Understanding Rural-Urban Differences in the Implementation of Population Health Activities

Research In Progress Webinar
Thursday, March 16, 2017   *1:00-2:00pm ET/ 10:00-11:00am PT*

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

UK College of Public Health
Center for Public Health Systems and Services Research

Agenda

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

Understanding Rural-Urban Differences in the Implementation of Population Health Activities

Presenters: **Lava Timsina, PhD, MPH,** Research Data Analyst, Center for Outcomes Research in Surgery (CORES), School of Medicine, Indiana University *ltimsina@iu.edu*

Commentary: **Nathan Hale, PhD,** Department of Health Services Management & Policy, East Tennessee State University College of Public Health *halenl@etsu.edu*

Drew Beckett, MPH, Public Health Director, Bourbon County Health Department, KY *AndrewB.Beckett@ky.gov*

Questions and Discussion

Presenter

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Research Data Analyst, Center for Outcomes Research in Surgery (CORES)

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Acknowledgements

Objective

- To examine the rural-urban differences in the scope of and multi-sectoral contributions to population health activities

Background

- Rural –Urban differences
  - Rural communities
    - more likely to experience higher mortality rates
    - have poorer health status, less insured, and less access to preventive care measures
    - have higher incidence of cancer with poor outcomes
    - have higher diabetes and injury mortality rates
  - Differences in access to medical care, characteristics of health delivery systems, characteristics of population at-risk, the external environment, levels of the infrastructure, resources and capacity
  - Widening gap in rural-urban differences in life-expectancy over time
  - Differences in the availability of population health activities

Background

- Traditionally, the rural population health service delivery system emphasized access to care through direct service provision as a fundamental principal of health services delivery

  - However, given that most healthcare problems reported in rural communities stem from risky health behaviors, a lack of health education, lower utilization of healthcare services, and an increasingly aging population, rural populations may be better served by a public health system that focuses on the delivery of core population health services.

  - Given the resource constraints faced by public health agencies in many rural communities, they may not have the capacity to offer a complete package of population health services on their own. One strategy to overcome resource limitations is to partner with other public health system partners in the community and to distribute the burden of effort among these partners.

Some Definitions

- **Population health** - the health outcomes of a population, including the distribution and patterns of multiple determinants of such outcomes within the population

- **Public health system** - group of entities that includes official government public health agencies, other public, private sector, and voluntary organizations that produce a significant impact on the health of public by contributing to the delivery of essential population health services

Population Health Activities

- Based on a series of studies funded by the PHPPO (Public Health Practice Program Office) of the Centers for Disease Control and Prevention (CDC) in the US, 20 population health activities were identified to serve as indicators of local public health systems performance and each of the 20 activities were then linked to 1 of the 3 core public health functions: Assessment, Policy development, and Assurance.
  - National Longitudinal Survey of Local Public Health Systems: 1998-2016

Mays, G. P., et al. (2004). *Am. J. of Public Health, 94*(6), 1019-1026. doi:94/6/1019

Public Health Systems Configurations

Type of system

COMPREHENSIVE SYSTEM CAPITAL

A broad scope of recommended population health activities (>75%) supported through dense networks of contributing organizations and sectors.

Centralized: wide range of organizations contribute to activities, with local public health agency playing a central role.

Distributed: wide range of organizations contribute to activities, with local public health agency playing a less central role.

Compact: narrower range of organizations contribute to activities, with local public health agency playing a central role.

CONVENTIONAL SYSTEM CAPITAL

A moderate scope of recommended population health activities (>50%) implemented through lower-density networks of contributing organizations and sectors.

Centralized: local public health agency plays central role in performing activities.

