Health Policy and Management Faculty
Publications

Health Policy & Management, Department of

11-2016

Control of the Public Health IT Physical Infrastructure: Findings From the 2015 Informatics Capacity and Needs Assessment Survey

Kelley Chester
C3 Informatics

Barbara L. Massoudi
RTI International

Gulzar H. Shah
Georgia Southern University, gshah@georgiasouthern.edu

Follow this and additional works at: https://digitalcommons.georgiasouthern.edu/health-policy-facpubs

Part of the Health Policy Commons, and the Health Services Administration Commons

Recommended Citation

Control of the Public Health IT Physical Infrastructure: Findings From the 2015 Informatics Capacity and Needs Assessment Survey

Kelley Chester, DrPH; Barbara L. Massoudi, MPH, PhD; Gulzar H. Shah, PhD, MStat, MS

Background: Despite improvements in information technology (IT) infrastructure in public health, there is still much that can be done to improve the adoption of IT in state and local health departments, by better understanding the impact of governance and control structures of physical infrastructure. **Objective:** To report out the current status of the physical infrastructure control of local health departments (LHDs) and to determine whether there is a significant association between an LHD's governance status and control of the physical infrastructure components. **Design:** Data came from the 2015 Informatics Capacity and Needs Assessment Survey, conducted by Georgia Southern University in collaboration with the National Association of County and City Health Officials. **Participants:** A total of 324 LHDs from all 50 states completed the survey (response rate: 50%). **Main Outcome Measure(s):** Outcome measures included control of LHD physical infrastructure components. Predictors of interest included LHD governance category. **Results:** The majority of the control of the physical infrastructure components in LHDs resides in external entities. The type of governance structure of the LHD is significantly associated with the control of infrastructure. **Conclusions:** Additional research is needed to determine best practices in IT governance and control of physical infrastructure for public health.

KEY WORDS: governance, informatics, information technology, infrastructure, local health departments, local public health agencies

● Background

Public health departments have made significant improvements to their information technology (IT) infrastructure in recent years. However, there is still much that can be done to improve the adoption of IT in state and local health departments, by better understanding the impact of governance and decision making, or control, structures of physical infrastructure.[1-3] Physical infrastructure includes not only hardware and software systems but also the ability to manage, maintain, and secure those systems.

Public health adoption and implementation of IT traditionally lags behind our health care counterparts.[4,5] In 2014, 3 out of 4 hospitals in the United States utilized at least basic electronic health record (EHR) technology.[6] Public health has made strides in implementing EHR technology and other data management and analysis tools, but it is still unclear how widespread adoption is.[7] These technologies are important to both health care and public health because they support federally funded quality and incentive programs like Meaningful Use.[8] IT and EHR technologies play a major role in connecting public health departments not only with health care organizations but also with other public agencies.[9]

Governance and control structures determine how an organization makes decisions about IT.[10] There is no

single structure that is considered to be the best practice in either the IT field or within public health.[11] There is little research to support best practices in IT governance for public health[12]; however, governance structures are influential in determining how public health programs and agencies perform on a wide range of issues. The degree of centralization or decentralization in decision making also affects governance structures and the ability to standardize across the organization.

Developing an IT governance structure should be based on the overarching structure and strategies of the organization as a whole. These strategies must be enterprise-wide to support the ever-increasing frequency and volume of public health data.[13,14] In US public health there are many models of governance. Local health departments (LHDs) are sometimes governed by a state health department or at the opposite end of the spectrum may be completely governed at the local level by a local body, like a board of health or the county government. There is also a shared model where governance functions occur at both the state and local levels. IT governance in public health departments often mimics the structure of the overall governance structure, but can also be programmatic in nature.

An example of extreme decentralization of IT governance is the situation in which program managers make independent decisions about IT with little or no oversight from a governing committee or central authority. This extreme situation results in duplication of efforts, needless purchases, and a reduced ability to scale.[10] Although this is not a common occurrence in public health departments, the typical structure of public health perpetuates programmatic decision making. In contrast to decentralization, an IT governance structure that is built on a centralized model has its own challenges.[15] When IT decisions are made by either a centralized or by an external governing body, the needs of programs and local health departments may not be readily understood or considered. This is often looked upon as a "top-down" approach.

