ABSTRACT
Context: Ensuring adequate and appropriate training of the workforce is a crucial priority for governmental public health. This is particularly important, given the diverse backgrounds of the public health workforce; the vast majority (approximately 83%) do not have formal training in public health, and those that do have formal training in public health have limited training in management and other essential organizational skills.
Objective: The purpose of this article is to identify training needs among public health workers in specific job types and settings.
Design and Participants: This cross section study used 2014 data from the Public Health Workforce Interests and Needs Survey. Qualitative analyses were used to code open-ended responses to questions about training needs. Needs are stratified across job types and jurisdiction.
Results: Eight main themes or skill areas were identified with the largest proportion indicating a need for management/leadership skills (28.2%). The second most frequent need was communication skills (21.3%). Across the 9 job types examined, general management skills were either the first or second training need for 7 job types. Among individuals who already have leadership/management positions, budgeting was the most common training need.
Conclusions: Findings from this study can inform targeted strategies to address training needs for specific types of employees. Such strategies can influence the efficiency and effectiveness of public health efforts and employee satisfaction. As new public health frameworks—like Public Health 3.0 and the Chief Health Strategist—are advanced nationally, it is necessary to ensure that the workforce has the skills and abilities to implement these frameworks.

KEY WORDS: PH WINS, public health, training, workforce

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level, and senior management/executive level). Ensuring an appropriately trained public health workforce is not only important for the effectiveness of the public health mission, it is also a crucial component of maintaining a satisfied workforce and ultimately retaining those workers in the field. In fact, previous studies have shown that job satisfaction is correlated to supportive training environments.

Although what is known about the training needs of the public health workforce has been growing in recent years, it remains relatively limited. Studies of training needs are often restricted to findings from small samples and convenience samples, focused in a particular area of public health or type of skill (eg, training needs in evidence-based decision making or policy development) or are limited to a specific type of employee (eg, health educators, individuals in leadership/management). More generalizable findings have been recently conducted using the 2014 Public Health Workforce Interests and Needs Survey (PH WINS) data. For example, a study by Kornfeld and colleagues assessed employee perceptions of their business skills and found that approximately half of state respondents perceived themselves to be proficient in budgeting and approximately a third of state respondents perceived themselves to be proficient in performing quality improvement and strategic management.

These findings are crucial in understanding gaps in state-level employee business skills; however, a more comprehensive understanding of all of the skills that are perceived to be priorities among employees is still needed. Such information will be valuable to developing strategies to train in concordance with perceived needs. Furthermore, given the relationship between perceptions of a supportive training environment and job satisfaction, strategies that meet employees' perceived training needs have the potential to positively impact job satisfaction.

Given that ongoing resource constraints within public health agencies will continue to limit how much training and continuing education support can be provided, strategic decisions about training priorities are going to be even more necessary. This study examines training needs identified by public health employees in state and local public health agencies and stratifies findings across job types. Data from the 2014 PH WINS were used for this study. Findings are presented on the basis of the agency's jurisdiction as it may be valuable to understand the training needs at both the local and state levels for strategic decision making in these organizations. Public health leaders and managers can incorporate findings from this study to develop targeted strategies to address training needs in specific settings as well as to specific types of employees. Such information and strategies have the potential to influence not only the efficiency and effectiveness of public health efforts but also public health employee satisfaction.

Methods

Data and population studied

Data from the PH WINS data set were used for this study. Details of the methods behind the development of the survey instrument and the sampling methods used in PH WINS are available elsewhere. In brief, PH WINS utilized a complex survey design consisting of 3 unique sampling frames. The first frame was a nationally represented state frame with a 47% response rate and a total of 10,046 state employee responses from 37 of the 50 state health agencies. The 2 remaining sampling frames were convenient samples of local health departments (LHDs), with 1 frame including 14 of the 20 LHD members in the Big Cities Coalition, while the third frame consisted of 50 LHDs in 7 pilot states (Arkansas, Georgia, Mississippi, South Carolina, Vermont, Washington, and Wisconsin). In total, 10,979 LHD employees contributed survey responses.