Distributed: local public health agency plays a less central role in performing activities.
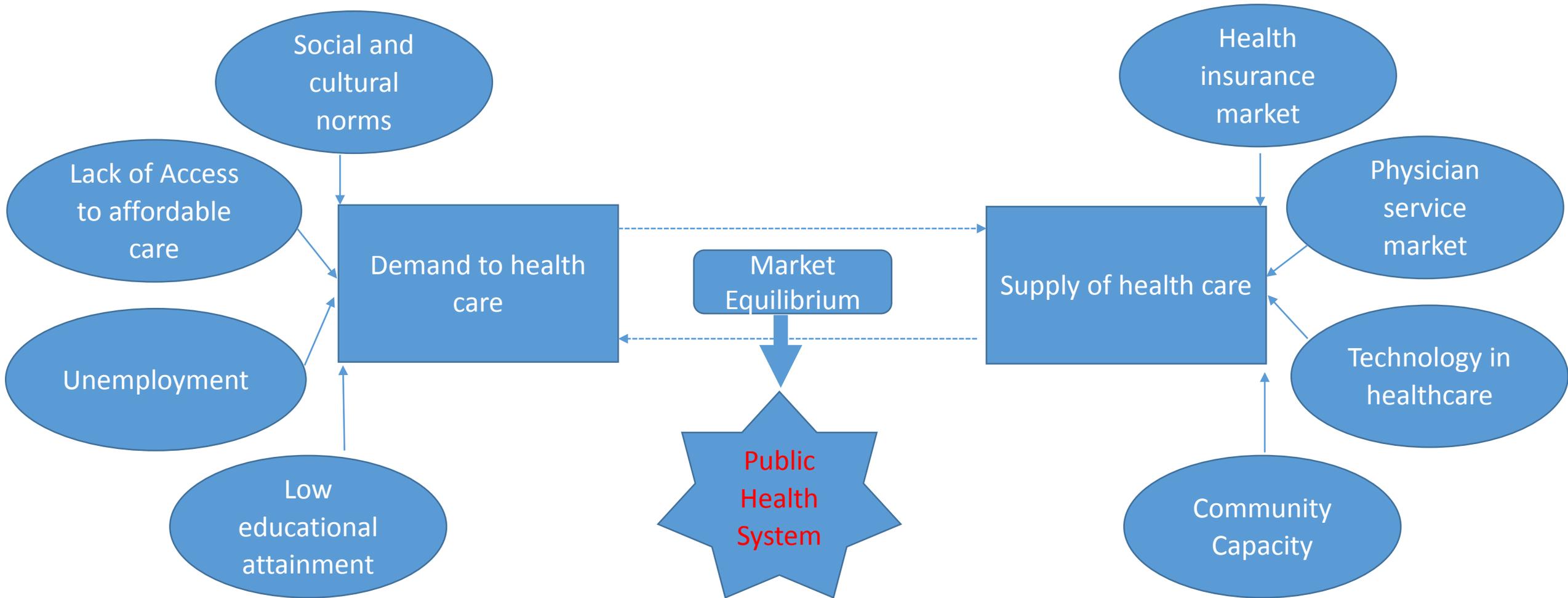
LIMITED SYSTEM CAPITAL

A narrow scope of recommended public health activities (<50%) implemented through lower-density networks of contributing organizations and sectors.

Centralized: local public health agency plays central role in performing activities.

Distributed: local public health agency plays a more peripheral role in performing activities.

Demand-Supply Framework to Health Care

Adapted from Alan Maynard and Panos Kanavos, "Health Economics: An Evolving Paradigm", Health Economics 9, 2000, 183-90

Framework explained

- At population level, demand for health care is affected by socioeconomic characteristics of the population such as socio-cultural norms, income and poverty status, educational attainment, unemployment rates, and access barriers. The rural communities are characterized by:
  - increasing elderly population
  - greater prevalence of risk factors: Smoking, obesity, physical inactivity rates higher in rural communities
  - high poverty rates, lower education rates, higher unemployment rates
  - higher mortality rates, lower rates of declines in mortality

- The supply of population health activities in a community would be a function of community capacity and effort to invest in population health activities, and multi-agency relationships between physicians, consumers, and third party payers across the physician services market and health insurance market. Rural communities are characterized by:
  - Limitedly available resources, lower funding levels, limited access to grants funding,
  - lack of specialized medical care providers,
  - problems in recruiting and retaining staffs,
  - limited access to transportation, wide geographic coverage area, smaller health centers with limited budgets
  - Only 11% of the physicians practice in rural America
  - Clinically active, nonfederal, nonresident national physician/population ratio to 100,000 populations
    - National = 191.1
    - Urban = 209.6
    - Rural = 52.3

- The interaction between demand and supply of health care produces a "Market Equilibrium" that provides a basis to examine public health systems:
  - How well is the system performing?
  - Is it accessible?
  - Is quality at desired level?

Methods

- Study design, data and sample
  - Cross-sectional design controlling for the correlation between Local Health Departments (LHDs) located in the same state
  - Data from 2014 National Longitudinal Survey of Public Health Systems (NLSPHS)
  - Data linkages
    - Area Health Resource Files – 2013-2014
    - 2013 National Association of City and County Health Officials Profile Survey
  - Rural Urban Classification: Rural-Urban Continuum Code (RUCC)
  - NLSPHS study sample: of 1,051 LHDs surveyed, 524 (49.9%) responses were received, representing 47 states and DC
    - Rural LHDs (Non-metro counties from RUCC): 176 LHDs responded (46.0% response rate)
    - Urban LHDs (Metro counties from RUCC): 348 LHDs responded (52.2% response rate)

Classification of Rural-Urban Continuum Code, 2013

The Rural-Urban Continuum Code classification was developed by the U.S. Department of Agriculture, Economic Research Service, using the Office of Management and Budget county definitions. For this study, we defined non-metropolitan counties with RUCC codes 4 to 9 as Rural, and communities with RUCC codes 1 to 3 as Urban.