The purpose of this study is to examine the results of the 2015 Informatics Capacity and Needs Assessment Survey and to report out the current status of the physical infrastructure control of LHDs. This study also seeks to determine whether there is a significant association between an LHD's governance status and control of the physical infrastructure components.

● Methods

Data sampling and design

Data were drawn from the 2015 Informatics Capacity and Needs Assessment Survey, conducted by the Jiann-Ping Hsu College of Public Health at Georgia Southern University in collaboration with National Association of County and City Health Officials' (NACCHO). This web-based survey had a target population of all LHDs in the United States. A representative sample of 650 LHDs was drawn using a stratified random sampling design on the basis of 7 population strata: fewer than 25 000, 25 000 to 49 999, 50 000 to 99 999, 100 000 to 249 999, 250 000 to 499 999, 500 000 to 999 999, and 1 000 000 and more. LHDs with larger populations were systematically oversampled to ensure inclusion of sufficient number of large LHDs in the completed surveys. The targeted respondents were informatics staff designated by the LHDs through a mini-survey conducted before the main survey.

A structured questionnaire was constructed and pretested with 20 informatics staff. The questionnaire included various measures to examine the current informatics capacity and needs of LHDs. The survey questionnaire was sent via the Qualtrics survey software to the sample of 650 LHDs. The survey remained open for 8 weeks in 2015. A total of 324 completed responses were received with a 50% response rate. Given that only a sample of all LHDs participated in the study and the larger LHDs were oversampled and overrepresented, statistical weights were developed to account for 3 factors: (a) disproportionate response rate by population size (7 population strata, typically used in NACCHO surveys), (b) oversampling of LHDs with larger population sizes, and (c) sampling rather than the census approach.

Measures

The survey included a listing of IT-related activities related to the control of local health department physical infrastructure. Respondents were asked to indicate who controlled each of these activities within the LHD. The response categories were "your LHD (within each department or program)," "your LHD (through a central department)," "city/county IT department," "state health agency," and "someone else." Participants were asked to check all that apply if control is shared (Table 1).

Analysis

Descriptive analysis was performed to calculate percentages for the categorical variables presented in Table 1. Additional analysis of the infrastructure control variables was carried out on the basis of grouping the control responses into state, local, and shared governance categories. The governance category is determined and assigned on the basis of how each LHD is governed. LHDs that are governed by a state health

TABLE 1 ● **Descriptive Statistics for the Variables in the Analyses, 2015 (N = 317)[a]**

Physical Infrastructure Component	Your LHD[b], %	Your LHD[c], %	City/County IT Department, %	State Health Agency, %	Someone Else, %
Hardware allocation or acquisition	25.4	32.7	43.3	20.1	5.6
Software selection	35.5	34.6	39.3	24.0	6.7
Software support	20.8	25.5	47.6	20.5	12.9
Data management	37.8	30.3	28.2	26.8	4.9
Data quality	13.9	20.3	51.7	22.2	12.0
IT system security	12.8	21.4	50.1	19.3	13.9
IT maintenance	24.1	35.9	42.6	14.5	4.5
IT budget allocation	35.4	27.6	25.6	23.8	7.6

Abbreviation: LHD, Local health department.
[a]Percentages do not add up to 100%.
[b]Within each department or program.
[c]Through a central department.

department (ie, the LHDs that are units of state health department) fall into the state category. Locally governed LHDs are categorized when a local body, such as the county or local board of health, performs all governance functions and the state health department has no direct authority over the LHD. Shared governance occurs when some governance functions are local whereas others (eg, hiring and firing the LHD director and budget allocation) are under the state health department. We used χ^2 for examining difference in our control of the public health IT physical infrastructure by LHD governance category. All analyses for this study were performed using SPSS version 23.0.

● Results

The respondents indicated that the majority of the control of the physical infrastructure components resides in external entities. The control of software support, IT system security, and data quality had a greater proportion of responses pointing toward outside control rather than within the LHD. Table 1 shows that IT security had the least amount of local control, with only 12.8% within each LHD program and 21.4% within a central department of the LHD. There were similar results for control of data quality, with 13.9% within each LHD program and 20.3% within a central department of the LHD. Software support was controlled within each LHD program in 20.8% of the respondents and by a centralized department within the LHD in 25.5%.

