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Multi-Sector Contributions to Public Health Delivery Systems: Economic, Institutional & Policy Determinants

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UNIVERSITY OF KENTUCKY
Center for Public Health Systems and Services Research

Systems for Action
National Coordinating Center
Systems and Services Research to Build a Culture of Health

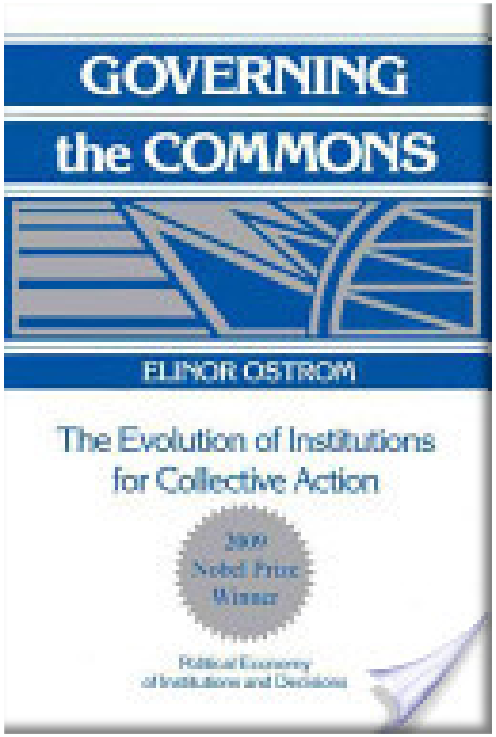
How do we support effective population health improvement strategies?

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

Kindig 1997

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

ACA creates new incentives & infrastructure for population health work

- Health insurance coverage expansion: ability to redeploy charity-care resources
- Hospital community benefit requirements
- Insurer and employer incentives
- Value-based payment models
- CMS Innovation Center demonstrations
- Prevention & Public Health Fund
- National public health accreditation standards

Questions of interest

- Which organizations contribute to the implementation of population health activities in local communities?
- How does do these contributions evolve under ACA implementation?
- What are the health and economic effects attributable to population health activities?

Primary data source

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

** Additional sample of 500 non-metro communities added in 2014 wave

Measures of population health activities

J.S. Durch, L.A. Bailey, and M.A. *Stoto*, eds. *Improving Health in the Community*, Washington, DC: Institute of Medicine, National Academies Press, 1997

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

Estimating changes associated with ACA implementation

Dependent variables:

- ***Scope***: Percent of population activities performed
- **Organizational centrality**: relative influence of organizations and sectors in supporting population health activities
- ***System capital***: composite measure of multi-sector contributions to population health activities

Independent Variables/Comparators:

- Pre-post ACA time trend
- Medicaid expansion vs. Non-expansion states (DD)
- Post-expansion coverage gains
- Public health accreditation status (DD)

Estimating ACA effects on multi-sector population health activities & systems

- Panel regression estimation with random effects to account for repeated measures and clustering of public health jurisdictions within states
- Difference-in-difference specification to estimate ACA expansion and public health agency accreditation effects on system:

$$E(\text{Scope/Centrality/System}_{ijt}) = f(\text{ACA}, \text{ACA*Post}, \text{Accred}, \text{Accred*Post}, \text{Agency}, \text{Community})_{ijt} + \text{State}_j + \text{Year}_t + \varepsilon_{ijt}$$