Urban (Metropolitan) Counties	
Code	Description
1	Counties in metro areas of 1 million population or more
2	Counties in metro areas of 250,000 to 1 million population
3	Counties in metro areas of fewer than 250,000 population
Rural (Non-metropolitan) Counties	
4	Urban population of 20,000 or more, adjacent to a metro area
5	Urban population of 20,000 or more, not adjacent to a metro area
6	Urban population of 2,500 to 19,999, adjacent to a metro area
7	Urban population of 2,500 to 19,999, not adjacent to a metro area
8	Completely rural or less than 2,500 urban population, adjacent to a metro area
9	Completely rural or less than 2,500 urban population, not adjacent to a metro area

Measures

- Dependent variables
  - Composite measure (Average) of the availability of all 20 population health activities
  - Comprehensive structural configuration of each public health delivery system
- Independent variable
  - Rural/Urban communities
- Control variables
  - Demographic : proportion of non-white
  - Socioeconomic: Unemployment rates, Per capita income, uninsurance rates
  - Healthcare resources: Per capita Physicians, Hospital beds, and FQHCs

Statistical Analysis

- Stratified Analysis
  - Stratified by rural and urban jurisdictions
- Generalized estimating equations (GEE)
  - Link functions
    - Availability of population health activities = linear
    - Comprehensive configuration of the public health system = logit
  - Adjusted for the effect of correlated observations due to clustering
    - Correlation structure = unstructured
- Assessed multicollinearity
- Weighted estimates
  - Weights being the inverse of selection probabilities for each jurisdiction in sample

Characteristics of Rural-Urban Jurisdictions

COVARIATES	Rural (n=176)		Urban (n=348)		p-value (Weighted difference)
	Unweighted Mean	Weighted Mean	Unweighted Mean	Weighted Mean	
% of population unemployed	7.1613	7.2402	7.3069	7.2499	0.9647
Hospital beds per 100,000 residents*	0.0035	0.0031	0.0255	0.0336	0.0024
Physicians per 100,000 residents*	0.0011	0.001	0.0435	0.0571	0.0001
Total Uninsurance rate*	17.568	16.5189	14.8916	14.6539	<0.0001
Number of FQHC per 10,000 population below poverty level*	0.0061	0.0056	0.051	0.0474	<0.0001
% of population non-white*	11.8638	9.3732	21.9229	20.2437	<0.0001
Income (in dollar) per capita (in 100,000s)*	0.3745	0.3713	0.4408	0.4392	<0.0001
FREQUENCY DISTRIBUTION (Percentages)					
Jurisdiction*					
County/City-County	81.82	89.30	72.17	69.98	
City/Township	0.57	0.31	16.23	18.58	<.0001
Other	17.61	10.39	11.59	11.44	
Centralization					
Centralized	9.66	7.62	8.02	7.79	
Non-centralized	90.34	92.38	91.98	92.21	0.9462

*p<0.05

Percent of Communities with 20 Population Health Activities by Rural and Urban Settings (2014), N=524

