



# A Network View of Population Health Delivery Systems

*Research In Progress Webinar*

*Thursday, December 15, 2016*

*1:00-2:00pm ET/ 10:00-11:00am PT*

*Funded by the Robert Wood Johnson Foundation*

# Agenda

**Welcome: C.B. Mamaril, PhD**, RWJF [Systems for Action](#) National Coordinating Center, Research Assistant Professor, University of Kentucky College of Public Health

## A Network View of Population Health Delivery Systems

**Presenter: Rachel Hogg Graham, DrPH, MA**, Assistant Professor of Health Sciences, Education, and Research, University of Kentucky College of Health Sciences [Rachel.hogg@uky.edu](mailto:Rachel.hogg@uky.edu)

**Commentary: Anna G. Hoover, PhD, MA**, Co-Director, RWJF [Systems for Action](#) National Coordinating Center, Assistant Professor, U. of Kentucky College of Public Health

## Questions and Discussion

# Presenter



## **Rachel Hogg Graham, DrPH, MA**

Affiliated Faculty, Center for Public Health  
Services and Systems Research, College  
of Public Health

Assistant Professor of Health Sciences,  
Education, and Research, College of  
Health Sciences

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# A Network View of Population Health Systems

Rachel Hogg Graham, DrPH, MA

*Assistant Professor*

University of Kentucky, College of Health Sciences

- Growing number of national initiatives that call for greater integration of public health, social service, and health care systems
  - IRS requirements for nonprofit hospitals
  - Public Health Accreditation
  - Accountable Care Organizations
  - Patient-Centered Medical Homes
  - CMS Accountable Health Communities

# Population Health Network

S4A  
Systems for Action



**Public Health**  
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# How do we examine cross-sector partnerships and their evolution?



- Social Network Analysis (SNA)
- Combine SNA with traditional regression modeling



# Questions of Interest

1. How have population health systems changed over time?
2. What characteristics of the community influence network structure?

## Community Characteristics

Population size  
Board of Health  
Income  
Number of insured individuals  
Portion of the population over 65  
Number of MDs  
Number of hospitals  
Community Health Center



## Network Structure

Degree Centrality  
Betweenness Centrality  
Density  
Degree Centralization



## Provision of Population Health Activities



## Population Health Outcomes



- National Longitudinal Survey of Public Health Systems (NLSPHS)
- Cohort of 360 communities with at least 100,000 residents
- Surveyed in 1998, 2006, 2012, 2014, 2016\* (70% response rate)
- Local public health officials report:
  - **Scope**: availability of 20 recommended core population health activities
  - **Network**: organization contribution to each activity
  - **Centrality of effort**: contributed by the governmental public health agency
  - **Quality**: perceived effectiveness of each activity



- Linked with:
  - Information on local public health agency and system (National Association of County and City Health Officials)
  - Community characteristics (Census and Area Health Resource File)





- Longitudinal observations of cross-sector participation in population health activities
- Multivariate regression for panel data to estimate the associations between network structure and socioeconomic, demographic, and health care delivery system characteristics



- Density
  - Measured by taking the proportion of relationships that exist in the network to the total possible relationships that can exist between organizations
- Degree Centralization
  - Measures the connectedness of organizations in the network as a whole
  - High level of degree centralization would indicate that the bulk of population health activities are provided by a select number of organizations

- Degree Centrality

- Counts the number of connections an organization has with the other organizations in the network
- A high level of degree centrality may be an indicator of organizations that actively seek or are sought out to be involved in population health systems

- Betweenness Centrality

- Captures the extent an organization lies between other organizations in the network
- Organizations with high betweenness centrality may hold important “gate-keeper” and information sharing roles