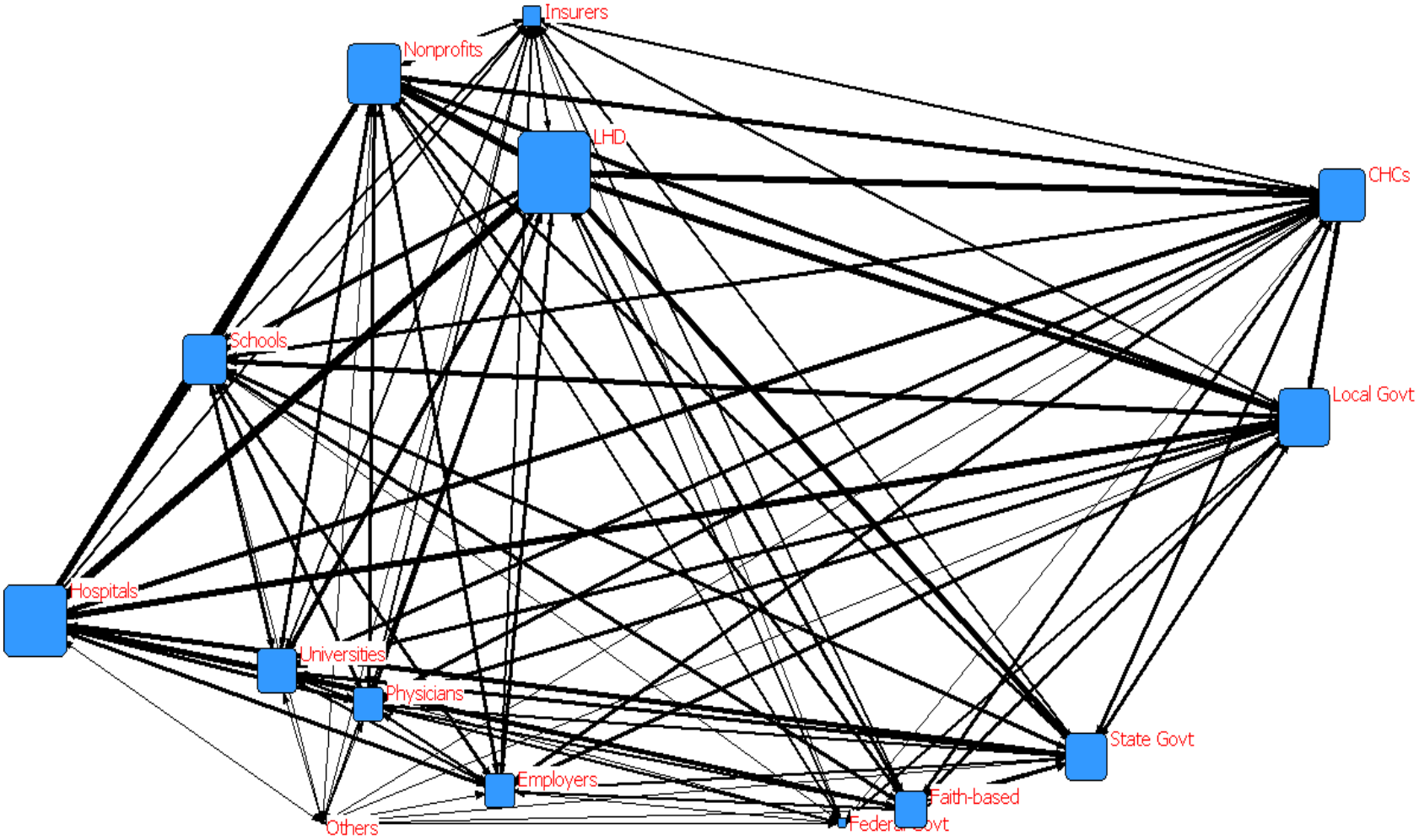
- Two-stage IV model to estimate long-run effect of system changes on population health

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

$$E(\text{Mortality/LE}_{ijt}) = f(\text{System+resid}, \text{Agency}, \text{Community})_{ijt} + \text{State}_j + \text{Year}_t + \varepsilon_{ijt}$$

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. **N=1019 community-years**