Activities	Rural (n=176)		Urban (n=348)		p-value (Weighted difference)
	Unweighted Mean	Weighted Mean	Unweighted Mean	Weighted Mean	
Conduct periodic assessment of community health status and needs	82.4	82.2	85.0	85.3	0.365
Survey community for behavioral risk factors	57.1	57.0	64.7	60.5	0.4599
Investigate adverse health events, outbreaks and hazards	97.7	96.1	99.7	99.4	0.0774
Conduct laboratory testing to identify health hazards and risks	92.1	90.0	94.5	94.0	0.1333
Analyze data on community health status and health determinants	62.3	59.6	70.0	70.0	0.0169
Analyze data on preventive services use	27.9	30.7	35.7	33.0	0.6068
Routinely provide community health information to elected officials	67.8	64.1	82.7	79.4	0.0007
Routinely provide community health information to the public	75.9	79.8	80.0	79.3	0.8804
Routinely provide community health information to the media	79.9	80.4	83.6	82.6	0.5364
Prioritize community health needs	73.7	75.1	81.3	82.3	0.054
Engage community stakeholders in health improvement planning	59.4	60.1	64.3	63.0	0.5248
Develop a community-wide health improvement plan	70.7	70.7	81.9	79.7	0.0274
Identify and allocate resources based on community health plan	32.8	34.0	41.7	39.1	0.2446
Develop policies to address priorities in community health plan	44.5	48.2	55.8	52.7	0.3328
Maintain a communication network among health-related organizations	79.3	82.1	83.3	82.0	0.9888
Link people to needed health and social services	46.5	45.8	49.4	46.5	0.8824
Implement legally mandated public health activities	93.7	96.4	92.2	93.1	0.0032
Evaluate health programs and services in the community	31.0	33.2	35.6	33.5	0.9504
Evaluate local public health agency capacity and performance	41.6	44.8	50.5	47.9	0.4937
Monitor and improve implementation of health programs and policies	29.5	33.5	46.8	44.3	0.0204
Mean performance of assessment activities (#1-6)	70.0	69.3	75.2	74.0	0.0409
Mean performance of policy and planning activities(#7-15)	64.8	66.0	72.9	71.5	0.0259
Mean performance of implementation and assurance activities (#16-20)	48.4	50.8	54.6	53.1	0.3768
Mean performance of all activities	61.2	62.2	67.8	66.4	0.0434

Percent of Communities with Population Health Activities: Rural vs Urban, only significant activities (p<0.05)

Analyze data : 60% vs 70%

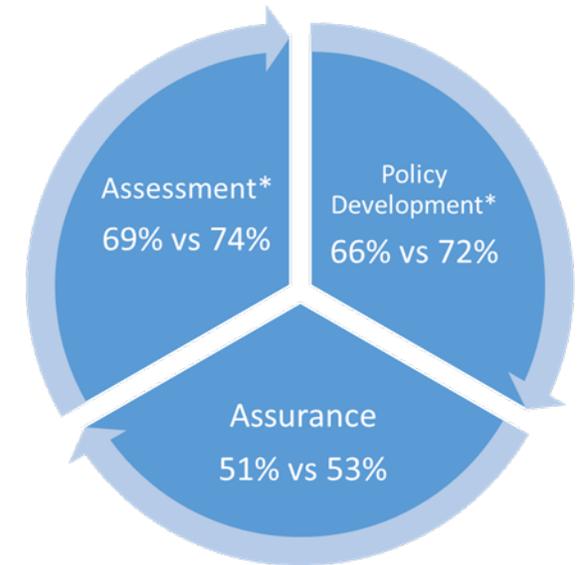Information to elected officials: 64% vs 79%