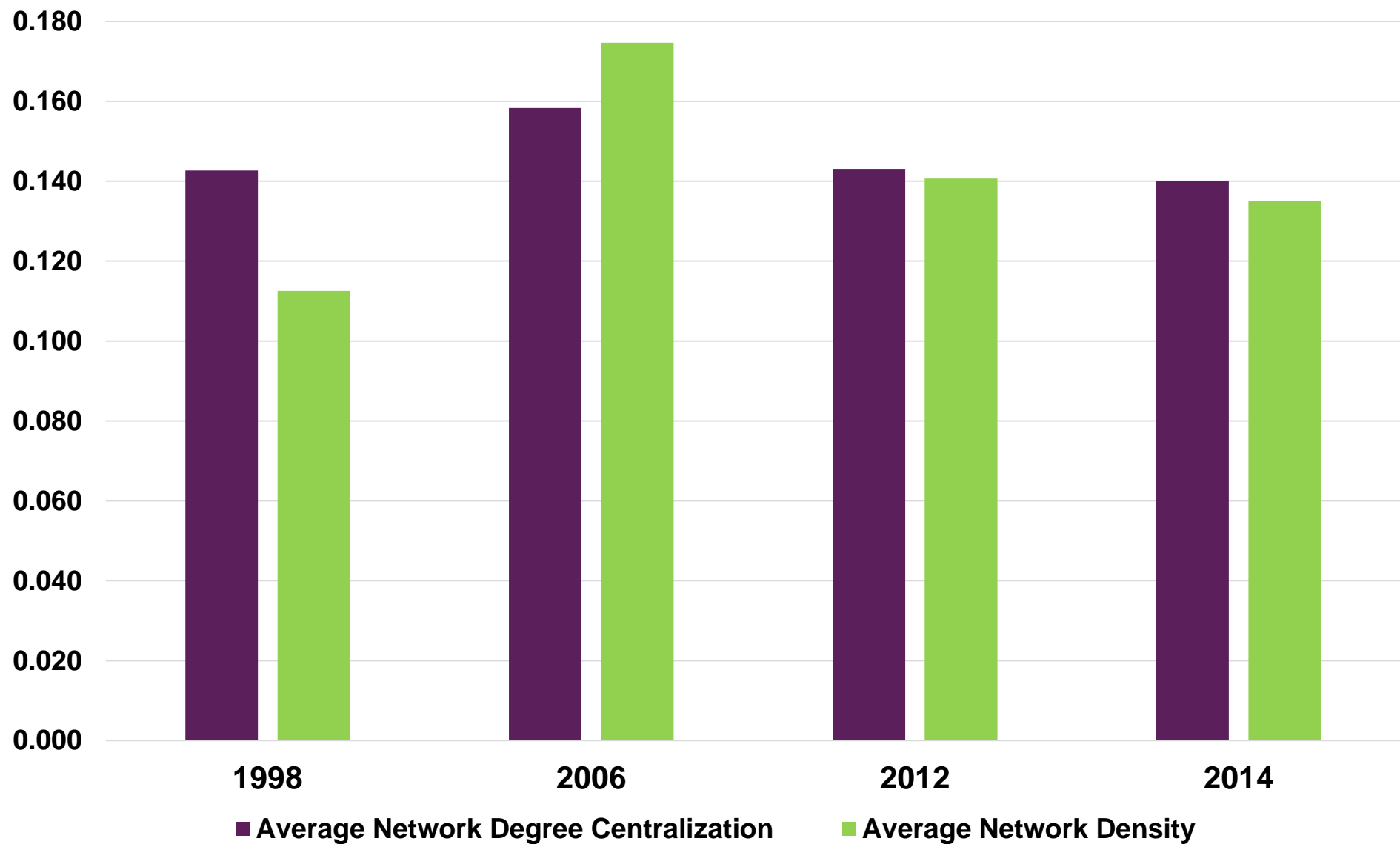
- Dependent Variables:

1. Network Density
2. Degree Centralization

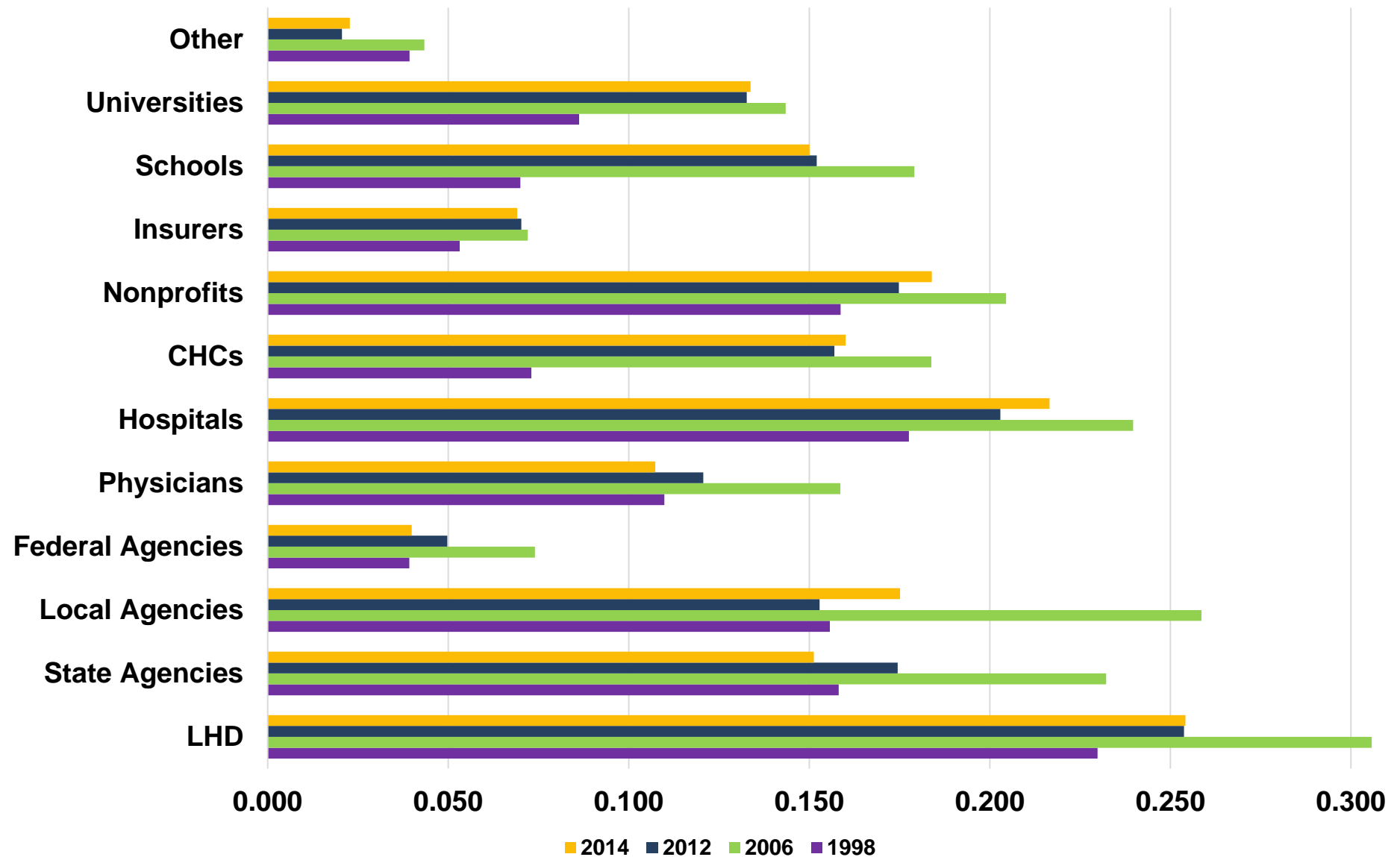
- Independent Variables:

- Population size
- BOH exists
- Income per capita
- % with a college degree
- % non white
- # uninsured
- % over 65
- MDs per capita
- Hospital beds per capita
- Federally Qualified Health Center yes/no