Mapping who contributes to population health

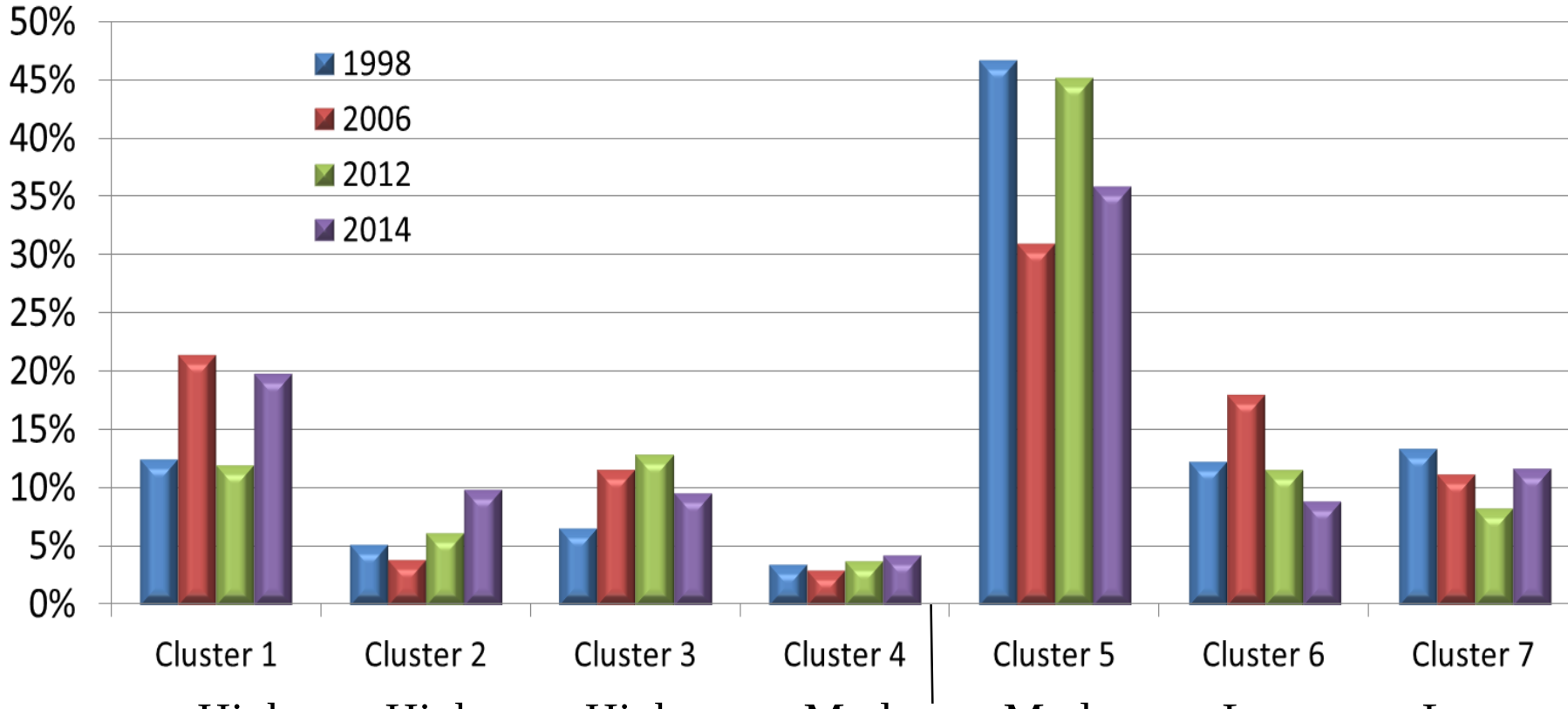


Node size = degree centrality

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.

Classifying multi-sector delivery systems for population health activities, 1998-2014

