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## Patterns of Interaction Among Local Public Health Officials and the Adoption of Recommended Practices

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# Patterns of Interaction Among Local Public Health Officials and the Adoption of Recommended Practices

## **Abstract**

The network that local health officials use to communicate about professional issues contains two groups of LHDs that are influential for either their ability to spread information or to innovate. Both groups are more likely to conduct community health assessments and develop health improvement plans. Since these activities are fundamental aspects of accreditation and health reform, the findings may present an early indication that these initiatives are having an effect on the public health system.

## **Keywords**

public health, network analysis, public health services, public health systems

## Introduction

There is an expectation that public health system performance can be advanced through a process of agency accreditation, and through implementation of population health provisions in the 2010 Patient Protection and Affordable Care Act (ACA). These initiatives have potential to change the professional outlook of leaders in public health organizations and the actual practice of public health. A secondary analysis using data from the National Association of County and City Health Officials (NACCHO) 2010 Profile of Local Health Departments investigated 1999 local health departments (LHDs) that comprise the network local health officials' use to communicate about policy and practice. The study examined if characteristics of LHDs that are influential in this network reflect the movement toward high performing public health systems. Network theory was used to identify a group of 64 LHDs with high potential to spread information, and experts identified a group of 159 innovative LHDs. The two groups were compared to other LHDs on key characteristics. Both groups were more likely to conduct community health assessments and develop health improvement plans. Since these activities are fundamental aspects of accreditation and the ACA, the findings may present an early indication that these policies are having an effect.

## Methods

The NACCHO Profile survey is distributed bi-annually to all 2565 LHDs in the US [14]. In 2010 the core survey contained 64 questions in 6 domains: governance, funding, characteristics of the health official, workforce, PH activities, community health assessment and planning. For the first time the survey included a network question: *“In thinking about your peers who lead other local health departments in the U.S., list the five LHDs whose leaders you communicate with most frequently about administrative, professional, and leadership issues in public health”*. The network question was to be answered only by the top executive/health official, and only LHDs (not individuals) named.

The responses to the network question were entered into a square matrix to create the communication network. The vertical and horizontal axis represented nodes, or LHDs. The cells of the matrix were populated to show the presence (1) or absence (0) of a tie between LHDs representing communication between health officials. These data were visualized to inspect communication patterns with the ORA software program.<sup>1</sup> Influential LHDs were identified and their characteristics compared to the rest of the network.

Information spreaders were identified as the intersecting set of LHDs that had the highest measurements of total degree centrality, information centrality, and Simmelian ties. LHDs high in total degree centrality have many incoming and outgoing ties, which places them in a position to access the ideas of many others<sup>2-5</sup>. LHDs high in information centrality, with the most direct and indirect ties through another LHD, receive information quickly<sup>6</sup>. LHDs high in Simmelian ties are embedded in mutually connected small groups, and have the advantage of strong ties that bridge groups<sup>7</sup>.

An innovative LHD was defined as *“among the first to introduce new and better ways of practicing public health.”* Representatives from five national groups engaged with LHDs around issues of performance were contacted by email and asked to provide a list of up to 100 LHDs that in their expert opinion met the definition. The groups were the Association of State and

Territorial Health Officials, NACCHO, Office for State, Tribal, Local and Territorial Support at CDC, the Robert Wood Johnson Foundation, NORC at the University of Chicago, and the Wisconsin Population Health Institute.

Innovators and information spreaders were compared with other LHDs in the network using the  $X^2$  statistic. Data from the NACCHO 2010 Profile survey served as dependent variables to describe eleven characteristics of LHDs from each of the six domains covered in the survey (see Table 1). Categorical or continuous responses were dichotomized for analysis. The continuous variable 'number of full time equivalent (FTE) employees' was binarized using a cut off of 25 FTE as this approximates the 50th percentile for LHDs nationally<sup>8</sup>. The Profile collected data on over 100 programmatic activities. Of these, the activity 'laboratory services performed by the LHD' was selected as an indicator for LHD capacity for service delivery.

