Evaluation of Training Gaps Among Public Health Practitioners in Washington State

Solongo Sainkhuu, MPH; Joana Cunha-Cruz, PhD, MPH, DDS; Megan Rogers, MS; Sarah Knerr, PhD, MPH; Betty Bekemeier, PhD, MPH, RN, FAAN

ABSTRACT

Context: Identifying training gaps in public health competencies and skills is a first step in developing priorities for advancing the workforce.

Objective: Our purpose was to identify training gaps in competencies and skills among local, state, and nonjurisdictional public health employees in Washington State. Our secondary aim was to determine whether training gaps differed by employees’ work-related and demographic characteristics.

Design: We used data from our training needs assessment of the public health workforce, conducted as an online cross-sectional survey in Spring/Summer of 2016.

Respondents and Setting: Employees from governmental local, state, and nonjurisdictional public health departments in Washington State.

Main Outcome Measures: Training gaps were calculated for 8 public health competencies and 8 skills, using a composite score of respondents’ ratings of their “training confidence” and “training need.” For each domain and skill area, we calculated the percentage of associated items, where respondents rated their training needs as high and their confidence as low to create scores ranging from 0% to 100%.

Results: The largest training gaps in public health competencies were in the Financial Planning and Policy Development domains. For skills, Quality Improvement and Developing Effective Communication Campaigns had the largest training gaps. In adjusted models, female employees or employees working in local health departments in select Washington State regions had higher training gaps in Financial Planning, Policy Development, and Quality Improvement, relative to male or state health department employees. Employees who worked in specialized programs, such as Communicable Disease Control, and Maternal, Child, and Family Health, had higher training gaps in Financial Planning and Developing Effective Communication Campaigns than those who worked in Administrative and Support Services.

Conclusions: We identified important training gaps in several competency domains and skills. Findings are informing decisions about tailoring training opportunities for public health practitioners in Washington and other states.

KEY WORDS: core public health competencies, public health skills, public health workforce development, training needs

Author Affiliations: Departments of Oral Health Sciences, School of Dentistry (Dr Cunha-Cruz) and Health Services, School of Public Health (Drs Cunha-Cruz, Knerr, and Bekemeier and Ms Rogers), University of Washington, Seattle, Washington; and Northwest Center for Public Health Practice, University of Washington, Seattle, Washington (Ms Rogers and Dr Bekemeier).

The authors acknowledge the contributions of other valued staff of the Northwest Center for Public Health Practice, University of Washington, and of the local and state public health practice partners that participated in this project.

The research analyzed de-identified secondary data and was determined to be exempt from human subjects’ review.

This research was partially funded by the Northwest Public Health Training Center (NWPHTC) through a grant (UB8HP31890) from the Health Resources & Services Administration (HRSA) as a field placement project for the University of Washington students through the Northwest Center for Public Health Practice (NWCPHP), University of Washington.

The authors declare no conflicts of interest.

The public health workforce consists of professionals providing a range of services to improve population wellness, including programs preventing disease, promoting healthy environments, and improving access to services. Given their breadth of responsibilities and diverse education,
many public health staff need ongoing training to acquire new skills for adequate job performance. However, studies assessing their workforce training gaps are limited.

The Public Health Workforce Interests and Needs Survey (PH WINS) is the only national sample survey measuring public health workforce knowledge, skills, and training needs. The 2017 PH WINS represented responses from 47 state public health agencies, 25 metropolitan large city health departments, and 71 large or midsized local health departments (LHDs). Small LHDs with less than 25 staff and serving populations less than 25,000 were not included. Nationwide, there are more than 2400 LHDs, but only 6% are classified as large jurisdictions serving more than 250,000 people. While large LHDs serve about 51% of US residents, 20% of residents live in rural areas served by small LHDs. Many small LHDs experience particularly severe workforce and budgetary limitations, impacting their ability to adequately serve their communities and support their staff, suggesting a pressing need for understanding the training needs of small LHDs.

For states with extensive rural areas, including Washington, PH WINS provides a rather limited understanding of the state’s workforce training needs. Washington has 35 LHDs. Only 4 of Washington’s midsized or larger LHDs participated in the 2017 PH WINS and 14 of Washington’s LHDs met the survey’s small LHD exclusion criteria. To better understand training needs of Washington’s public health workforce, particularly its rural jurisdictions, the Northwest Center for Public Health Practice (NWCPHP) analyzed data from a training needs assessment of the governmental public health workforce we originally conducted in 2016 to guide development of training plans and specific training activities. The study described here used the NWCPHP’s training needs assessment data to (1) identify training gaps in public health competencies and crosscutting skill areas, and (2) determine whether gaps differed by work-related and demographic characteristics of the workforce.

