

# Public Health Staff Development Needs in Informatics: Findings From a National Survey of Local Health Departments

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

**Context:** Public health practice is information-intensive and information-driven. Public health informatics is a nascent discipline, and most public health practitioners lack necessary skills in this area. **Objective:** To describe the staff development needs of local health departments (LHDs) related to informatics.

**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 & 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 LHDs' specific staff development needs related to informatics. Predictors of interest included jurisdiction size and governance type. **Results:** Areas of workforce development and improvement in informatics staff of LHDs included using and interpreting quantitative data, designing and running reports from information systems, using and interpreting qualitative data, using statistical or other analytical software, project management, and using geographical information systems. Significant variation in informatics training needs exists depending on the size of the LHD population and governance type. **Conclusion:** Substantial training needs exist for LHDs across many areas of informatics ranging from very basic to specialized skills and are related to the size of LHD population and governance type.

**KEY WORDS:** informatics, information technology, local health departments, local public health agencies, workforce development

Public health practice is an information-intensive and information and surveillance-driven enterprise.<sup>1,2</sup> Local health departments (LHDs) are expected to build and maintain a robust informatics infrastructure to access large amounts of data generated by health care providers and other community partners.<sup>3</sup> Informatics capacities are considered among the foundational capabilities, important to providing surveillance and other important public health functions and services<sup>4</sup> and to enable the most efficient and effective use of the informatics infrastructure and the data it can bring. However, most public health professionals may lack necessary skills in most effectively using information for public health.<sup>5</sup> A large proportion of state and local public health employees may not even be aware of the importance of informatics. A study assessing the levels of awareness about public health trends among public health employees shows that only 67.7% of state health department employees and 55.2% of LHD employees were aware that leveraging electronic health information is a public health trend.<sup>6</sup> These findings are indicative of low capacity and the importance of assessing informatics-related needs of all public health employees. A focus on all public health employees rather than just the informatics staff may be essential because efficient utilization of public health informatics is a collaborative process involving not only the informatics staff

**Author Affiliations:** eHealth, Quality Measurement and Health Data Analytics Division, RTI International, Atlanta, Georgia (Dr Massoudi); C3 Informatics, LLC, Milton, Georgia (Dr Chester); Jiann-Ping Hsu College of Public Health, Georgia Southern University, Statesboro (Dr Shah).

The authors declare no conflicts of interest.

This is an open-access article distributed under the terms of the Creative Commons Attribution-Non Commercial-No Derivatives License 4.0 (CCBY-NC-ND), where it is permissible to download and share the work provided it is properly cited. The work cannot be changed in any way or used commercially.

**Correspondence:** Barbara L. Massoudi, PhD, MPH, eHealth, Quality Measurement and Health Data Analytics Division, RTI International, 2951 Flowers Rd S, Ste 119, Atlanta, GA 30341 (bmassoudi@rti.org; barbara.massoudi@gmail.com).

DOI: 10.1097/PHH.0000000000000450

but also the programmatic staff benefiting from these capacities.

Information systems and other information technology (IT) solutions can help improve care coordination and billing functions of health departments providing clinical services. They also improve capacity to assess immunization completion rates, syndromic surveillance of influenza-like illnesses, and food-borne illness.<sup>7,8</sup> Informatics capacity also cuts across many public health functions. In this issue, Shah et al<sup>9</sup> describe the many ways electronic exchange of health information supports public health activities. In an analysis of how informatics supports the Essential Services of Public Health,<sup>10</sup> Dixon and colleagues<sup>11</sup> concluded that the relevance and necessity of day-to-day public health informatics knowledge and skills exceeded the current skill level in all areas of the informatics stack. The central challenge put forth for the public health enterprise is managing information used for public health activities, and this challenge ought to be viewed as a strategic imperative. This imperative calls for enhancing competency in informatics for all public health professionals by addressing their learning needs.<sup>12</sup> A core strategy for building an informatics-savvy health department is development of a skilled workforce, enabling the organization to be capable of meeting new demands and using resources efficiently.<sup>13</sup>