Question examined

The question analyzed for this study asked was "What (if any) additional skills would you like to gain or strengthen to achieve your career goals?" A total of 1980 individuals provided at least 1 additional skill in response to the question: 1664 state public health employees and 316 local public health employees. Tables present overall findings and are stratified at the state and local levels.

Analysis

A team of 3 coders used a grounded theory approach to code a set of 50 responses, identifying the most prominent needs raised in each response. Each response was assigned up to 2 primary codes. The team discussed the analysis, agreed upon a standard set of codes, individually recoded the 50 responses, and discussed to ensure concordance. The 3 coders then each coded a separate set of 200 responses; a fourth coder coded a subset of each to assess interrater reliability (ranging from 80% to 95%). The 3 coders completed the remainder of the responses. The responses corresponding to the 5 most commonly occurring primary codes were selected for further analysis. Secondary themes were identified for each of these responses to gain more depth. Primary and secondary themes were tabulated and stratified by job classification for state
employees. A total of 9 job categories were used on the basis of job types that could be logically grouped together in targeted strategies to address training needs (eg, business support staff, community-based health worker, environmentalist, epidemiologist, information technology staff, laboratory staff, leadership/management, nurse, other clinical staff). Local responses were not stratified by job category because of the smaller sample size of local respondents. Comments that reported a perceived problem or issue with training at their organization were summarized separately. All coding was conducted using Atlas.ti (Atlas.ti 7, Scientific Software Development GmbH, 2013, Berlin). This study was deemed exempt from human subjects’ considerations by the institutional review board at the institution of the first author.

**Results**

The majority of respondents were women (1845/2308 or 79.9%) (Table 1). In terms of age of respondents, the largest group of respondents was between 51 and 60 years old (33.8%). The majority of respondents had a bachelor’s degree (34.9%). The largest group of respondents was in the role of business support staff (17.9%).

**TABLE 1 Sample Demographics**

|                      | Overall (n = 2308) | State (n = 1959) | Local (n = 349) |
|----------------------|--------------------|-----------------|----------------|
| **Sex**              |                    |                 |                |
| Female               | 1845 (79.9%)       | 1556 (79.4%)    | 289 (82.8%)    |
| Male                 | 434 (18.8%)        | 380 (19.4%)     | 54 (15.5%)     |
| **Age, y**           |                    |                 |                |
| ≤20                  | 3 (0.1%)           | 1 (0.1%)        | 2 (0.6%)       |
| 21-30                | 157 (6.8%)         | 127 (6.5%)      | 30 (8.6%)      |
| 31-40                | 431 (18.6%)        | 359 (18.3%)     | 72 (20.6%)     |
| 41-50                | 570 (24.7%)        | 377 (24.4%)     | 93 (26.7%)     |
| 51-60                | 780 (33.8%)        | 679 (34.7%)     | 101 (29.0%)    |
| 61-65                | 238 (10.3%)        | 204 (10.4%)     | 34 (9.7%)      |
| >66                  | 90 (3.9%)          | 77 (3.9%)       | 13 (3.7%)      |
| **Education level**  |                    |                 |                |
| No bachelor’s degree | 549 (23.8%)        | 488 (24.9%)     | 61 (17.5%)     |
| Bachelor’s degree    | 805 (34.9%)        | 681 (34.8%)     | 124 (35.5%)    |
| Master’s degree      | 796 (34.5%)        | 660 (33.7%)     | 136 (39.0%)    |
| Doctorate degree     | 158 (6.8%)         | 130 (6.6%)      | 28 (8.0%)      |
| **Tenure at agency** |                    |                 |                |
| 0-5 y                | 791 (34.3%)        | 675 (34.5%)     | 116 (32.2%)    |
| 6-10 y               | 533 (23.1%)        | 462 (23.6%)     | 71 (20.3%)     |
| 11-15 y              | 359 (15.6%)        | 300 (15.3%)     | 59 (16.9%)     |
| 16-20 y              | 243 (10.5%)        | 205 (10.5%)     | 38 (10.9%)     |
| >21                  | 349 (15.1%)        | 289 (14.8%)     | 60 (17.2%)     |
| **Role**             |                    |                 |                |
| Business support staff| 414 (17.9%)        | 359 (18.3%)     | 55 (15.8%)     |
| Management           | 369 (16.0%)        | 306 (15.6%)     | 63 (18.1%)     |
| Nurse                | 322 (14.0%)        | 257 (13.1%)     | 65 (18.6%)     |
| Community-based health worker | 172 (7.5%) | 135 (6.9%) | 37 (10.6%) |
| Epidemiologist       | 145 (6.3%)         | 120 (6.1%)      | 25 (7.2%)      |
| Laboratory staff     | 111 (4.8%)         | 105 (5.4%)      | 6 (1.7%)       |
| Environmentalist     | 105 (4.5%)         | 84 (4.3%)       | 21 (6.0%)      |
| Information technologist staff | 100 (4.3%) | 95 (4.8%) | 5 (1.4%) |
| Other clinical staff | 158 (6.8%)         | 137 (7.0%)      | 21 (4.0%)      |
| Unspecified          | 399 (17.3%)        | 350 (17.9%)     | 49 (14.0%)     |
Sixty years of age (780/2308 or 33.8%), with those aged 31 to 40 years and 41 to 50 years making up the next largest age groups. Approximately, a third of respondents joined their agency within the last 5 years (791/2308 or 34.3%). Demographics did not differ notably between state and local respondents.

