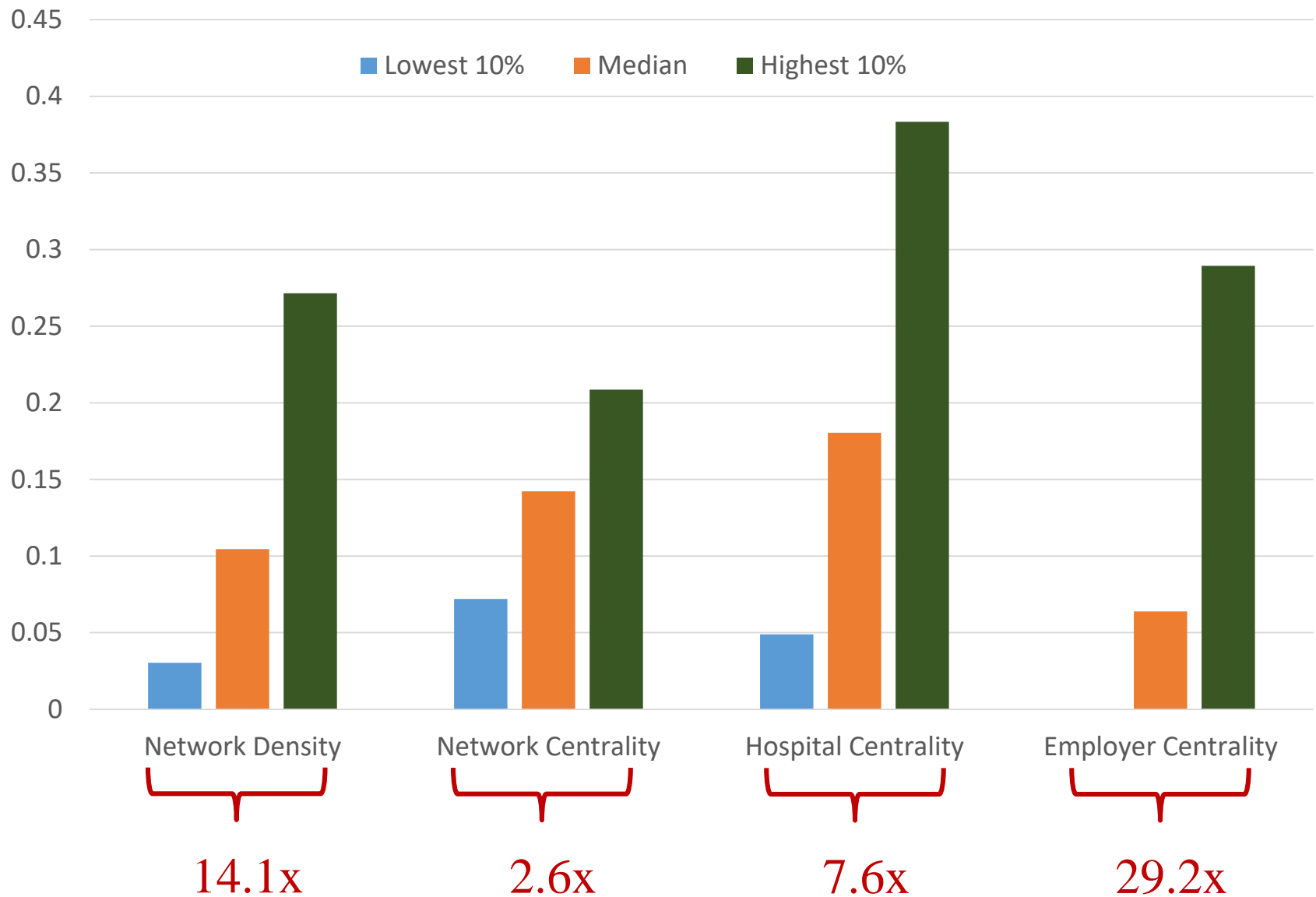
- Identify exogenous sources of variation in system strength that are unrelated to outcomes
 - Governance structures: local boards of health
 - Decision-making authority: agency, board, local, state
- Controls for unmeasured factors that jointly influence systems and outcomes



Variation and change in comprehensive systems



Variation in network structure in 2016



Organizational contributions to population health activities

	% of recommended activities implemented			
	Type of Organization	1998	2016	Percent Change
	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%