For advocacy, policy, and capacity-building initiatives targeting training of LHD workforce in informatics capacities to succeed, it is imperative to understand their specific training needs. In the absence of such knowledge, these efforts may not be as fruitful because what does not get measured may not get done.<sup>14</sup> The current literature has a significant gap concerning LHD workforce informatics-related needs. The purpose of this study is to utilize a nationwide survey of LHDs to learn about their workforce development needs related to informatics and information systems. This study also seeks to determine whether there is a significant association between LHDs' governance status and their workforce development needs related to informatics and information systems. The focus of this study is on the general public health workforce, not those whose primary role is informatics-focused but who comprise only 1% of the current overall workforce.<sup>1</sup> A discussion of the overall technical maturity of LHDs is presented in several other articles in this issue.

## ● Methods

### Data and sampling 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 the National Association of County & City Health Officials (NACCHO). This Web-based survey had a target population of all LHDs in the United States. Respondents were informatics staff identified by LHDs prior to the main survey who provided responses about the entire public health workforce of their LHD. A representative sample of 650 LHDs was drawn using a stratified random sampling design based on 7 population strata: less than 25 000; 25 000-49 999; 50 000-99 999; 100 000-249 999; 250 000-499 999; 500 000-999 999; and 1 000 000 and more. LHDs with larger population were systematically oversampled to ensure inclusion of a sufficient number of large LHDs in the completed surveys.

A structured questionnaire that included measures to examine LHDs' current informatics capacity and needs was constructed and pretested with 20 informatics staff members. The completed questionnaire was administered to the sample of 650 LHDs via Qualtrics survey software. The survey remained open for 8 weeks in 2015. A total of 324 completed responses were received (50% response rate). Statistical weights were developed to account for 3 factors: (a) disproportionate response rate by population size (using 7 population strata, typically used in NACCHO surveys), (b) oversampling of LHDs with larger population sizes, and (c) sampling rather than a census approach. For more technical terms, such as business process analysis and redesign, and geographic information systems, among others, respondents were provided with written definitions.

### Measures

Public health staff needs were measured by asking: "Please identify important areas of need for your agency's staff development, related to information systems (select all that apply)." Response categories were "Yes," "No," and "Don't know/Not sure."

### Analysis

We described the staff development needs of LHDs using frequencies and percentages. Additional analyses of the training needs were examined 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 department (ie, the LHDs are units of state health department) fall into the state category. Locally governed LHDs are categorized as local when all governance functions are performed by a local body (county, board of health) 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 LHD director, budget allocation) are under the state health department. We used the  $\chi^2$  test for examining difference in training needs by jurisdiction size. To assess the differences in training needs by LHD governance category, we used the Somers D test. We performed all analyses for this study using SPSS (version 23.0).

## ● Results

Data on staff development needs in informatics were available for a total of 299 LHDs. As shown in Table 1, the most commonly reported development needs, regardless of LHDs' population size, included using and interpreting quantitative data (62.7%), designing and running reports from information systems (59.4%), using and interpreting qualitative data (58.7%), using statistical or other analytical software (53.8%), project management (50.8%), and using geographical information systems (50.6%). The least common needs, regardless of LHDs' population size were acting as a "super user" for your informatics systems (27.9%), basic computing skills (32.6%), developing requirements for informatics system development (33.5%), and maintaining a Web site (34.8%). LHDs of all jurisdiction sizes, except for large health departments serving jurisdictions of 500 000 or more, reported very low rates ( $\leq 5.0\%$ ) of staff already being sufficiently skilled. Large health departments reported that 40.0% of staff members are sufficiently skilled. Similarly,

LHDs of all jurisdiction sizes reported very low rates ( $\leq 5.4\%$ ) of not having any informatics-related staff development needs. Analysis of the relationship between jurisdiction size and development needs showed significantly higher percentages for all development needs among health departments serving large jurisdictions ( $\geq 500\ 000$ ) except for maintaining a Web site. The results indicate that there is a significant association between the jurisdiction size (<50 000, 50 000-499 999,  $\geq 500\ 000$ ) and staff development needs.