Eight main themes or skill areas were identified, with the largest number of respondents indicating a need for management/leadership skills (665 of 2308 respondents or 28.8%) (Table 2). The second most frequent area of need was computer skills (449 of 2308 respondents or 19.5%). Within each main theme numerous specific skills were identified. More specifically, within the management/leadership theme, the most common specific skills needed were general management skills (n = 274/2308 or 11.6%) and general leadership skills (134/2308 or 5.8%), followed by quality assurance/ process improvement (80/2308 or 3.5%) and strategic management (68/2308 or 2.9%). Within the computer skills theme, respondents asked for general administrative computer skills (208/2308 or 8.8%), general technology skills (145/2308 or 6.3%), and database management skills (66/2308 or 2.9%). Communication skills were also requested frequently among all respondents. Interpersonal skills (148/2308 or 6.4%) was the most common specific skill requested in the communication skills theme. A higher percentage of local respondents indicated needing grant writing skills (15/349, 4.3%) than those at the state level (44/1959 or 2.2%). In particular, the need for grant writing skills was more prominent among local respondents than public risk communication (10/349 or 2.9%), which was the second most frequent communication subtheme among state respondents (72/1,959 or 3.7%). Approximately 11% of overall respondents requested program-related skills without specifying the type of skills needed (218/2308 or 11.1%). Similarly, in the data analysis theme, approximately 8% of respondents requested general data analysis and management skills (191/2308 or 8.3%). Among respondents who were specific about data analysis skills needed, skills in geographic information systems (242/308 or 1.0%) and data analysis software (19/2308 or 0.8%) were specified. The finance theme primarily focused on budgeting skills (183/2308 or 7.9%) but more so among local respondents (34/349 or 9.7%) than among state respondents (149/1959 or 7.6%).

Across the 9 job types examined in state agencies, general management skills were either the first or second training need for 7 of the job types (Table 3). Among state employees who serve in leadership/management positions (n = 306), budgeting (n = 49/306 or 16%) was the most common training need identified, followed closely by a need for general management skills (n = 46/306 or 15%). Unspecified program-specific skills were the most common or second most common skills needed among 4 state-level professions: nurses (24/257 or 9.3%); other clinical staff (16/137 or 11.7%); community-based health workers (15/135 or 11.1%); and environmentalists (10/84 or 11.9%). General computer skills were the most common or second most common needs among laboratory staff (12/105 or 11.4%), other clinical staff (14/137 or 10.2%), and business support staff (42/359 or 11.7%). General data analysis and management skills were the most commonly cited needs among epidemiologists (n = 29/120 or 24.2%) and information technology staff (n = 16/95 or 16.8%) at the state level.