Methods

We used cross-sectional, secondary data from our training needs assessment of the public health workforce conducted as part of NWCPHP’s Public Health Training Center activities (Health Resources & Services Administration grant #UB6HP31690) in 2016. Our study was considered exempt by the University of Washington Human Subjects Division.

The NWCPHP’s training needs data were collected from employees working in state and local health departments and nonjurisdictional institutions (ie, generally these were nongovernmental institutions without specific jurisdictional boundaries, eg, tribal, university, and hospital settings) in Washington. The NWCPHP partnered with the Washington State Association of Local Public Health Official’s (WSALPHO) Workforce Development subcommittee and other state and local partners on the instrument’s design and approach. The NWCPHP and WSALPHO leaders encouraged all Washington public health agencies to participate. LHD directors from 21 of Washington’s 35 LHDs (60%) agreed to have their agencies participate. Only 1 LHD director declined agency participation and 13 did not respond. Participating directors chose from 2 survey dissemination methods: (1) NWCPHP staff directly e-mailing individualized survey links and targeted reminders to staff, or (2) directors e-mailing out a survey Web link and reminders themselves to staff. Data were collected using a Web-based, Qualtrics (Provo, Utah) survey. The survey included 72 questions, with most response options on a 4-point Likert scale. Participating LHDs were provided with an agency-level report for organizational planning, and respondents could download their individual responses for use in developing personal training plans. No monetary compensation was provided.

Data were collected between March and July 2016. The survey captured training gaps in competency domains and specific skills described by NWCPHP practice partners as important for staff development. The survey was also based largely on prior NWCPHP training needs surveys employed in 2010 and 2013, focusing on the competencies established by the Public Health Foundation’s Core Competencies for Public Health Professionals from the Council on Linkages between Academia and Public Health Practice (COL). Some of these items included COL competency questions used and validated in the Public Health Nurse Competency Self-Assessment. The COL’s 8 domain titles and related items were modified by the NWCPHP staff based on systematic feedback from partners and for readability. Specifically, the COL’s Financial Planning and Management, Policy Development/Program Planning, and Leadership and Strategic Planning domains were each split into multiple domains. In addition, 2 domains were renamed to simplify language and provide clarity. The revised domains were Data Management (originally named Analytic/Assessment) (9 items), Communication (8 items), Community Engagement (originally named Community Dimensions of Practice) (9 items), Cultural Competency (6 items), Financial Planning (6 items), Program Planning (6 items), Management (10 items), Leadership: Systems Thinking (7 items), Leadership: Strategic Planning (5 items), Policy Development (7 items), and Public Health Science (5 items).
The 8 crosscutting skill areas were described by the NWCPHP practice partners as key skills they desire among staff, which were not addressed by COL competencies. The crosscutting skills included Quality Improvement (4 items), Ethics and Public Health Law (6 items), Technology Uses: Computers & Software Systems (8 items), Working Efficiently (5 items), Working with Others (6 items), Communication Skills (6 items), Decision Making (2 items), and Developing Effective Communication Campaigns (6 items). The skill area survey items were drawn from existing instruments and partner input.13

The survey included questions about competencies, skills, employment, and respondent characteristics. For this analysis, we focused on the questions that assessed perceived confidence and training need in public health competencies, crosscutting skills for select employment, and respondent characteristics. To report confidence level and training need, respondents selected a minimum of 4 competency domains where they needed training to increase their work proficiency.

They then rated themselves on current confidence and training need within that domain. For example, those who selected the Financial Planning domain first rated their confidence level as high, moderate, low, no, or N/A and, second, their need for training as high, moderate, low, no, or N/A for each item within that domain (eg, “developing a business plan”). “N/A” (Not Applicable) was provided as an option, as not all items were relevant to all employees. Respondents similarly rated their confidence and training need across crosscutting skills. The NWCPHP staff pilot tested the instrument with WSALPHO’s Workforce Development subcommittee members and 21 public health nurses at 1 LHD. A focus group was also held with 8 pilot testers to formally assess the survey’s clarity, item relevance, and formatting. The employment and respondent characteristics assessed included (1) workforce demographics (age, gender, race/ethnicity, and education), (2) work-related characteristics (years in organization and position, part-time or full-time status, retirement plans, and organizational role [frontline or entry level, supervisory or management level, senior or executive level]), and (3) worksetting characteristics (rural, urban, suburban, or serving the entire state or multiple geographies) [Washington region and agency and primary program area]. For Washington region and agency, we grouped employees working in LHDs by the Washington Health Care Authority’s Accountable Communities of Health (ACH).14 The ACHs are 9 Washington counties and multicounty-based regions with shared leadership among the region’s LHDs, health care organizations, and service agencies with formalized and common interests in improving health.14 As a means to compare geographical differences, we grouped LHDs by their 9 ACH regions since many regions included LHDs with small numbers of survey respondents. State health department staff and employees working in institutions that were often nongovernmental and without specific jurisdictional boundaries were categorized separately for analysis.14