Health improvement plan: 71% vs 80%

Legally mandated public health activities: 96% vs 93%

Monitor and improve programs/policies: 34% vs 44%

Assessment*
69% vs 74%

Policy Development*
66% vs 72%

Assurance
51% vs 53%

Mean of all 20 Population health activities*: 62% vs 66%

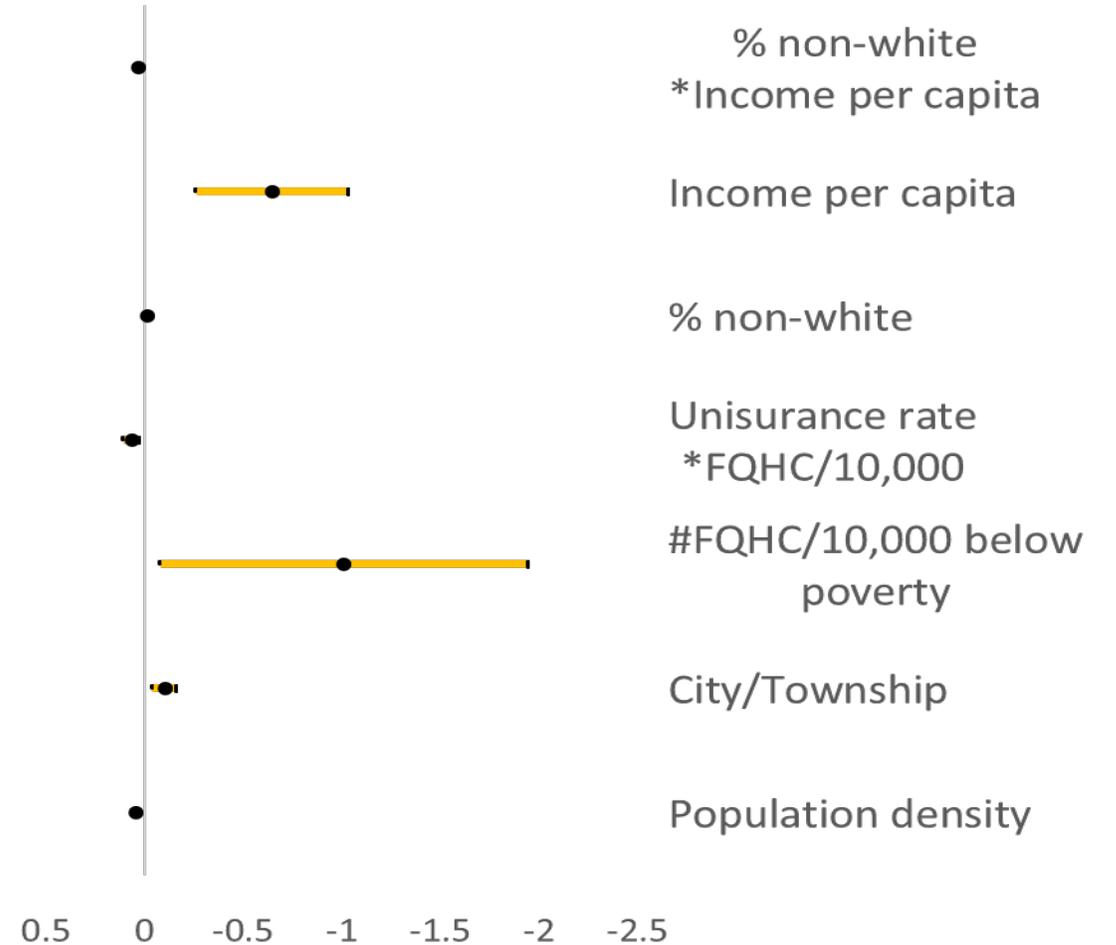# Percent of Rural-Urban Communities with different Public Health System Configurations, 2014