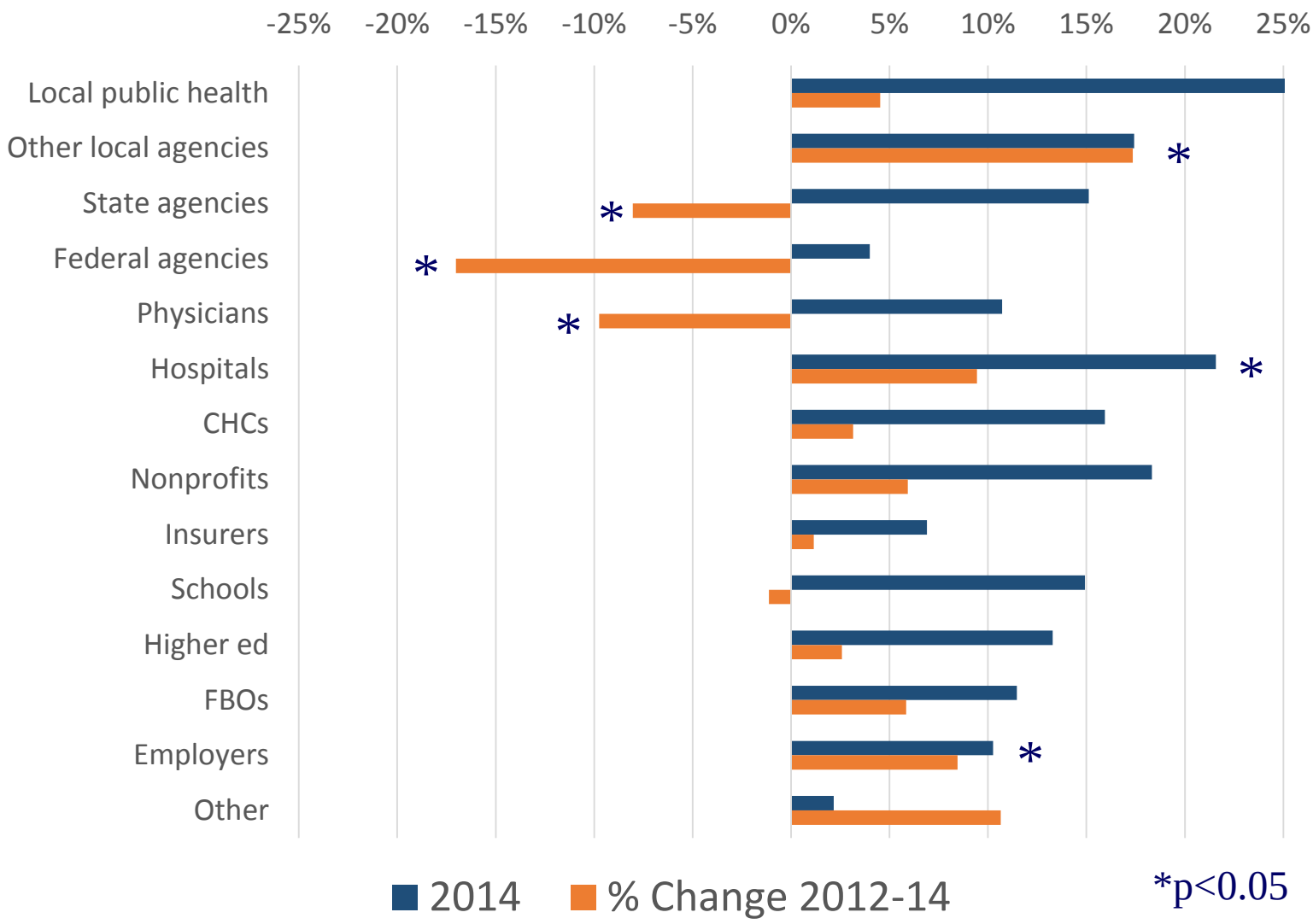


	Cluster 1	Cluster 2	Cluster 3	Cluster 4	Cluster 5	Cluster 6	Cluster 7
Scope	High	High	High	Mod	Mod	Low	Low
Centrality	Mod	Low	High	High	Low	High	Low
Density	High	High	Mod	Mod	Mod	Low	Mod
	Comprehensive (High System Capital)			**Conventional**		**Limited**	

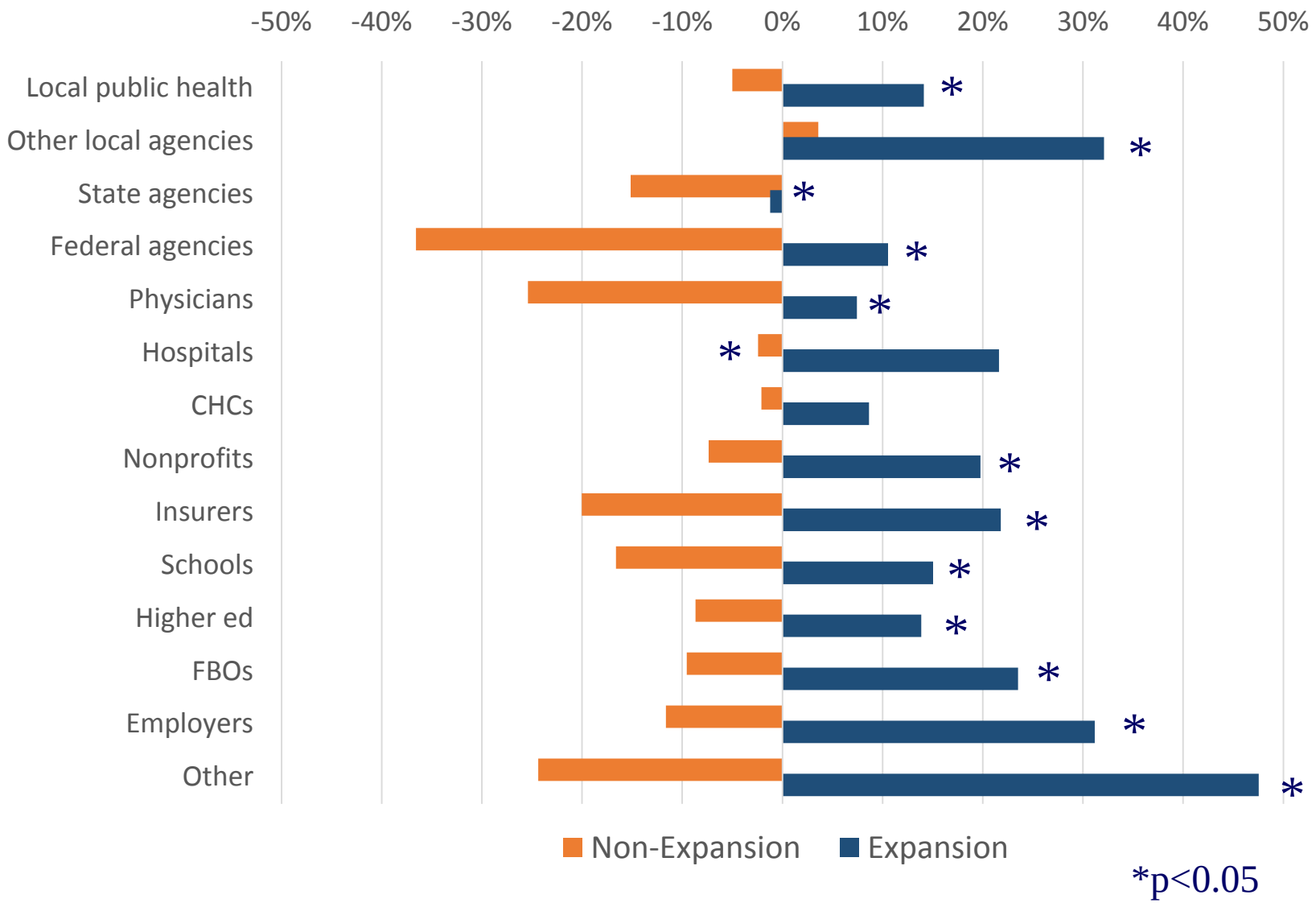
Organizational contributions to population health activities, 1998-2014