Nearly one-third of all respondents (743/2308 or 32.2%) reported a perceived problem or issue with training at their organization (Table 4). The majority of these responses indicated that there are barriers to growth or training within the organization without providing details about the barriers (n = 218/743 or 29.3%). The next most frequently cited barriers were lack of support for continuing education (n = 139/743 or 18.7%) and lack of support for advanced degrees (n = 117/743 or 15.7%). Issues with career development were also reported (n = 98/743 or 13.2%). The 2 most commonly discussed issues were the same for both state and local respondents (unspecified barriers to growth training and lack of support for continuing education); however, the third most commonly discussed barrier among state respondents was lack of support for advanced degrees (n = 104/632 or 16.5%) whereas among locals, it was language/cultural competency (17/111 or 15.3%).

Discussion
Throughout the 20th century, chronic disease was increasingly the major cause of morbidity and mortality within the United States. The ascendance of chronic disease was not the result of a new virus or bacteria but a confluence of social and community factors that include the distribution of social and economic opportunities; the availability of resources and support within our homes, neighborhoods, and communities; the quality of our schooling; the safety of our workplaces; and the cleanliness of our water, food, and air. The shift in the causes of disease in the United States from microbial, physiological, and biological to social and environmental requires an equal shift in the skills and abilities of the public health workforce. For continued improvement in the nation’s health, the governmental public health workforce must have the skills to not only do what it currently does well but also influence
### TABLE 2
Frequency of Themes and Subthemes by Respondents at the State and Local Levels