# Average Network Measures

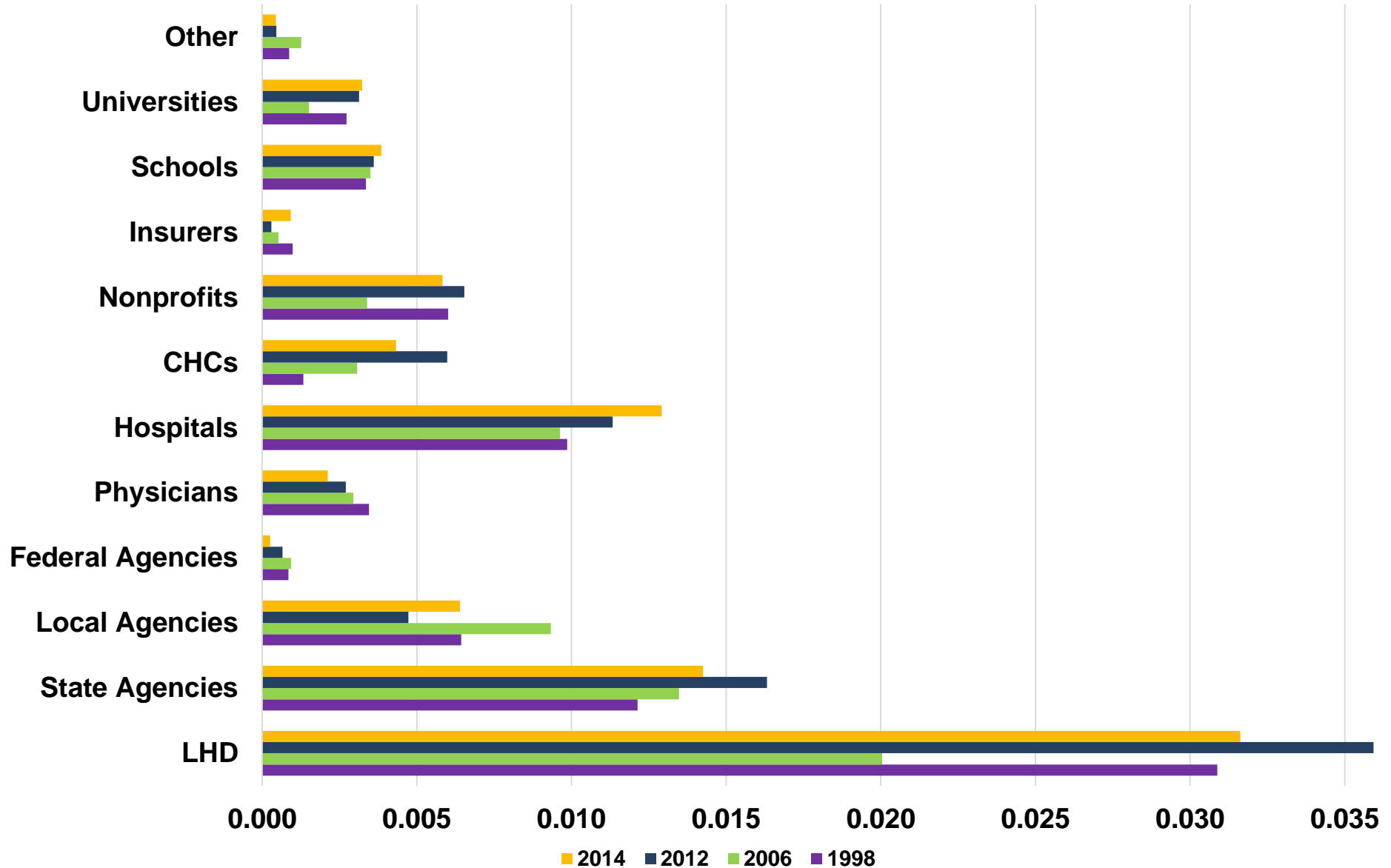


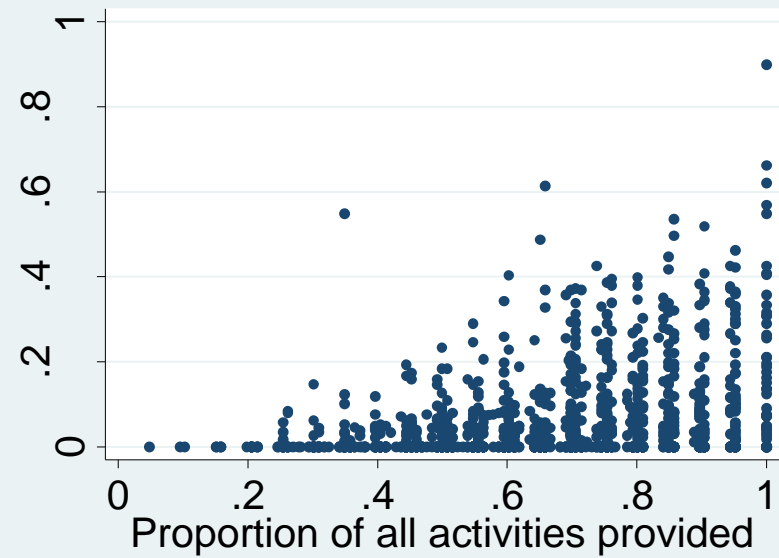
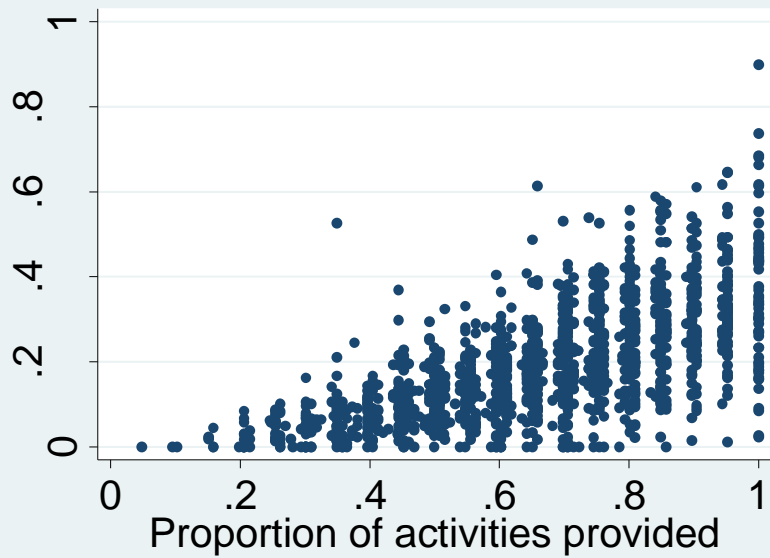