Type of Organization	% of Recommended Activities Implemented 1998	2014	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%

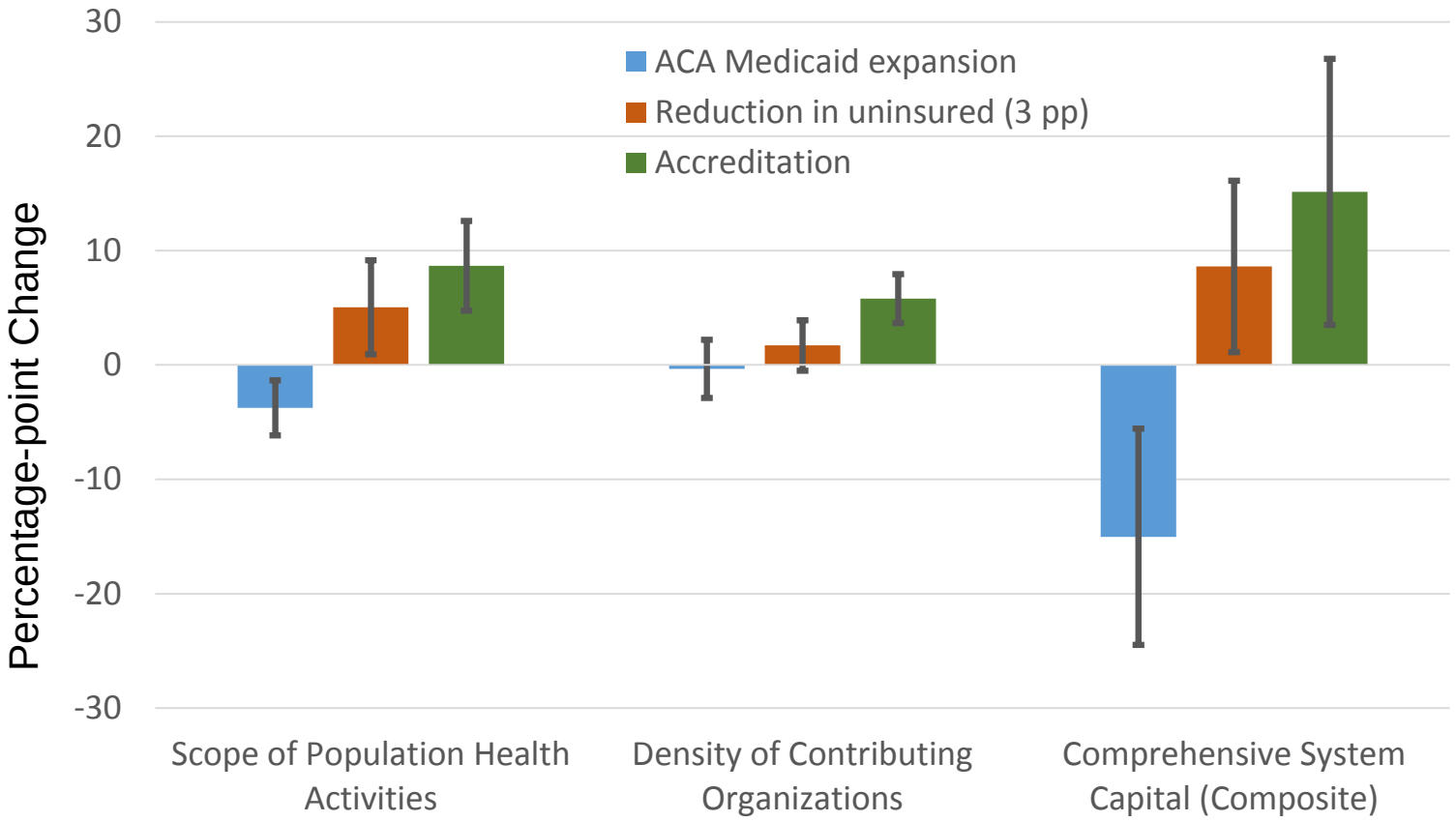
Changes in organizational centrality for population health activities, 2012-2014