| Themes                         | Subthemes                                      | Overall (n = 2308) | State (n = 1959) | Local (n = 349) |
|-------------------------------|------------------------------------------------|-------------------|-----------------|-----------------|
|                               |                                                | n     | %    | n     | %    | n     | %    |
| 1. Leadership/Management skills | Totals for theme                               | 665   | 28.8 | 532   | 27.2 | 133   | 38.1 |
|                               | General management                             | 274   | 11.9 | 223   | 11.4 | 51    | 14.6 |
|                               | General leadership                             | 134   | 5.8  | 106   | 5.4  | 28    | 8.0  |
|                               | Quality assurance/Process improvement          | 80    | 3.5  | 63    | 3.2  | 17    | 4.9  |
|                               | Strategic management                            | 68    | 2.9  | 54    | 2.8  | 14    | 4.0  |
|                               | Evidence-based decision making                 | 26    | 1.1  | 21    | 1.1  | 5     | 1.4  |
|                               | Human resources                                | 16    | 0.7  | 13    | 0.7  | 3     | 0.9  |
|                               | Organizational techniques                      | 15    | 0.6  | 13    | 0.7  | 2     | 0.6  |
|                               | Contracts                                      | 13    | 0.6  | 12    | 0.6  | 1     | 0.3  |
|                               | Organizational behavior                        | 11    | 0.5  | 7     | 0.4  | 4     | 1.1  |
|                               | Team building                                  | 9     | 0.4  | 7     | 0.4  | 2     | 0.6  |
|                               | Negotiation                                    | 7     | 0.3  | 6     | 0.3  | 1     | 0.3  |
|                               | Funding                                        | 5     | 0.2  | 2     | 0.1  | 3     | 0.9  |
|                               | Health care administration                     | 5     | 0.2  | 3     | 0.2  | 2     | 0.6  |
|                               | Business analysis                              | 1     | 0.0  | 1     | 0.1  | 0     | 0.0  |
|                               | Facility management                            | 1     | 0.0  | 1     | 0.1  | 0     | 0.0  |
| 2. Computer skills            | Totals for theme                               | 449   | 19.5 | 372   | 19.0 | 77    | 22.1 |
|                               | General administrative computer                | 203   | 8.8  | 162   | 8.3  | 41    | 11.7 |
|                               | General technology                             | 145   | 6.3  | 125   | 6.4  | 20    | 5.7  |
|                               | Database management                            | 66    | 2.9  | 55    | 2.8  | 11    | 3.2  |
|                               | Software (unspecified)                         | 10    | 0.4  | 10    | 0.5  | 0     | 0.0  |
|                               | Informatics                                    | 9     | 0.4  | 6     | 0.3  | 3     | 0.9  |
|                               | Microsoft Office (Word and PowerPoint)         | 9     | 0.4  | 7     | 0.4  | 2     | 0.6  |
|                               | Routine health information systems             | 3     | 0.1  | 3     | 0.2  | 0     | 0.0  |
|                               | Coding                                         | 2     | 0.1  | 2     | 0.1  | 0     | 0.0  |
|                               | Graphic design                                 | 2     | 0.1  | 2     | 0.1  | 0     | 0.0  |
| 3. Communication skills       | Totals for theme                               | 424   | 18.4 | 351   | 17.9 | 73    | 20.9 |
|                               | Interpersonal skills                           | 148   | 6.4  | 123   | 6.3  | 25    | 7.2  |
|                               | Public risk communication                      | 82    | 3.6  | 72    | 3.7  | 10    | 2.9  |
|                               | Public speaking                                | 61    | 2.6  | 54    | 2.8  | 7     | 2.0  |
|                               | Grant writing                                  | 59    | 2.6  | 44    | 2.2  | 15    | 4.3  |
|                               | General writing                                | 34    | 1.5  | 27    | 1.4  | 7     | 2.0  |
|                               | Social media                                   | 21    | 0.9  | 18    | 0.9  | 3     | 0.9  |
|                               | Community outreach                             | 11    | 0.5  | 5     | 0.3  | 6     | 1.7  |
|                               | Marketing                                      | 5     | 0.2  | 5     | 0.3  | 0     | 0.0  |
|                               | Writing for publication                        | 3     | 0.1  | 3     | 0.2  | 0     | 0.0  |
| 4. Program-related skills     | Totals for theme                               | 263   | 12.3 | 235   | 12.0 | 48    | 13.8 |
|                               | General program-specific (unspecified)         | 191   | 8.3  | 160   | 8.2  | 31    | 8.9  |
|                               | Epidemiology                                   | 21    | 0.9  | 18    | 0.9  | 3     | 0.9  |
|                               | Core public health                             | 9     | 0.4  | 8     | 0.4  | 1     | 0.3  |
|                               | Workplace and laboratory safety                | 8     | 0.3  | 7     | 0.4  | 1     | 0.3  |
|                               | Biostatistics                                  | 7     | 0.3  | 2     | 0.1  | 5     | 1.4  |

(continues)
TABLE 2
Frequency of Themes and Subthemes by Respondents at the State and Local Levels* (Continued)