For analyzing the primary program area, we categorized programs based on the Foundational Public Health Services 5 programs and categories for foundational infrastructure or capabilities.1 The two infrastructure categories we delineated were assessment/surveillance combined with emergency preparedness and response, and “other capabilities” (eg, communications).1

Our decision to combine assessment/surveillance and emergency preparedness was based on having a small number of respondents identifying these as their “primary program areas” of work and the relationship of these to each other in the Foundational Public Health Services structure.1

Our main outcomes of interest were training gaps in competency domains and crosscutting skill areas. For each item within a domain or skill area, we classified respondents as having a training gap if they rated their confidence as “low” or “no” confidence and their need for training as “high” or “moderate” need. Otherwise, they were classified as not having a training gap for that item. Training gaps thus reflect job areas and where respondents both lack confidence and desire training.

We calculated gap scores for each competency domain and skill area by determining the percentage of items within the competency domain and skill area with training gaps. Respondents needed to answer at least half of the items within a domain or skill area for us to calculate gap scores; otherwise, their score was considered missing for that domain or area. We used the simple mean of the nonmissing items to impute training gap scores for respondents with missing data who had answered at least half of the items within a competency domain or skill area. Training gap scores could range from 0% (interpreted as no gap in any item for that domain/area) to 100% (interpreted as training gaps in all items for that domain/area).

For each competency and skill area, we calculated mean gap scores and standard deviations (SD) by averaging respondent-level gap scores across the sample (Tables 1 and 2). Mean gap scores represent the average number of items where respondents had gaps for that domain/skill area. We used simple linear regression to calculate unadjusted associations between gap scores and workforce characteristics, job, and work environment. Multiple regression models included all
TABLE 1
Estimated Means and Standard Deviations for Public Health Competency

| Public health competency                  | N  | Mean | SD  |
|-------------------------------------------|----|------|-----|
| Data Management                           | 890| 24.6 | 26.1|
| Communication                             | 840| 24.0 | 24.8|
| Community Engagement                      | 836| 27.0 | 25.0|
| Cultural Competency                       | 768| 30.3 | 32.0|
| Financial Planning                        | 621| 37.8 | 34.9|
| Program Planning                          | 1,057| 23.4 | 29.7|
| Management                                | 704| 23.8 | 27.1|
| Leadership: Systems Thinking              | 1,152| 24.3 | 28.0|
| Leadership: Strategic Planning            | 1,101| 26.6 | 32.4|
| Policy Development                        | 869| 34.1 | 35.3|
| Public Health Science                     | 601| 17.2 | 25.1|

variables with $P$ values less than .2 in simple regression models. Adjusted regression coefficients ($\beta$) and 95% confidence intervals (CIs) were reported and $P$ values less than .05 were considered significant. Data were analyzed using Stata Statistics/Data Analysis, version 14 (Stata Corp LP, College Station, Texas).

Results

In 2016, there were approximately 1762 state and 2771 LHD employees in Washington, giving a survey response rate of 69% ($n = 1224$) and 46% ($n = 1280$) for these employees, respectively. The remaining 108 respondents represented other Washington agencies. Almost two-thirds of respondents self-identified as white (64.1%) and 61.4% as female (Table 3). Many respondents had college degrees (64.1%), most held full-time positions (87.8%), and 46.9% worked at the state health department. Only 4.1% worked in

TABLE 2
Estimated Means and Standard Deviations for Crosscutting Skill

| Strategic Skill                          | N  | Mean | SD  |
|------------------------------------------|----|------|-----|
| Quality Improvement                      | 1289| 37.0 | 39.4|
| Ethics and Public Health Law             | 1,721| 22.1 | 31.4|
| Technology Uses: Computers & Software Systems | 2,120| 21.8 | 23.3|
| Working Efficiently                      | 2,149| 9.0  | 18.7|
| Working with Others                      | 2,238| 10.7 | 19.2|
| Communication Skills                     | 2,094| 14.2 | 21.2|
| Decision Making                          | 2,199| 8.7  | 23.1|
| Developing Effective Communication Campaigns | 633| 30.5 | 35.7|