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



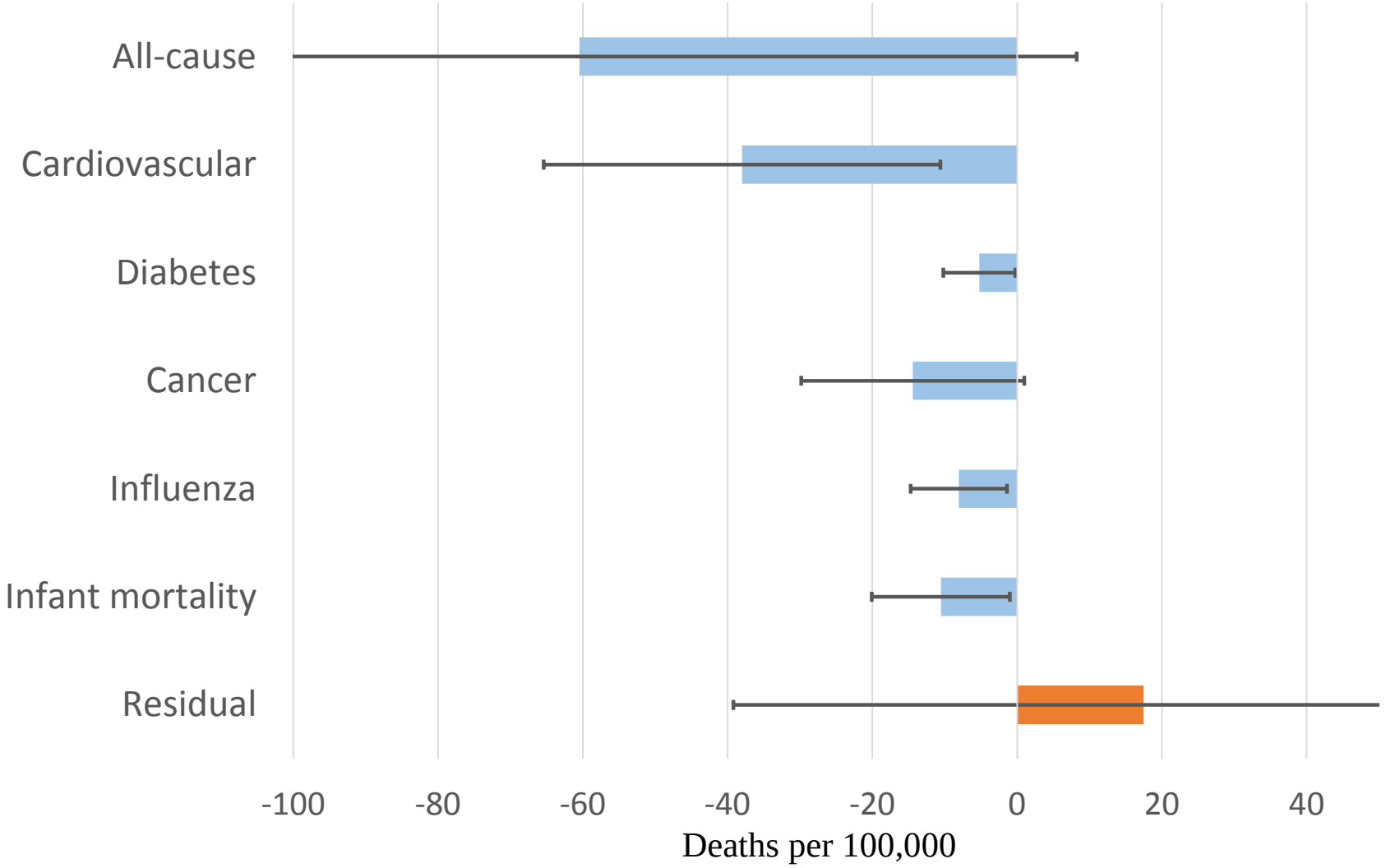
DD estimates of ACA effects on population health activities