On the basis of respondents, IT maintenance and software selection were equally controlled within the LHD and external entities. Both of these received similar percentages of within the LHD and either city/county, state, or someone else being in control. Data management and IT budget allocation were physical infrastructure components that were more commonly controlled by the LHD. IT budget allocation was controlled within each LHD program in 35.4% of the respondents and within a central department of the LHD in 27.6%. There were similar results for data management, with 37.8% within each LHD program and 30.3% within a central department of the LHD.

Table 2 shows the results of the χ^2 test to determine association between the LHDs governance category and the response for the control of the physical infrastructure components. Each control variable along with the corresponding control aspect (ie, hardware allocation or acquisition within LHD [through each department or program], hardware allocation or acquisition within LHD [through central department]) was tested for significance at a P value of .05. In all test cases with the exception of software selection through someone else ($P = .145$), the P value was highly significant. The results indicate that there is a significant association between the governance category (state, local, shared) and the control of physical infrastructure components.

● Discussion and conclusions

We studied the control of physical infrastructure components and the possibility of the association of those components to the governance category (state, local, shared) of local health departments. The descriptive statistics showed that the majority of the governance, maintenance, and support of LHDs physical infrastructure is handled either externally or in a decentralized manner. The correlation showed that there is a significant association between an LHD's governance type or category and the control of the physical infrastructure components.

Decentralization is evident in control of infrastructure components such as hardware allocation,

TABLE 2 ● **Percentage of LHDs Reporting Control of Physical Infrastructure Components Related to LHD Governance Category**

Control of Physical Infrastructure Components	Governance Category			
	Yes (vs No), % State	Yes (vs No), % Local	Yes (vs No), % Shared	*P* Value
Hardware allocation or acquisition within LHD (through each department or program)	5.5	24.8	48.3	<.001
Hardware allocation or acquisition within LHD (through central department)	20.2	31.9	50.6	<.001
Hardware allocation or acquisition through city or county IT department	5.0	50.9	14.8	<.001
Hardware allocation or acquisition through state health agency	84.9	10.8	39.1	<.001
Hardware allocation or acquisition through someone else	0.0	6.5	3.7	<.001
Software selection within each department or program	5.5	38.0	41.7	<.001
Software selection within LHD (through central department)	14.7	34.4	54.7	<.001
Software selection through city or county IT department	5.0	46.2	13.2	<.001
Software selection through state health agency	90.0	13.8	48.8	<.001
Software selection through someone else	3.7	7	7.8	.15
Software support within LHD (through each department or program)	1.8	21.1	35.4	<.001
Software support within LHD (through central department)	21.9	22.1	57.2	<.001
Software support through city or county IT department	5.0	56.2	14.8	<.001
Software support through state health agency	82.6	11.7	37.9	<.001
Software support through someone else	1.8	14.8	7.8	<.001
Data management within LHD (through each department or program)	7.8	41.1	37.4	<.001
Data management within LHD (through central department)	13.8	30.0	48.1	<.001
Data management through city or county IT department	5.0	32.9	9.9	<.001
Data management through state health agency	92.2	17.5	44.4	<.001
Data management through someone else	0.0	5.5	3.7	<.001
Data quality within LHD (through each department or program)	0.0	14.3	23.0	<.001
Data quality within LHD (through central department)	15.1	16.7	54.5	<.001
Data quality through city or county IT department	5.0	61.2	14.8	<.001
Data quality through state health agency	85.3	12.1	49.4	<.001
Data quality through someone else	3.7	13.4	7.8	<.001
IT system security within LHD (through each department or program)	1.8	12.2	28.0	<.001
IT system security within LHD (through central department)	18.3	17.4	57.2	<.001
IT system security through city or county IT department	5.0	59.2	14.8	<.001
IT system security through state health agency	85.3	10.5	33.5	<.001
IT system security through someone else	3.7	15.7	7.8	<.001
IT maintenance within LHD (through each department or program)	5.5	23.3	47.1	<.001
IT maintenance within LHD (through central department)	13.8	35.4	59.7	<.001
IT maintenance through city or county IT department	5.0	50.9	7.8	<.001
IT maintenance through state health agency	84.9	6.4	18.5	<.001
IT maintenance through someone else	0.0	5.0	3.7	<.01
IT budget allocation within LHD (through each department or program)	9.6	37.6	40.7	<.001
IT budget allocation within LHD (through central department)	11.9	26.8	48.1	<.001
IT budget allocation through city or county IT department	3.2	29.9	9.9	<.001
IT budget allocation through state health agency	90.0	14.4	42.8	<.001
IT maintenance through someone else	0.0	8.8	3.7	<.001