TABLE 3
Survey Respondent Characteristics ($N = 2612$)

| Work and Setting Characteristics | N  | %  |
|----------------------------------|----|----|
| Washington State region and agency |    |    |
| King County Healthier Here ACH   | 435| 16.7|
| Better Health Together ACH       | 194| 7.4 |
| North Sound ACH                  | 183| 7.0 |
| Pierce County ACH                | 151| 5.8 |
| Local Health Department in 5 remaining ACHs* | 317| 12.1|
| State Health Department          | 1224| 46.9|
| Nongovernmental institution (tribal, hospital, university, etc) | 108| 4.1 |
| Service population               |    |    |
| Rural population                 | 349| 13.4|
| Suburban population              | 299| 11.4|
| Urban population                 | 791| 30.3|
| Other (eg, serves entire state or multiple geographies) | 1050| 40.2|
| Missing                          | 123| 4.7 |
| Primary program area             |    |    |
| Communicable Disease Control     | 233| 8.9 |
| Chronic Disease and Injury Prevention | 417| 16.0|
| Environmental Public Health      | 453| 17.3|
| Maternal, Child, and Family Health | 254| 9.7 |
| Access to and Linkage with Clinical Care | 234| 9.0 |
| Surveillance and Emergency Preparedness | 323| 12.4|
| Administration and Support Services | 660| 25.3|
| All or Others                    | 36 | 1.4 |
| Missing                          | 2  | 0.1 |
| Years at current organization     |    |    |
| < 4                              | 950| 36.4|
| 4-7                              | 333| 12.8|
| 7-10                             | 334| 12.8|
| > 10                             | 975| 37.3|
| Missing                          | 20 | 0.7 |
| Years in current role            |    |    |
| < 4                              | 1368| 52.4|
| 4-7                              | 383| 14.7|
| 7-10                             | 318| 12.2|
| > 10                             | 523| 20.0|
| Missing                          | 20 | 0.7 |
| Employment status                |    |    |
| Full-time                        | 2292| 87.8|
| Part-time or others (consultant, contractor, volunteer etc) | 310| 11.9|
| Missing                          | 10 | 0.3 |

(continues)
TABLE 3
Survey Respondent Characteristics (N = 2612) (Continued)

| Time to retirement | N  | %  |
|--------------------|----|----|
| <3 y               | 199| 7.6|
| 3-4 y              | 222| 8.5|
| >5 y               | 2165| 82.9|
| Missing            | 26 | 1.0|

| Role by organizational level | N   | %    |
|------------------------------|-----|------|
| Frontline/entry level        | 1694| 64.9|
| Program management/supervisory level | 766 | 29.3|
| Senior management/executive level | 152 | 5.8|

| Supervisory role | N   | %    |
|------------------|-----|------|
| Yes              | 1998| 76.5|
| No               | 614 | 23.5|

Demographic Characteristics

| Gender         | N   | %    |
|----------------|-----|------|
| Female         | 1605| 61.4|
| Male           | 571 | 21.9|
| Not reported   | 436 | 16.7|

| Age, y         | N   | %    |
|----------------|-----|------|
| <30            | 165 | 6.3  |
| 30-39          | 450 | 17.2 |
| 40-49          | 536 | 20.5 |
| 50-59          | 640 | 24.5 |
| ≥60            | 381 | 14.6 |
| Missing        | 440 | 16.9 |

| Ethnicity/race | N   | %    |
|----------------|-----|------|
| Asian          | 108 | 4.1  |
| Black/African American | 96 | 3.7  |
| Hispanic (all races) | 106 | 4.1  |
| Other or multiracial (American Indian, Alaska Native, etc) | 153 | 5.9  |
| White          | 1674| 64.1 |
| Missing        | 475 | 18.1 |

| Highest level of education | N   | %    |
|----------------------------|-----|------|
| Less than college          | 364 | 13.9 |
| College degree             | 1106| 42.3 |
| Master’s/doctorate degree  | 743 | 28.5 |
| Missing                    | 399 | 15.3 |

Abbreviation: ACH, Accountable Communities of Health.