Controlling 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, state and year fixed effects. Vertical lines are 95% confidence intervals. **N=1019 community-years**

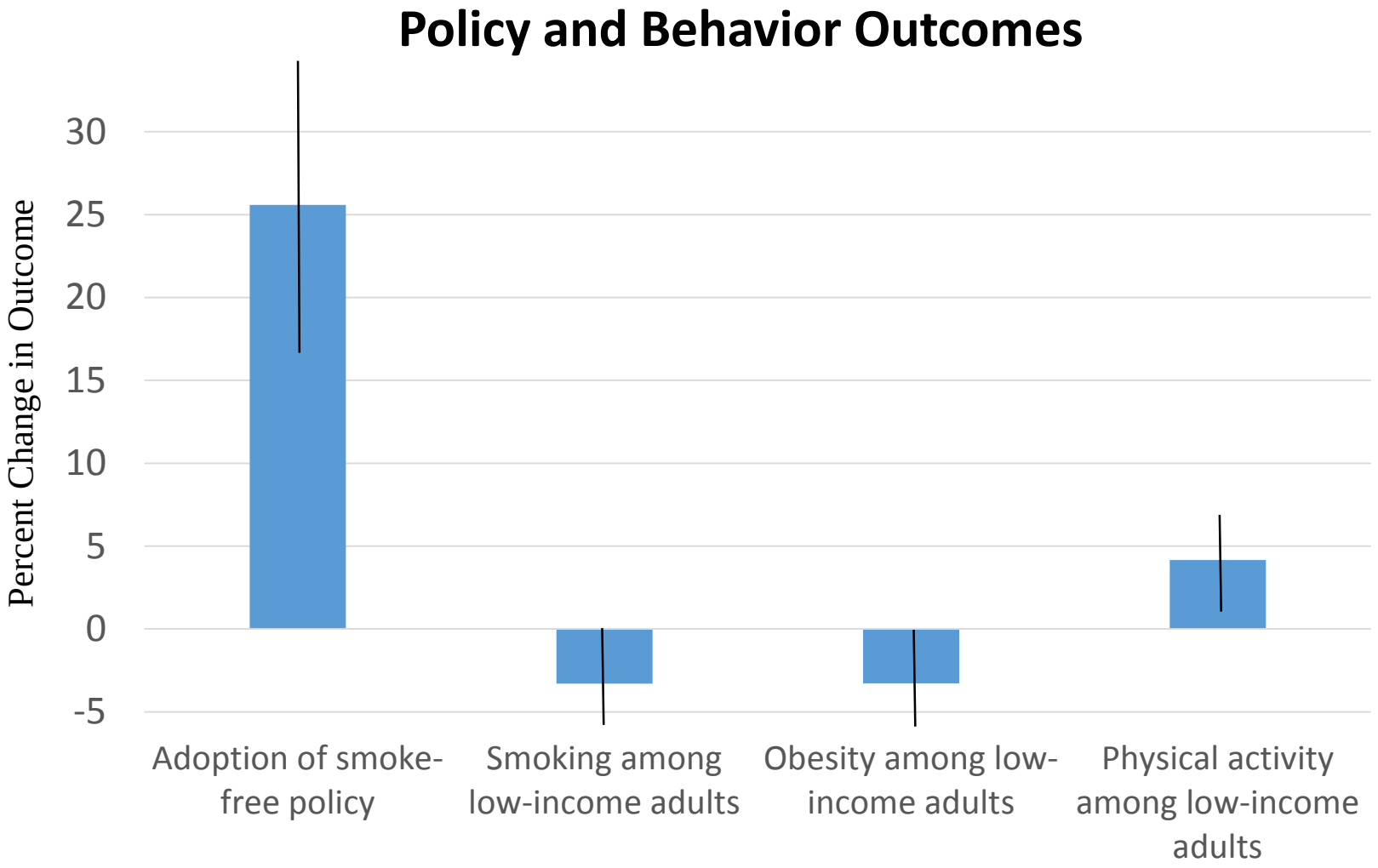
Long-run health effects attributable to comprehensive systems