Legend: ■ Rural ■ Urban

Categories: Comprehensive, Conventional, Limited
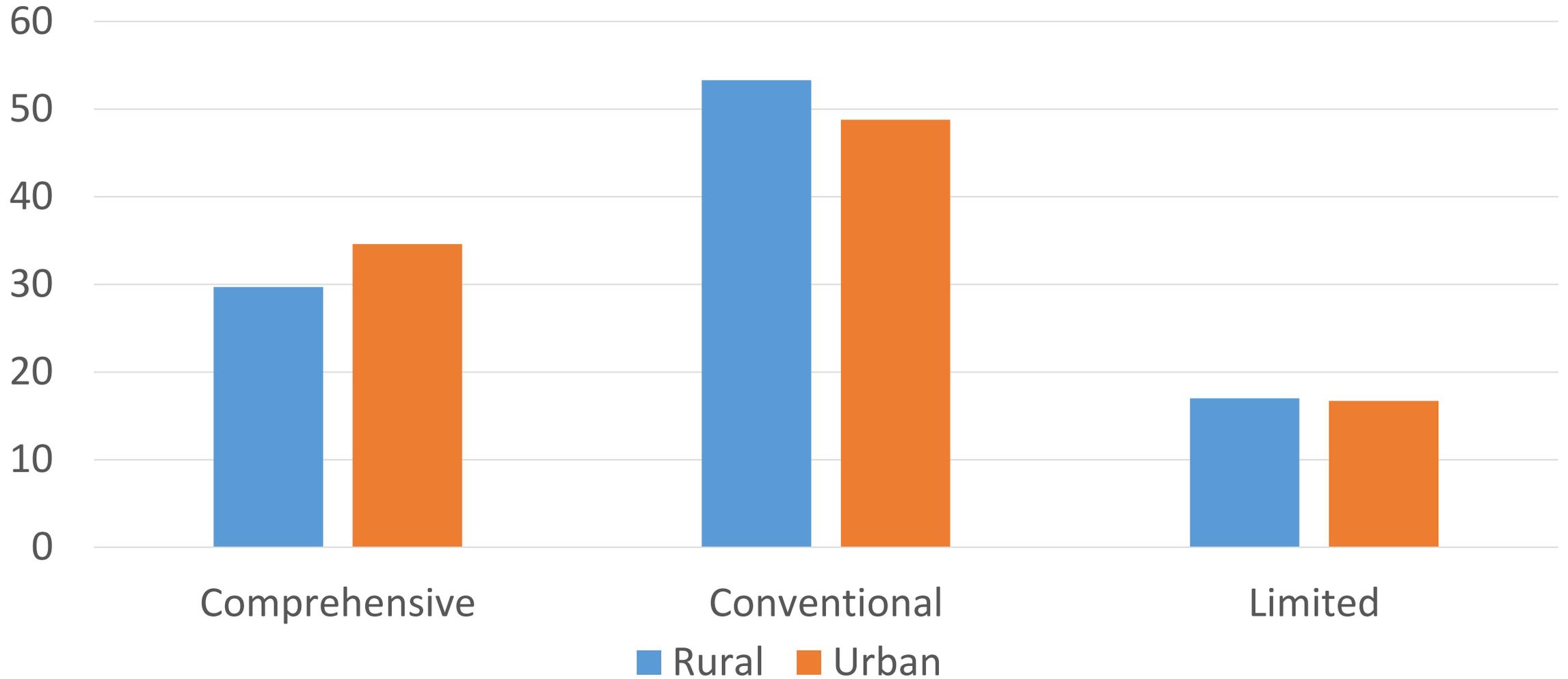
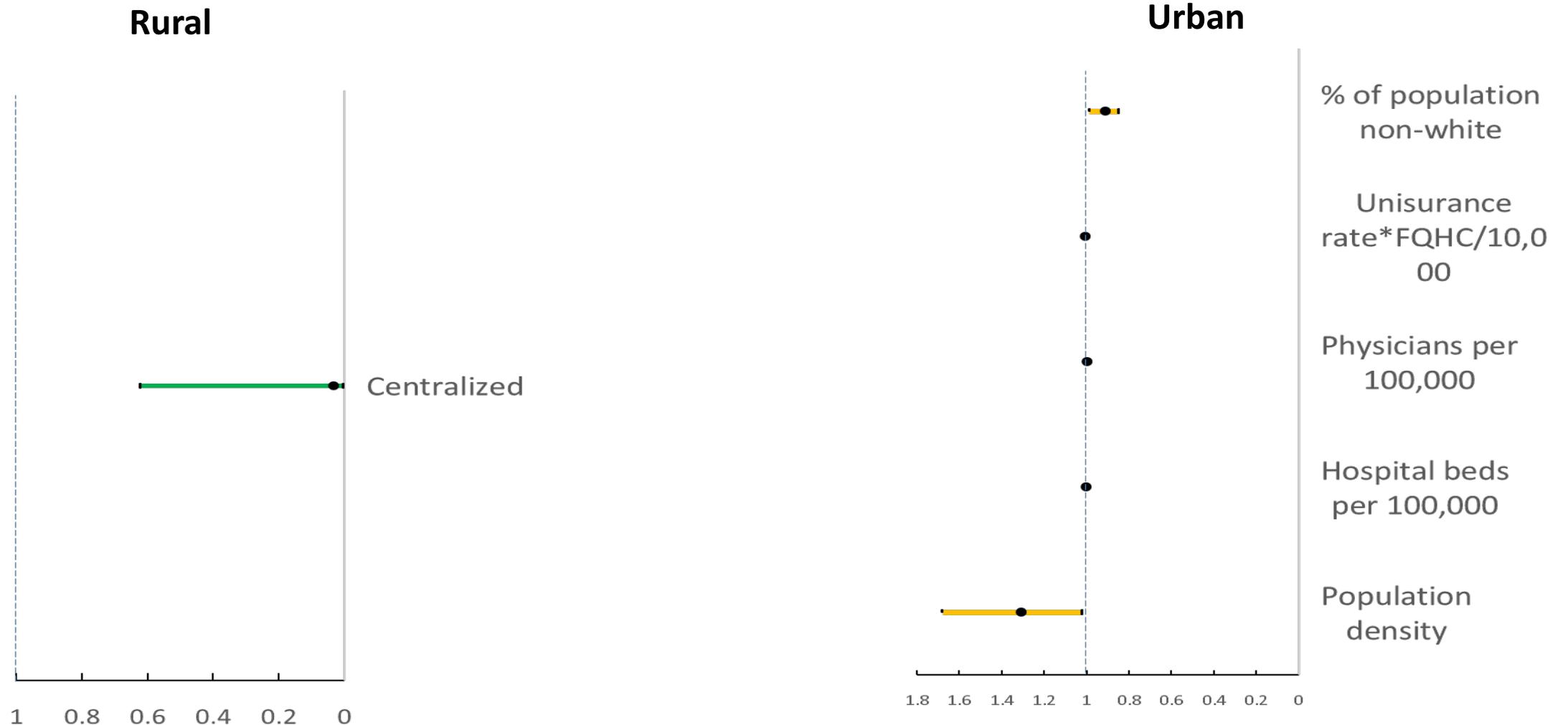# Predictors* of the Availability of Population Health Activities: (Coefficients)