## Results

There are 2565 LHDs in the US that received the NACCHO Profile survey. Of those 2107 responded, and of those 1531 LHDs (or 73%) named at least one contact in response to the network question. Among the contacts named were 196 LHDs that did not respond to the survey, and 280 LHDs that did. Responses that named organizations not LHDs (e.g. state health department or a local public health association) were removed (n = 9 LHDs). This produced a network of 1999 LHDs, or 78% of all LHDs. A set of 64 respondents met the criteria for information spreaders, and 159 respondents were identified as innovators.

On visual inspection the communication pattern for information spreaders is more locally focused within states, and for innovators more nationally distributed across state and regional lines (Figure 1).

Table 1 shows the comparative analysis. There were no significant differences by governance or jurisdictional type. Information spreaders and innovators were similar in that they were more likely to have completed community health assessments ( $X^2 = 8.2$  and  $12.5$  respectively,  $p < 0.01$ ) and participated in developing community health improvement than other LHDs in the network plans ( $X^2 = 3.4$ ,  $p < 0.01$ , and  $X^2 = 4.0$ ,  $p = .05$ , respectively).

In comparison to other LHDs information spreaders were *less* likely to have local boards of health ( $X^2 = 17$ ,  $p < 0.01$ ) and slightly *more* likely to have a first time top executive ( $X^2 = 5.7$ ,  $p = 0.02$ ). Innovators were slightly *less* likely to have an RN as top executive ( $X^2 = 6.4$ ,  $p = 0.01$ ), but *more* likely to have an MD ( $X^2 = 112$ ,  $p < 0.01$ ), or an MPH ( $X^2 = 64$ ,  $p < 0.01$ ) in that role. Innovators were also more likely to perform lab services ( $X^2 = 55$ ,  $p < 0.01$ ) and have  $\geq 25$  FTE employees ( $X^2 = 179$ ,  $p = 0.01$ ) than other LHDs.

Comparisons between Information spreaders and innovators follow a similar pattern. Innovators tended to have fewer first-time top executives, fewer RN top executives, and more with MD and MPH credentials. More innovators performed lab services and had  $\geq 25$  FTE employees.

It is important to note that the study is cross sectional. Changes may have occurred in the network since the data were collected in 2010. The results reflect only 78% of LHDs in the nation, and do not consider communication with state health departments or professional groups. Respondents were only allowed to name 5 contacts and may have more contacts.

## Implications

Two important initiatives are precipitating change in public health systems. An agency accreditation process aimed at 2565 local and 56 state and territorial health departments was inaugurated in 2011(9). The Patient Protection and Affordable Care Act, enacted in early 2010, contains provisions to increase the prevention and public health focus of the clinical health care system<sup>10</sup>. Both initiatives emphasize community health assessments and improvement plans as a means to system improvement.

The analysis describes LHDs in a position to spread information and innovations in comparison to other LHDs in health officials' communication networks. Information spreaders are associated with first time health officials and no board of health. They tend to communicate within states. Innovators are associated with greater size and capacity, and leaders with MD or MPH credentials. Their communication pattern spans states and regions. Both groups are more active in community health assessment and planning than other LHDs. This suggests they may be in influential positions in the network *because* they are engaged in two activities that are hallmarks of both accreditation and health reform. As such this may be the first empirical indication of the systemic impact of these important national initiatives.

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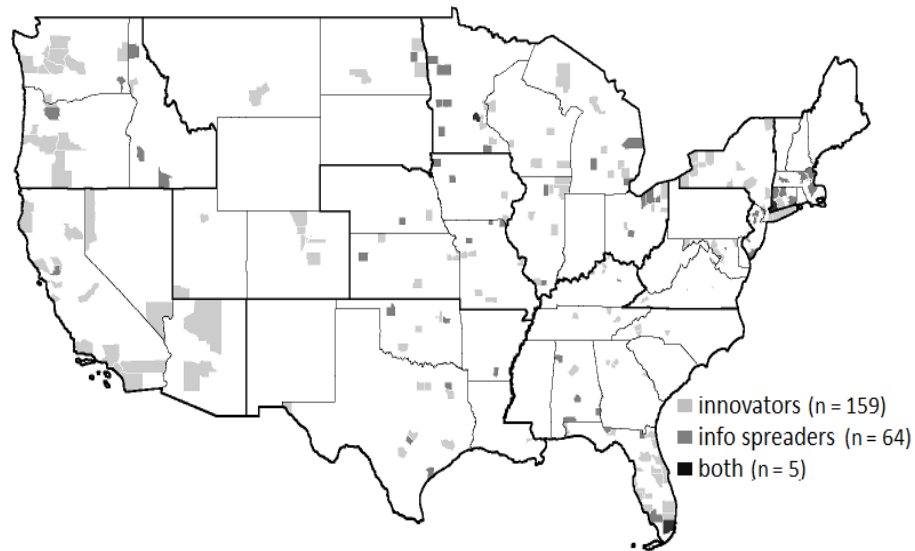
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**Figure 1** Information spreaders and innovators in the health officials' communication network. Note the local/regional pattern of ties for information spreaders and distributed national pattern of ties for innovators.