IV Estimates on Mortality, 1998-2014



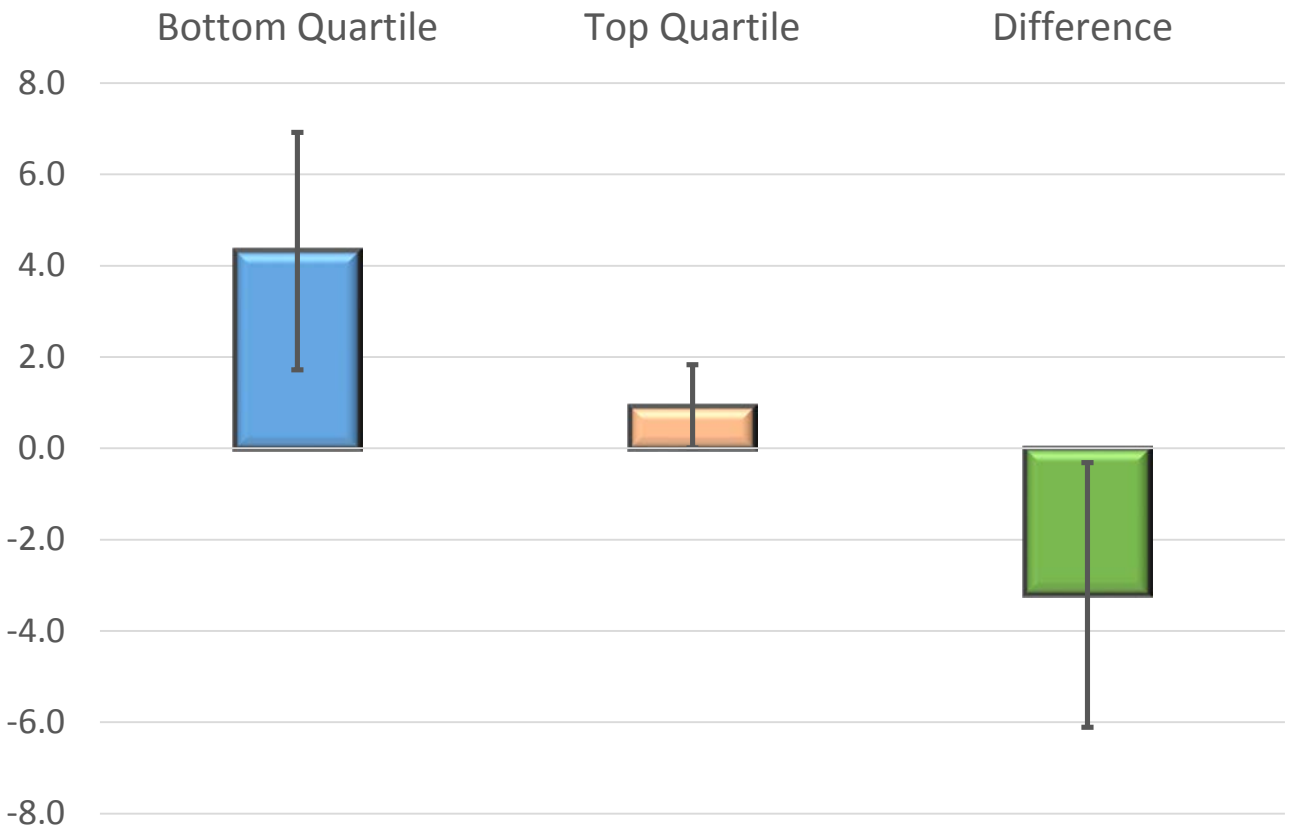
Models also control for racial composition, unemployment, health insurance coverage, educational attainment, age composition, and state and year fixed effects. N=1019 community-years

Long-run health effects attributable to comprehensive systems



Long-run health effects attributable to multi-sector systems

IV Estimates of Comprehensive System Capital Effects 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

Conclusions and Implications

- ACA-related coverage expansions are associated with significant increases in multi-sector contributions to population health activities.
- Public health agency accreditation is associated with even larger gains in multi-sector activities
- Multi-sector population health activities may reduce preventable mortality and reduce income-related disparities in life expectancy.
- Health gains from population health are additive to the gains attributable to coverage expansion

Limitations

- Low-resolution measures of population health activities
- Measure extensive margin of population health activities rather than intensive margin
- Do not directly observe incidence of other ACA population health components (e.g. community benefit)

For More Information

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