| Themes                              | Subthemes                          | Overall (n = 2308) | State (n = 1959) | Local (n = 349) |
|-------------------------------------|------------------------------------|--------------------|------------------|-----------------|
|                                     | n   | %    | n   | %    | n   | %    |
| Environmental health                | 7   | 0.3  | 5   | 0.3  | 2   | 0.6  |
| Maternal, child, and reproductive   | 9   | 0.4  | 7   | 0.4  | 2   | 0.6  |
| health                              |                                 |                    |                  |                 |
| Nutrition/WIC                       | 5   | 0.2  | 4   | 0.2  | 1   | 0.3  |
| Health care reform                  | 4   | 0.2  | 3   | 0.2  | 1   | 0.3  |
| Medical coding and billing          | 4   | 0.2  | 4   | 0.2  | 0   | 0.0  |
| Disease surveillance                | 3   | 0.1  | 3   | 0.2  | 0   | 0.0  |
| Emergency preparedness              | 3   | 0.1  | 3   | 0.2  | 0   | 0.0  |
| Health systems                      | 3   | 0.1  | 3   | 0.2  | 0   | 0.0  |
| Biology                             | 2   | 0.1  | 2   | 0.1  | 0   | 0.0  |
| Case management                     | 2   | 0.1  | 2   | 0.1  | 0   | 0.0  |
| Chronic disease                     | 2   | 0.1  | 2   | 0.1  | 0   | 0.0  |
| Social determinants of health       | 2   | 0.1  | 2   | 0.1  | 0   | 0.0  |
| Capacity building                   | 1   | 0.0  | 0   | 0.0  | 1   | 0.3  |
| **5. Data analysis skills**         |      |      |      |      |      |      |
| Totals for theme                    | 234 | 10.1 | 200 | 10.2 | 34  | 9.7  |
| General data analysis and           |      |      |      |      |      |      |
| management                          | 191 | 8.3  | 162 | 8.3  | 29  | 8.3  |
| Geographic information systems      | 24  | 1.0  | 22  | 1.1  | 2   | 0.6  |
| Data analysis software              | 19  | 0.8  | 16  | 0.8  | 3   | 0.9  |
| **6. Finance skills**               |      |      |      |      |      |      |
| Totals for theme                    | 214 | 9.3  | 176 | 9.0  | 38  | 10.9 |
| Budgeting                           | 183 | 7.9  | 149 | 7.6  | 34  | 9.7  |
| General finance                     | 16  | 0.7  | 14  | 0.7  | 2   | 0.6  |
| Grant management                    | 14  | 0.6  | 12  | 0.6  | 2   | 0.6  |
| Auditing                            | 1   | 0.0  | 1   | 0.1  | 0   | 0.0  |
| **7. Policy skills**                |      |      |      |      |      |      |
| Totals for theme                    | 180 | 7.8  | 145 | 7.4  | 35  | 10.0 |
| Policy development and advocacy     |      |      |      |      |      |      |
| General policy                      | 47  | 2.0  | 38  | 1.9  | 9   | 2.6  |
| Legislation                         | 7   | 0.3  | 7   | 0.4  | 0   | 0.0  |
| Health equity                       | 3   | 0.1  | 3   | 0.2  | 0   | 0.0  |
| **8. Research skills**              |      |      |      |      |      |      |
| Totals for theme                    | 98  | 4.2  | 82  | 4.2  | 16  | 4.6  |
| Program evaluation                  | 52  | 2.3  | 42  | 2.1  | 10  | 2.9  |
| General research                    | 29  | 1.3  | 25  | 1.3  | 4   | 1.1  |
| Needs assessment                    | 5   | 0.2  | 4   | 0.2  | 1   | 0.3  |
| Health impact assessment            | 3   | 0.1  | 3   | 0.2  | 0   | 0.0  |
| Investigation                       | 3   | 0.1  | 3   | 0.2  | 0   | 0.0  |
| Program monitoring                  | 3   | 0.1  | 3   | 0.2  | 0   | 0.0  |
| Program design                      | 2   | 0.1  | 1   | 0.1  | 1   | 0.3  |
| Academic research partnerships      | 1   | 0.0  | 1   | 0.1  | 0   | 0.0  |

Abbreviation: WIC, Special Supplemental Nutritional Program for Women, Infants, and Children.