Abbreviation: LHD, local health department.

software selection, and support and data management. This result matches the programmatic structure of public health in general. It is common in public health for programs to operate on the basis of programmatic funding. Programs often receive funding to support specific public health imperatives that have infrastructure-related requirements, including acquisition of specific software for collecting and reporting data. The decision and control of programmatic-based infrastructure are typically made in a decentralized manner or even outside the public health agency.

Another theme that emerged was evidence of shared control of physical infrastructure. This was evident in the number of multiple control responses received to the specific physical infrastructure components (n = 2534) as compared with the number of respondents (n = 324). The respondents were asked to check all that apply to indicate a shared control of the infrastructure component. Shared governance implies partnerships with key stakeholders and leadership within the organization to achieve common goals and objectives. Shared governance allows for standardization across the enterprise, which has cost-savings, de-duplication of efforts, and allows for solutions to scale up to meet changing needs and programs.

Additional research is needed to determine best practices in IT governance and control of physical infrastructure for public health. Governance structures, whether they are shared, centralized, or decentralized, are influential in determining how public health programs successfully implement public health interventions and keep their populations healthy.

There were limitations to this study. Because the survey was aimed at capturing the perspective of informatics staff at LHDs, NACCHO was asked to provide contact persons for the LHDs in the study to identify relevant informatics staff. These contacts were mostly top administrators at the LHDs and their perspective on who represented the informatics area of the LHD may have implications for interpretation for our results. A related limitation is that self-reported survey responses are not independently verified.

REFERENCES

1. Vest JR, Menachemi N, Ford E. Governance's role in local health departments' information system and technology usage. *J Public Health Manag Pract*. 2012;18(2): 160-168.
2. Massoudi BL, Goodman KW, Gotham IJ, et al. An informatics agenda for public health: summarized recommendations from the 2011 AMIA PHI Conference. *J Am Med Inform Assoc*. 2012;19(5):688-695.
3. Walker DM, Mark DL. Hospital adoption of health information technology to support public health infrastructure. *J Public Health Manag Pract*. 2016;22(2):175-181.
4. US Department of Health and Human Services. *Healthy People 2010*. Washington, DC: US Government Printing Office; 2000.
5. Yasnoff WA, Overhage JM, Humphreys BL, et al. A national agenda for public health informatics. *J Public Health Manag Pract*. 2001;7(6):1-21.
6. The Office of the National Coordinator for Health Information Technology. *Adoption of Electronic Health Record Systems Among U.S. Non-Federal Acute Care Hospitals: 2008–2014*. Washington, DC: US Government Printing Office; 2015.
7. McCullough JM, Zimmerman FJ, Bell DS, Rodriguez HP. Local public health department adoption and use of electronic health records. *J Public Health Manag Pract*. 2015;21(1): E20-E28.
8. Blumenthal D, Tavenner M. The "meaningful use" regulation for electronic health records. *N Engl J Med*. 2010;363:501-504.
9. Magruder C, Burke M, Hann NE, Ludovic JA. Using information technology to improve the public health system. *J Public Health Manag Pract*. 2005;11(2):123-130.
10. Pick RA. Shepherd or servant: centralization and decentralization in information technology governance. *Int J Manage Inf Syst (Online)*. 2015;19(2):61.
11. Nolan R, McFarlan FW. Information technology and the board of directors. *Harvard Bus Rev*. 2005;83(10):96.
12. Weill P. Don't just lead, govern: how top-performing firms govern IT. *MIS Q Exec*. 2004;3(1):1-17.
13. Miller C, Ishikawa C, DeLeon M, et al. Joint recommendations for the public health informatics infrastructure. *J Public Health Manag Pract*. 2015;21(5):516-518.
14. Jarris P, Soper P, Gordon GS. Shared technology infrastructure for the public health enterprise: the time is now. *J Public Health Manag Pract*. 2015;21(3):308-309.
15. Gordon JR, Gordon SR. Structuring the interaction between IT and business units. *Inf Syst Manage*. 2000;17(1):7-16.