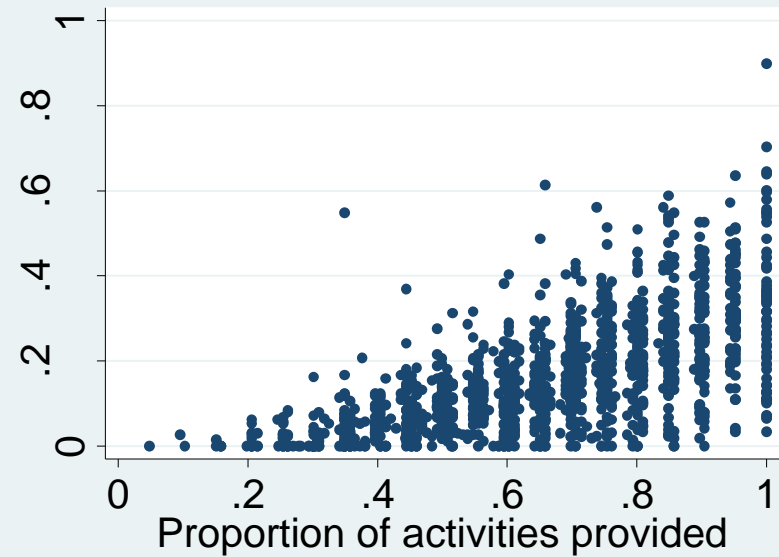
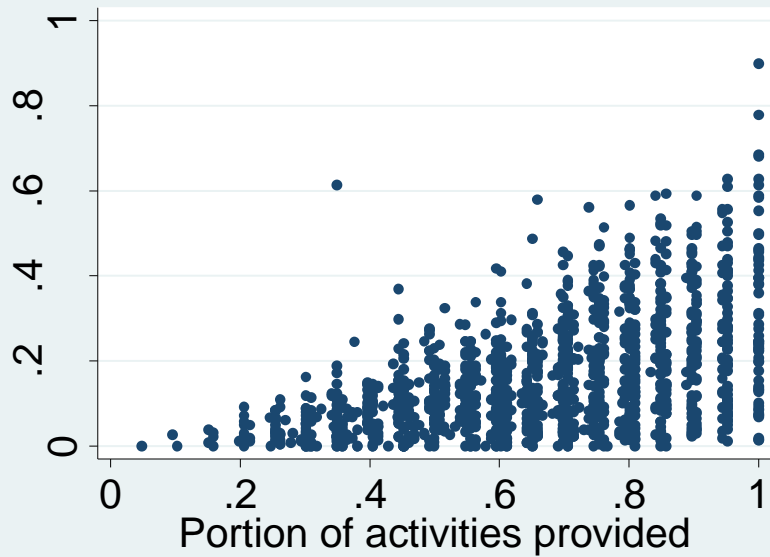
# Organization Degree Centrality