Rural
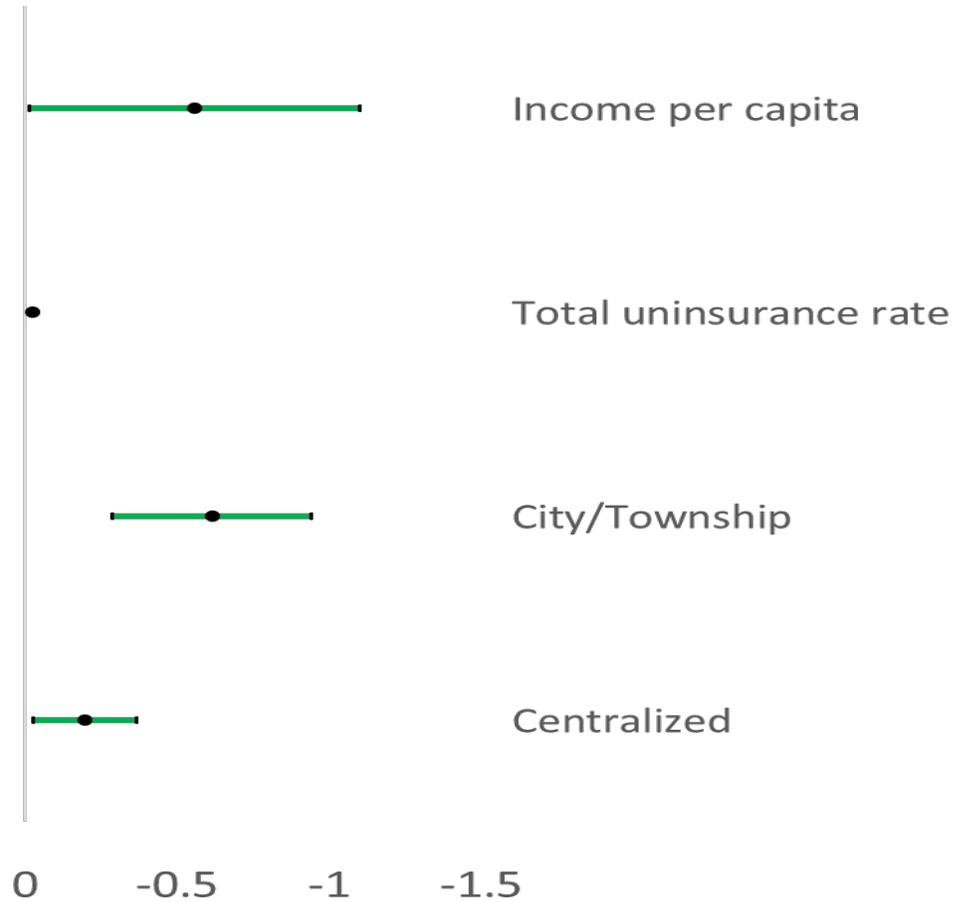
Urban

*Only those predictors with p<0.05

Predictors* of Comprehensive Public Health Systems: Rural and Urban (Odds ratio)

Rural

Urban

Centralized

% of population non-white

Unisurance rate*FQHC/10,000

Physicians per 100,000

Hospital beds per 100,000

Population density

*Only those predictors with p<0.05

Discussion

- On an average, urban communities (67.8%) performed 7% higher number of population health activities compared to rural ones (61.2%). Increase in population density in urban communities predicted greater availability of population health activities.
  - With increasing working adults in urban communities, they generate increasing local tax bases that might have increased the number of population health activities in the community.
- The findings in rural communities also suggest that the centralized states have fewer number of population health activities and also have weaker population health systems at local levels. However, in urban areas this relationship was not observed.
  - A decentralized government authority in rural communities may be more informed of and responsive to local community needs. In urban communities, the benefits of decentralization could be outweighed by the advantage of the size and economies of scale achievable through centralization
- The Federally Qualified Health Centers (FQHC) per 10,000 population below poverty were associated with non-comprehensive population health system.
  - The primary health care services in FQHC programs generally include treatment of acute or chronic medical problems rather than ensuring provision of the population health services in the community.

Discussion

- These findings may reflect the limited financial resources available to rural populations, a greater focus of the public health system on clinical services in the presence of fewer medical care providers, or the presence of populations that experience poorer health and greater health disparities.

- The presence of dense networks of contributing organizations and sectors serving urban populations coupled with a higher resource and income base may facilitate the provision of these recommended health activities.