a) health officials' information network



b) location of information spreaders and innovators by state



c) information spreaders and their contacts



d) innovators and their contacts



**TABLE 1** Frequency table using proportions. Significant comparisons between information spreaders, innovators and other LHDS are shaded.

NACCHO Profile variable	n	LHDs	Information spreader n = 64	χ <sup>2</sup> df = 1	p-value	LHDs	Innovator n = 159	χ <sup>2</sup> df = 1	p-value	n	Information spreader	Innovator	χ <sup>2</sup> df = 1	p-value
<b>Governance category</b>	2106			0.7	0.41			1.3	0.26	207		‡	1.2	0.27
1 Local		0.73	0.69			0.73	0.77				0.71	0.78		
0 State or shared		0.27	0.31			0.27	0.23				0.29	0.22		
<b>Jurisdiction type</b>	2106			0.1	0.74			3.5	0.06	207		‡	2.4	0.12
1 county/city		0.87	0.86			0.87	0.92				0.85	0.92		
0 multi-county/city		0.13	0.14			0.13	0.08				0.15	0.08		
<b>Local board of health</b>	2098			*	17.1	0.00		0.7	0.42	207			7.2	0.01
1 yes		0.76	0.53			0.75	0.72				0.54	0.73		
0 no		0.24	0.47			0.25	0.28				0.46	0.27		
<b>First-time health executive</b>	2079			5.7	0.02			3.4	0.07	207			10.0	0.00
1 yes		0.76	0.89			0.77	0.71				0.92	0.71		
0 no		0.24	0.11			0.23	0.29				0.08	0.29		
<b>CHA completed</b>	2090			8.2	0.00			12.5	0.00	207		‡	0.3	0.57
1 yes		0.75	0.91			0.75	0.87				0.90	0.87		
0 no		0.25	0.09			0.25	0.13				0.10	0.13		
<b>Participated in developing CHI</b>	2082			3.4	0.00			4.0	0.05	207		‡	0.2	0.67
1 yes		0.59	0.70			0.59	0.67				0.69	0.66		
0 no		0.41	0.30			0.41	0.33				0.31	0.34		
<b>Top executive is RN</b>	1812			3.4	0.07			*	6.4	0.01	207		9.0	0.00
1 yes		0.35	0.47			0.37	0.26				0.48	0.25		
0 no		0.65	0.53			0.63	0.74				0.52	0.75		
<b>Top executive is MD</b>	1812			0.8	0.36			111.5	0.00	207			23.1	0.00
1 yes		0.13	0.09			0.10	0.43				0.06	0.43		
0 no		0.87	0.91			0.90	0.57				0.94	0.57		
<b>Top executive has MPH</b>	1812			1.2	0.26			64.0	0.00	207			7.2	0.01
1 yes		0.23	0.29			0.21	0.49				0.29	0.50		
0 no		0.77	0.71			0.79	0.51				0.71	0.50		
<b>Laboratory services performed</b>	2028			0.0	0.91			54.8	0.00	207			15.6	0.00
1 yes		0.31	0.31			0.28	0.57				0.25	0.56		
0 no		0.69	0.69			0.72	0.43				0.75	0.44		
<b>LHD size</b>	1970			2.0	0.15			178.5	0.00	207			61.2	0.00
1 ≥25 FTEs		0.43	0.52			0.39	0.95				0.47	0.95		
0 <25 FTEs		0.57	0.48			0.61	0.05				0.53	0.05		

\* negative association; ‡ no difference between information spreaders and innovators

CHA = community health assessment

CHI = community health improvement plan