# Organization Betweenness Centrality





# Regression Results

	Density	Degree Centralization
Population	0.258**	0.122**
BOH	0.215**	0.118**
Income pcap	0.000	-0.000 <sup>†</sup>
% with college degree	0.001	0.002
% non-white	-0.005**	-0.003*
Number uninsured	-0.006	-0.008*
% over 65	0.008	0.008*
MDs pcap	0.000**	-0.000**
FQHC (yes/no)	0.112 <sup>†</sup>	-0.014
Hospital Beds pcap	0.000**	0.000**

\*\*p<0.01, \*p<0.05, <sup>†</sup> p<0.1

# What does this tell us?

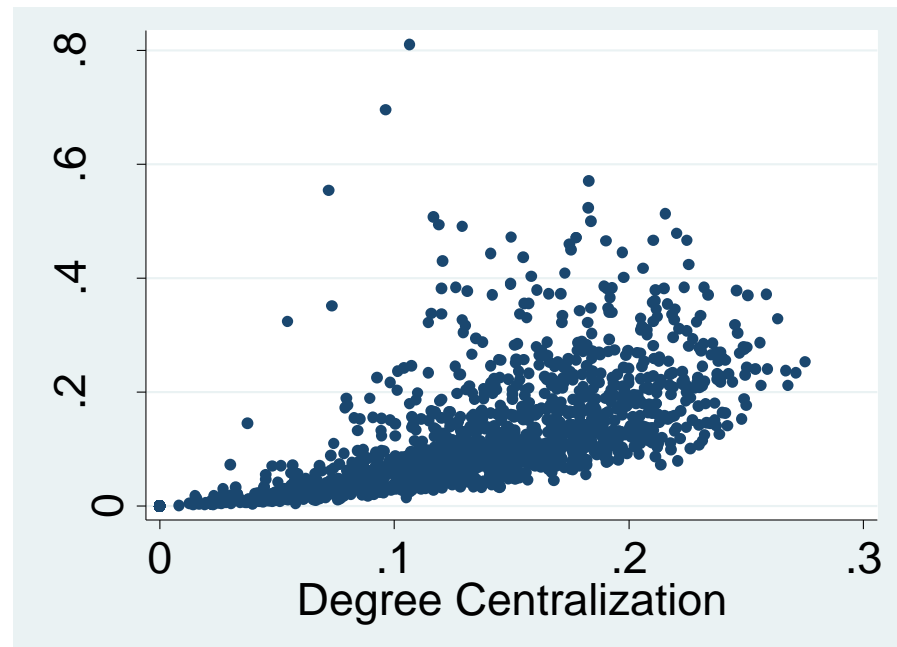
- Associations between network structure with socioeconomic, demographic, and health care delivery system characteristics
- BOH as the convener and coordinator?
- Negative associations with characteristics that typically indicate populations faced with greater health disparities
  - Network constriction

# Leads to more questions...

- What are the costs and benefits to working across sectors?
- How can communities that are trying to meet the complex needs of individuals with unmet social and medical needs be incentivized to work collaboratively?
  - Organizational and financial
- PARTNER Social Network Analysis Tool
  - <http://partnertool.net/>

# Next Steps

- Examine rural communities with the expanded sample
- Adding in more SNA variables
- Exploring the relationship between density and degree centralization



- Deeper look at the networks to understand what strategies for aligning medical, social, and population health services have the largest effect on health and well-being
  - Understanding of what works where and in which population groups
- Mixed-methods approach
  - Examine the cost vs. benefit of collaboration

# Project Updates

go to: <http://systemsforaction.org/projects/network-view-population-health-delivery-systems>

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### A Network View of Population Health Delivery Systems

#### Overview

The delivery of population health services is a cross-sector effort that involves many different organizations in the community. While research has shown the collaborative nature of public health, very little has examined the relationship between community characteristics and the nature and volume of multi-sector partnerships that form. This presentation describes use of Social Network Analysis (SNA) methods to examine how the composition of population health systems evolve over time and how socioeconomic and demographic factors impact network structure.