- By contrast, rural communities are constrained with limited resources and lower population health system capital, and as a result may have less capacity and flexibility to deliver the recommended population health activities.

Limitations

- This is a cross-sectional study and thus does not support causal inference

- Self-reported survey
  - May not reflect all relevant activities and contributing organizations in the community

- Data on concentration, value and quality of the population health delivery services were not collected from the NLSPHS survey

Implications

- Evidence suggests that the US communities characterized as transitioning to having comprehensive system capital experience reduced mortality rates (Mays et al. (2016), Health Affairs 35 (11): 2005-2013).

- Building multi-sectoral system capital across rural communities would help alleviate geographic and socioeconomic disparities in health within the US.

- Creative solutions exist that may help rural public health systems deliver a more comprehensive set of population health services in a more effective manner. One potential strategy is sharing services with other agencies across jurisdictions

- Creating community coalitions and encouraging broad participation in health planning have been shown to be effective modalities in improving rural population health service delivery.

- Rural public health systems may also benefit from efforts to strengthen their capacity related to resource allocation planning, and resource deployment consistent with the plan.

Future Directions

- Together with the 2014 waves of the survey, expand the study by including 2016 waves of NLSPHS which would help us observe the trend of population health activities and system configurations by rural-urban communities

- Examine the effect of system capital on objectively measured all-cause mortality rates by rural and urban jurisdictions

Commentary

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Questions and Discussion

Webinar Archives

Upcoming Webinars

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

COMPREHENSIVENESS IN THE DELIVERY SYSTEMS FOR POPULATION HEALTH ACTIVITIES: GEOGRAPHIC AND LONGITUDINAL VARIATION

Dominique Zephyr, MA, Statistician, Systems for Action National Coordinating Center, University of Kentucky College of Public Health

Thursday, April 20, 1-2pm ET/ 10-11am PT

INTEGRATION OF HEALTH CARE AND PUBLIC HEALTH TO IMPROVE HIV EARLY DETECTION AND CONTROL

Deborah Porterfield. MD, MPH, and Christine A. Bevc, PhD, MA, RTI International and UNC Chapel Hill School of Public Health

Wednesday, May 3, 12-1pm ET/ 9-10am PT

IMPLEMENTATION AND DIFFUSION OF THE NEW YORK CITY MACROSCOPE ELECTRONIC HEALTH RECORD SURVEILLANCE SYSTEM

Katharine (Tina) McVeigh, PhD, MPH, New York City Department of Health and Mental Hygiene

Thank you for participating in today's webinar!
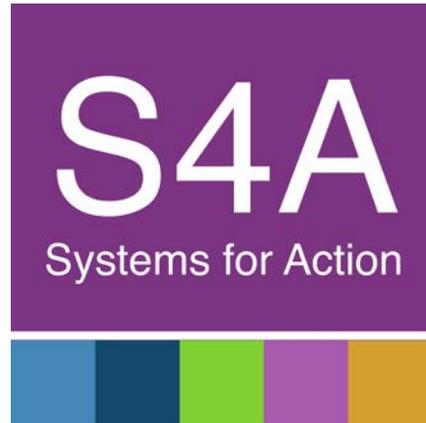
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For more information about the webinars, contact:

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Acknowledgements

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Speaker Bios

Lava Timsina, PhD, MPH is responsible for developing, maintaining and analyzing clinical outcome data at the Center for Outcomes Research in Surgery. He also advises on research study and data base design, analysis, and selection of outcome measures. Dr. Timsina recently completed his Ph.D. in Epidemiology & Biostatistics at the University of Kentucky. He obtained his MPH degree with a concentration in epidemiology from the University of Nebraska Medical Center, and his undergraduate degree in public health from Tribhuvan University, Nepal.

Nathan Hale, PhD is Assistant Professor in the Department of Health Services Management & Policy at the East Tennessee State University College of Public Health. Dr. Hale's research interests include public health services and systems, maternal and child health, and rural health, and his work has examined the role of local health department clinical services on services received and outcomes among rural and vulnerable populations. He has also served as the primary investigator on multiple statewide projects aimed at improving the health and well-being women and children, and previously worked in public health practice at the local, regional, and state level.

Andrew (Drew) Beckett, MPH is the Public Health Director for the Bourbon County Health Department. He was most recently named the 'Trailblazer Award' winner by the Kentucky Health Departments Association as the most outstanding director with less than 5 years of experience. He is currently the Kentucky Public Health Association president. Mr. Beckett also maintains an active role on many boards serving the public of Bourbon and Scott Counties, and received his MPH degree from the University of Kentucky.