Table 2 shows the results of the Somers D test to determine association between the LHDs' governance category and the staff development needs. In all cases with the exceptions of using word processing, spreadsheet, and presentation software (eg, Microsoft Office) ( $P = .71$ ), maintaining a Web site ( $P = .11$ ), and basic computing skills ( $P = .98$ ), the  $P$  value was highly significant. The results indicate that there is a significant association between the governance category (state, local, shared) and the staff development needs. The association indicates that those with shared or local governance have many more staff development needs than those with state governance.

## ● Discussion

While health informatics is complex and evolving, local public health agency employee training needs are mostly related to their skills in use of data and information to support their specific programmatic functions

**TABLE 1 ● Percentage of LHDs Reporting Specific Staff Development Needs Related to Informatics by Type of Size of LHD Jurisdiction Size (N = 299)<sup>a</sup>**

Agency Staff Development Needs	Jurisdiction Size, % Yes (vs No)				P
	All LHDs	<50 000	50 000-499 999	$\geq 500\ 000$	
Using and interpreting quantitative data	62.7	56.7	69.9	81.3	<.001
Designing and running reports from information systems	59.4	56.7	60.5	80.0	<.001
Using and interpreting qualitative data	58.7	51.7	66.1	84.2	<.001
Using statistical or other analytical software	53.8	47.1	61.5	76.7	<.001
Project management	50.8	43.7	58.4	77.1	<.001
Using geographical information systems	50.6	45.9	57.3	57.5	<.001
Using word processing, spreadsheet, and presentation software (eg, Microsoft Office)	44.3	38.8	51.7	55.4	<.001
Using and interpreting clinical data from EHRs and other clinical sources	43.1	34.2	52.4	76.7	<.001
Conducting business process analysis and redesign	42.4	33.7	53.4	63.7	<.001
Maintaining a Web site	34.8	35.2	34.5	33.3	.66
Developing requirements for informatics system development	33.5	25.9	40.6	67.9	<.001
Basic computing skills	32.6	28.7	37.9	40.0	<.001
Acting as a "super user" for your informatics systems	27.9	20.6	36.2	51.7	<.001
Staff are already sufficiently skilled	3.6	2.6	5.0	40.0	.004
No informatics-related staff development needed for our staff	3.5	2.9	4.1	5.4	.06

Abbreviations: EHR, electronic health record; LHD, local health department.  
<sup>a</sup>Bolded  $P$  values show that differences are significant based on the  $\chi^2$  test.

**TABLE 2 • Percentage of LHDs Reporting Specific Staff Development Needs Related to Informatics by Type of LHD Governance With Respect to State Health Agency Authority (N = 299)<sup>a</sup>**

Agency Staff Development Needs	Governance Category, % Yes (vs No)			P
	State	Local	Shared	
Using and interpreting quantitative data	46.7	65.6	52.3	<.001
Designing and running reports from information systems	37.2	63.2	46.6	<.001
Using and interpreting qualitative data	48.7	60.4	52.3	.001
Using statistical or other analytical software	32.1	56.9	47.3	<.001
Project management	26.5	52.6	57.7	<.001
Using geographical information systems	32.1	53.1	45.2	<.001
Using word processing, spreadsheet, and presentation software (eg, Microsoft Office)	41.6	44.5	45.2	.71
Using and interpreting clinical data from EHRs and other clinical sources	21.3	43.4	59.3	<.001
Conducting business process analysis and redesign	12.8	45.6	41.4	<.001
Maintaining a Web site	28.1	35.4	36.0	.11
Developing requirements for informatics system development	14.8	36.3	26.1	<.001
Basic computing skills	33.2	32.6	32.1	.98
Acting as a “super user” for your informatics systems	17.8	29.2	25.2	.002
Staff are already sufficiently skilled	15.7	1.3	13.5	<.001
No informatics-related staff development needed for our staff	12.8	1.9	9.0	<.001

Abbreviations: EHR, electronic health record; LHD, local health department.