#### Details

**Project:** [A Network View of Population Health Delivery Systems](#)

**Type:** RIP Webinars

**Resource:** [Event Details](#)

**Authors:** Hogg Graham, RA

**Date:** 12/08/2016

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Title	Date▼	Type
<a href="#">A Network View of Population Health Delivery Systems</a>	12/08/2016	Presentation



# Commentary



## **Anna. G. Hoover, PhD, MA**

Co-Director, RWJF Systems for Action  
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# Questions and Discussion

# Webinar Archives

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

## Upcoming Webinars

Wednesday, January 11, 12-1pm ET/ 9-10am PT

### **ESTIMATING THE COSTS OF FOUNDATIONAL CAPABILITIES FOR THE NATION'S PUBLIC HEALTH SYSTEM**

*C. B. Mamaril, PhD, Senior Scientist, Systems for Action National Coordinating Center, University of Kentucky College of Public Health*

Thursday, January 19, 1-2 pm ET/ 10-11am PT

### **INTER-ORGANIZATIONAL COLLABORATION IN LOCAL PUBLIC HEALTH SYSTEMS**

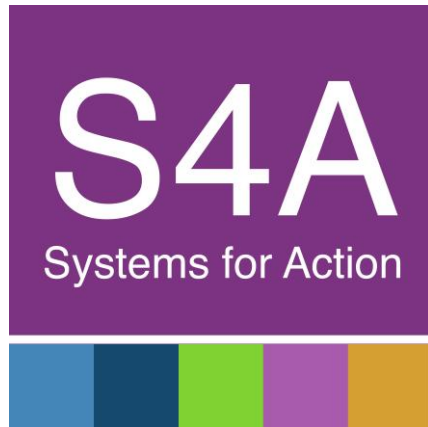
*Justin Marlowe, PhD, MPA, and Betty Bekemeier, PhD, MPH, RN, University of Washington*

Wednesday, February 8, 12-1pm ET/ 9-10am PT

### **UNDERSTANDING RURAL-URBAN DIFFERENCES IN THE IMPLEMENTATION OF POPULATION HEALTH ACTIVITIES**

*Lava Timsina, PhD, MPH, Systems for Action National Coordinating Center, University of Kentucky College of Public Health*

# Thank you for participating in today's webinar!



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*For more information about the webinars, contact:*

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# Speaker Bios

**Dr. Rachel Hogg Graham** is an Assistant Professor in the University of Kentucky, College of Health Sciences, Department of Human Health Sciences. Her research focuses on public health system organization and composition and the integration of public health and health care delivery systems. She has published several peer reviewed articles, and is currently funded by AcademyHealth and the Robert Wood Johnson Foundation. Before joining the faculty in 2015, Dr. Hogg Graham completed a postdoctoral fellowship at the University of Colorado Denver School of Public Affairs. She earned her doctorate of public health (DrPH) in Health Services Management and her MA in History, specializing in the history of health and medicine, at the University of Kentucky.

**Dr. Anna Goodman Hoover** is co-director of the Systems for Action National Program Office where she helps organize cross-cutting and multi-network research studies designed to evaluate and compare public health strategies implemented across diverse settings. Dr. Hoover, a communication scientist and assistant professor in the Department of Preventive Medicine and Environmental Health, conducts research in such areas as participatory communication, dissemination and implementation science, and stakeholder engagement in support of evidence-based decision making. She also serves as communications director and co-leader of research translation for the University of Kentucky Superfund Research Program, supporting the use of research outcomes at the community, provider, and policy levels.

# Acknowledgements

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