Predictors of Comprehensive Systems

First Stage Probit Results

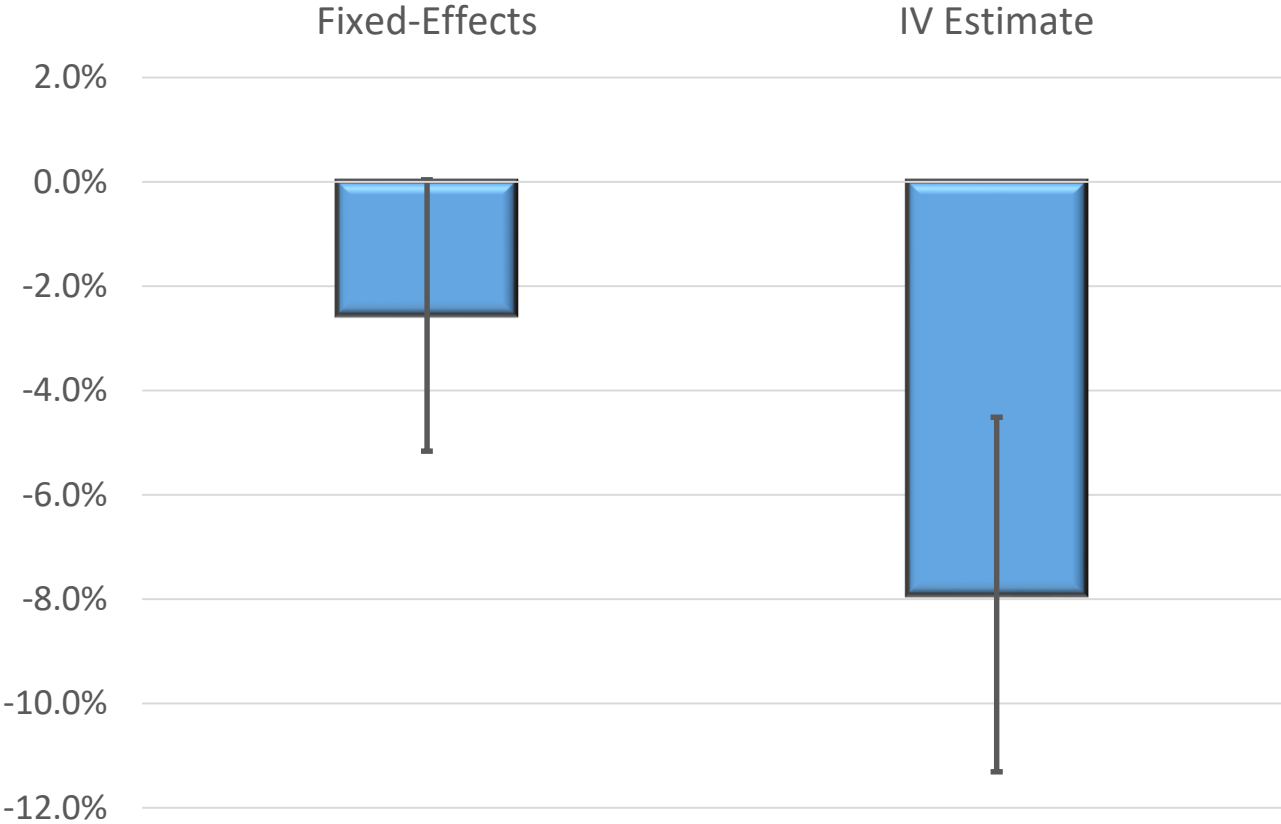
Variable	Marginal Effect	S.E.	
Population size (10,000s)	0.033	0.009	***
Poverty rate (10%)	-0.033	0.016	**
Policy-making local BOH (0,1)	0.046	0.016	***
Centralized local health agency (0,1)	-0.087	0.036	**
Local control of health budget (0,1)	0.043	0.022	*
Local health tax/fee authority (0,1)	0.028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

IVs

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

For More Information

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Glen P. Mays, Ph.D., M.P.H.

glen.mays@uky.edu

[@GlenMays](#)

Web: www.systemsforaction.org
Email: systemsforaction@uky.edu
Archive: works.bepress.com/glen_mays
Blog: publichealtheconomics.org