<sup>a</sup>Bolded *P* values show that differences are significant based on the Somers D test statistics.

and services. For instance, the most common training needs were reported to be using and interpreting quantitative data, designing and running reports from information systems, and using and interpreting qualitative data. In the absence of an understanding of these needs, most efforts might have focused on IT training related to software and hardware. Using statistical or other analytical software, project management, and using geographical information systems were among the other top needs. These training needs may be met better if these capacities are recognized as strategic issues and proper resources are allocated.

In general, the larger the population served by the LHD jurisdiction, the greater the training needs are. And LHDs with local governance reported higher percentages of training needs than those with shared governance, or state governance, who reported the lowest percentages. These findings are consistent with other reports describing workforce needs related to informatics.<sup>1,14-17</sup>

What is striking about these findings is that not only are basic computing skills and use of Microsoft Office products a need but also are data and statistical analyses (quantitative and qualitative). These analytical core public health skills, which are critical elements in data and information-driven public health decision making, are a development need for more than half the LHDs reporting. In addition, use of clinical systems, such as extracting public health data from electronic health records (EHRs), was a need for 76.7% of large

(≥500 000) LHDs. Without this capability, LHDs will be at a significant disadvantage despite the increased adoption of EHRs and the vast quantities of EHR data becoming available for public health surveillance, reporting, and registry development.<sup>18</sup> Consistent with other findings,<sup>14</sup> use of geographic information systems was a training need for more than half of the LHDs. Increasingly, epidemiologists are using geographic distribution of disease in addition to temporal distribution to characterize outbreaks and develop better public health interventions. The reported needs related to developing and procuring new information systems, such as project management, business process analysis and redesign, and informatics system requirements gathering paint a grim outlook for development of new systems that will meet the needs and expectations of public health users.

Barriers to training and development of the public health workforce are well understood and include cost, time, funding systems, distances to be traveled to reach training,<sup>19</sup> inadequate incentives for participating in training and continuing education, lack of an integrated delivery system for lifelong learning, and no consensus on necessary competencies.<sup>20</sup> Innovative training and workforce professional development programs such as the Informatics Academy of the Public Health Informatics Institute,<sup>21</sup> and the Association of State and Territorial Health Officials and de Beaumont Foundation partnership building on the Public Health Workforce Interests and Need Survey (PH WINS:

Research to Action),<sup>22</sup> are needed to overcome these barriers.

Limitations of this study include the reliance on the informatics staff to provide information about the training and development needs of the entire public health workforce at their LHD. The informatics staff may not be aware of the needs of other staff related to informatics and information systems. In some cases, the technologies in question (ie, EHRs) may not be available to all LHDs and therefore training on using and interpreting data from these technologies may not have been reported as a need, even if LHD staff lack the capability to effectively use these systems and their outputs. No information was collected about which public health workers need what training. Assuming that not all workers will need a comprehensive knowledge of informatics, the need for additional information about targeted training remains unknown and further supports the need for comprehensive, role-based, updated informatics competencies for the field.

## ● Conclusion

Substantial training needs exist for LHDs across many areas of informatics ranging from very basic to more specialized skills. Many of these needs are related to core public health practice skills and must be met if LHDs are to function effectively in the information age.