*Main themes are listed in the order of frequency. n = the number of respondents who listed at least 1 skill. % refers to percentage out of total 1980 responses. Comments could be assigned to more than 1 subtheme.
| Main Themes                  | Business Support Staff (n = 359)                                                                 | Community-Based Health Worker (n = 135)                                                                               | Environmentalist (n = 84)                                                                                      | Epidemiologist (n = 120)                                                                                       | Information Technology Staff (n = 95)                                                                              |
|-----------------------------|-----------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------|
| Management/Leadership skills | 2. General management (n = 40; 11.1%)                                                           | 2. General management (n = 12; 8.9%)                                                                                 | 2. General management (n = 8; 9.5%)                                                                            | 2. General management (n = 19; 15.8%)                                                                            | 3. General management (n = 11; 11.6%)                                                                               |
|                            | 7. General leadership (n = 17; 4.7%)                                                           | 3. General leadership (n = 10; 7.4%)                                                                               | 5. General leadership (n = 5; 6.0%)                                                                            | 7. General leadership (n = 8; 6.7%)                                                                            | 6. General leadership (n = 4; 4.2%)                                                                               |
|                            | 4. Strategic management (n = 9; 6.7%)                                                           | 4. Strategic management (n = 9; 6.7%)                                                                               | 7. General leadership (n = 8; 6.7%)                                                                            | 7. Strategic management (n = 3; 3.2%)                                                                            | 7. Strategic management (n = 3; 3.2%)                                                                               |
| Communication skills        | 3. Interpersonal skills (n = 29; 8.1%)                                                          | 4. Public speaking (n = 9; 6.7%)                                                                                  | 6. General writing (n = 4; 4.8%)                                                                               | 8. Public risk communication (n = 6; 5.0%)                                                                      | 4. Interpersonal skills (n = 9; 9.5%)                                                                             |
|                            | 10. Public speaking (n = 13; 3.6%)                                                             | 8. Social media (n = 6; 4.4%)                                                                                      |                                                                                                                 |                                                                                                                 |                                                                                                                  |
| Computer skills             | 1. General computer (n = 42; 11.7%)                                                             | 7. General computer (n = 8; 5.9%)                                                                                  | 4. General technology (n = 6; 7.1%)                                                                           | 3. General technology (n = 12; 10.0%)                                                                           | 1. General technology (n = 18; 18.9%)                                                                            |
|                            | 9. Database management (n = 14; 3.9%)                                                           | 7. General technology (n = 8; 5.9%)                                                                               | 5. General computer (n = 5; 6.0%)                                                                              | 5. General computer (n = 7; 7.4%)                                                                             | 5. General computer (n = 7; 7.4%)                                                                               |
|                            | 6. General technology (n = 18; 5.0%)                                                           | 6. General technology (n = 12; 10.0%)                                                                            | 6. General program-specific (n = 7; 7.4%)                                                                       | 6. Database management (n = 4; 4.2%)                                                                            | 6. Database management (n = 4; 4.2%)                                                                               |
| Program-related skills      | 5. General program-specific (n = 21; 5.8%)                                                       | 1. General program-specific (n = 15; 11.1%)                                                                        | 1. General program-specific (n = 10; 11.9%)                                                                     | 6. General program-specific (n = 9; 7.5%)                                                                       | 5. General program-specific (n = 7; 7.4%)                                                                           |
|                            |                                                                                               | 5. Language/Cultural competency (n = 5; 6.0%)                                                                       | 8. Epidemiology (n = 6; 5.0%)                                                                                |                                                                                                                 |                                                                                                                  |
| Data analysis skills        | 8. General data analysis and management (n = 16; 4.5%)                                           | 3. General data analysis and management (n = 7; 8.3%)                                                              | 1. General data analysis and management (n = 29; 24.2%)                                                        | 2. General data analysis and management (n = 16; 16.8%)                                                        |                                                                                                                  |
|                            |                                                                                               | 4. Geographic information systems (n = 11; 9.2%)                                                                   | 4. Geographic information systems (n = 11; 9.2%)                                                              |                                                                                                                 |                                                                                                                  |
|                            |                                                                                               | 8. Data analysis software (n = 6; 5.0%)                                                                           | 8. Data analysis software (n = 6; 5.0%)                                                                        |                                                                                                                 |                                                                                                                  |
| Finance skills              | 4. Budgeting (n = 24; 6.7%)                                                                    | 8. Budgeting (n = 6; 4.4%)                                                                                        | 4. Budgeting (n = 6; 7.1%)                                                                                   | 7. Budgeting (n = 3; 3.2%)                                                                                   |                                                                                                                  |
| Policy skills               | 4. Policy development and advocacy (n = 9; 6.7%)                                                | 5. Policy development and advocacy (n = 5; 6.0%)                                                                   | 5. General policy (n = 6; 5.0%)                                                                               | 8. General policy (n = 6; 5.0%)                                                                               | 7. Budgeting (n = 3; 3.2%)                                                                                   |
| Research skills             |                                                                                               | 5. Program evaluation (n = 10; 8.3%)                                                                              |                                                                                                                 |                                                                                                                 |                                                                                                                  |
### TABLE 3
Ten Most Frequent Training Needs Subthemes Mentioned by Selected Respondent Job Category, State Level (Continued)