## REFERENCES

1. Baker EL. Addressing urgent public health workforce needs: building informatics competency and strengthening management and leadership skills. *J Public Health Manag Pract.* 2015;21:S5-S6.
2. Lumpkin JR, Magnuson JA. History and significance of information systems and public health. In: Magnuson JA, Paul C, eds. *Public Health Informatics & Information Systems.* 2nd ed. London, England: Springer-Verlag; 2014:19-36.
3. Public Health Accreditation Board. Public Health Accreditation Board standards and measures: version 1.5. <http://www.phaboard.org/wp-content/uploads/SM-Version-1.5-Board-adopted-FINAL-01-24-2014.docx.pdf>. Accessed February 2, 2016.
4. Resolve. Defining and constituting foundational "capabilities" and "areas" version 1 (V-1). Executive Summary. <http://www.resolve.org/site-healthleadershipforum/files/2014/03/Articulation-of-Foundational-Capabilities-and-Foundational-Areas-v1.pdf>. Accessed June 21, 2016.
5. Shah GH, Leider JP, Castrucci B, Williams K, Luo H. Characteristics of local health departments associated with their implementation of electronic health records and other informatics systems. *Public Health Rep.* 2016;131(1):272-282
6. Shah GH, Madamala K. Knowing where public health is going: levels and determinants of workforce awareness of national public health trends. *J Public Health Manag Pract.* 2015;21(6)(suppl):S102-S110.
7. Savel T, Foldy S. The role of public health informatics in enhancing public health surveillance. *MMWR Morb Mortal Wkly Rep.* 2012;61:20-24. <http://198.246.124.22/mmWR/pdf/other/su6103.pdf#page=22>. Accessed March 25, 2015.
8. Davidson A. Why should local health departments care about meaningful use? *NACCHO Exchange.* 2013; 12(1, ePublic Health):17-19.
9. Shah GH, Vest J, Lovelace K, McCullough JM. Local health departments' partners in electronic data exchange and connectivity with health information exchanges. *J Public Health Manag Pract.* 2015.
10. Public Health Functions Steering Committee (1995). Public health in America. <http://www.health.gov/phfunctions/public.htm>. Published 2008. Accessed March 14, 2016.
11. Dixon BE, Kharrazi H, Lehmann HP. Public health and epidemiology informatics: recent research and trends in the United States. *Yearb Med Inform.* 2015;10(1):199-206.
12. Baker EL, Ross DA. Managing information—addressing a central challenge of the public health enterprise. *J Public Health Manag Pract.* 2013;19(4):383-385.
13. LaVenture M, Brand B, Ross DA, et al. Building an informatics-savvy health department, part I: vision and core strategies. *J Public Health Manag Pract.* 2014;20(6): 667-669.
14. Castrucci BC, Rhoades EK, Leider JP, Hearne S. What gets measured gets done: an assessment of local data uses and needs in large urban health departments. *J Public Health Manag Pract.* 2015;21(suppl 1):S38-S48.
15. 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.
16. National Association of County & City Health Officials. The 2013 National Profile of Local Health Departments. <http://nacchoprofilestudy.org>. Published 2013. Accessed March 14, 2016.
17. Kornfeld J, Sznol J, Lee D. Characterizing the business skills of the public health workforce: practical implications from the Public Health Workforce Interests and Needs Survey (PH WINS). *J Public Health Manag Pract.* 2015;21(suppl 6):S159-S167.
18. Joseph S, Sow M, Furukawa MF, Posnack S, Chaffee MA. HITECH spurs EHR vendor competition and innovation, resulting in increased adoption. *Am J Manag Care.* 2014;20(9):734-740.
19. Northwest Center for Public Health Practice. *Oregon Public Health Workforce Training Needs Assessment Key Informant Interviews Summary Report.* Seattle, WA: Northwest Center for Public Health Practice; 2013.
20. Rowitz L. *Public Health Workforce Development.* Chicago, IL: Mid-America Regional Public Health Leadership Institute; 2012.
21. The Informatics Academy. <http://www.phii.org/academy>. Accessed March 17, 2016.
22. Association of State and Territorial Health Officials. ASTHO and de Beaumont Foundation commit to improve the public health workforce. <http://www.astho.org/Press-Room/ASTHO-and-de-Beaumont-Foundation-Commit-to-Improve-the-Public-Health-Workforce/12-12-15>. Accessed on March 17, 2016.