| Main Themes                              | Laboratory Staff (n = 105) | Leadership/Management (n = 306) | Nurse (n = 257) | Other Clinical Staff (n = 137) |
|------------------------------------------|----------------------------|--------------------------------|-----------------|-------------------------------|
| Management/Leadership skills            |                            |                                |                 |                               |
| 1. General management (n = 13; 12.4%)    |                            |                                |                 |                               |
| 2. General leadership (n = 5; 4.8%)      |                            |                                |                 |                               |
| 3. General technology (n = 9; 8.6%)      |                            |                                |                 |                               |
| 4. Clinical skills (n = 4; 3.8%)         |                            |                                |                 |                               |
| 5. Budgeting (n = 4; 3.8%)               |                            |                                |                 |                               |
| 6. Policy development and advocacy (n = 31; 10.1%) | | | |    |
| 7. Policy development and advocacy (n = 12; 4.7%) | | | |    |
| Data analysis skills                     |                            |                                |                 |                               |
| 5. General data analysis and management  |                            |                                |                 |                               |
| 6. General data analysis and management  |                            |                                |                 |                               |
| 7. General data analysis and management  |                            |                                |                 |                               |
| 8. General data analysis and management  |                            |                                |                 |                               |
| Finance skills                           |                            |                                |                 |                               |
| 5. Budgeting (n = 4; 3.8%)               |                            |                                |                 |                               |
| 6. Budgeting (n = 8; 5.8%)               |                            |                                |                 |                               |
| 7. Policy development and advocacy (n = 12; 4.7%) | | | |    |
| Research skills                          |                            |                                |                 |                               |
other sectors toward achieving mutually beneficial population health goals requiring the workforce to link perspectives and learn from other specialties to tackle today’s pressing community health challenges.

While these skills may not be currently prioritized in ongoing training offerings or in most curricula in schools and programs of public health, these data demonstrate a clear demand for leadership/management skills, informatics skills (computer and data themes), and financial management skills. Furthermore, these findings align well with the quantitative findings from PH WINS\(^1\) and other studies that have identified similar training and skills-building needs (eg, systems thinking, communicating persuasively, change management, information and analytics, problem solving, and working with diverse populations).\(^13\)

**Strengths and limitations**

This study has numerous strengths and limitations. First, the qualitative data used in this analysis are among the most recent opinions of the public health workforce and they provide valuable insight about the needs of current public health workers. However, training needs provided in open-ended responses were often general and did not always provide descriptions or specifics. Furthermore, it is not possible to differentiate the importance of the need(s) to the respondent (all needs mentioned were treated with the same level of importance). In addition, the PH WINS was a cross-sectional survey and provides information only at 1 point in time. Finally, as described in other peer-reviewed articles, there are limitations in using the PHWINS data due to the potential of nonresponse bias.\(^22\)

**Implications for Policy & Practice**

- As new public health frameworks—like Public Health 3.0 and the Chief Health Strategist—are advanced nationally, it is necessary to ensure that the workforce has the skills and abilities to implement these frameworks. Those skills and abilities are precisely what are identified here.

- It is the responsibility of funders (federal and philanthropic), schools and programs of public health, national training centers, and state and local health department leaders to ensure that the training needs expressed by the workforce here and in previous studies are met. Otherwise, without a workforce with the necessary preparation to meet a changing environment, the health of the nation not only risks continued improvements, it risks decline.

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