* Other 5 ACHs: Olympic Community of Health ACH; Cascade Pacific Action Alliance ACH; Southwest ACH; North Central ACH; and Greater Columbia ACH.

nonjurisdictional institutions such as tribal agencies or hospitals. Almost two-thirds (64.9%) performed duties as frontline/entry-level staff, while 5.8% held senior or executive roles. Less than 7.9% planned to retire in less than 3 years.

Approximately 81% of survey respondents completed items for at least 4 competency domains and all crosscutting skill areas. The 3 competency domains most often selected for additional training to increase work proficiency were as follows: Leadership: Systems Thinking, Leadership: Strategic Planning, and Program Planning. The highest training gap scores among these public health domains were in Financial Planning (mean: 37.8, SD: 34.9) and Policy Development (mean: 34.1, SD: 35.3).

Cultural Competency (mean: 30.3, SD: 32) and Leadership: Strategic Planning (mean: 26.6, SD: 32.5) had moderate training gap scores. Public Health Science (mean: 17.2, SD: 25.1) had the lowest training gap scores of all competencies (Table 1). We imputed training gap scores in competency domains for 39% of participants on average. The percentage of respondents who had 1 or more missing items in a domain area ranged from 25% (Leadership: System Thinking and Leadership: Strategic Planning) to 60% (Management).

The skill areas with the highest gap scores were Quality Improvement (mean: 37, SD: 39.4) and Developing Effective Communication Campaigns (mean: 30.5, SD: 35.7). Ethics and Public Health Law (mean: 22.1, SD: 31.4) and Technology Uses: Computers and Software Systems (mean: 21.8, SD: 23.3) had moderate training gap scores. Working Efficiently (mean: 9.1, SD: 18.7) and Decision Making (mean: 8.7, SD: 23.1) had the lowest gap scores for all skill areas (Table 2). We imputed gap scores in strategic skill areas for 22% of respondents on average. The percentage of respondents who had 1 or more missing items in a skill area ranged from 14% (Decision Making) to 58% (Quality Improvement).

We report here respondent-level variation in training gaps for the 2 domains and 2 crosscutting skill areas with the highest mean gap scores. Final multiple regression models for other competencies and crosscutting skills are shown in Supplemental Digital Contents 1 to 4, available at http://links.lww.com/JPHMP/A660. Training gap scores for Financial Planning were associated with all work, setting, and demographic characteristics in simple regression models, except for ethnicity/race. Washington region and agency, primary program, supervisory role, gender, and age remained independently associated with training gap scores in adjusted analyses (Table 4). The largest mean differences in Financial Planning gap scores were by age and primary program area. Specifically, employees working in Maternal, Child, and Family Health and Communicable Disease Control had training gap scores of 20.3 and 11.9 percentage points higher than employees working in Administrative and Support Services (95% CI, 6.8 to 33.9 and −1.1 to 22.7, respectively), and employees younger than 30 years had training gap scores of 10.4 percentage points...
### TABLE 4

Coefficients and 95% Confidence Interval Estimates of Training Gap in Selected Public Health Competencies

| Work Characteristics                                                                 | Financial Planning                  | Policy Development                  |
|--------------------------------------------------------------------------------------|-------------------------------------|-------------------------------------|
|                                                                                      | Coefficient | 95% CI            | Coefficient | 95% CI            |
| Washington State region and agency                                                   |             |                   |             |                   |
| King County Healthier Here ACH                                                       | 10.3        | 0.8 to 19.7<sup>h,c</sup> | 5.0         | −3.4 to 13.4      |
| Better Health Together ACH                                                           | 5.6         | −7.5 to 18.8      | 6.7         | −3.4 to 16.8      |
| North Sound ACH                                                                     | 12.2        | 0.1 to 24.2<sup>d</sup> | 4.4         | 5.1 to 14.0       |
| Pierce County ACH                                                                   | 1.3         | −12.9 to 15.6     | 3.1         | −12.0 to 18.3     |
| Local health department in 5 remaining ACHs<sup>a</sup>                              | 7.6         | −4.2 to 19.5      | 5.8         | −4.3 to 16.0      |
| State health department                                                             | Reference   | Reference         | Reference   | Reference         |
| Nongovernmental institution (tribal, hospital, university, etc)                      | 14.5        | −4.0 to 33.2      | 13.1        | −4.1 to 30.5      |
| Service population                                                                  |             |                   |             |                   |
| Rural population                                                                     | 2.3         | −9.3 to 14.0      | 1.2         | −8.7 to 11.2      |
| Suburban population                                                                  | 3.6         | −6.5 to 13.9      | 8.5         | −1.6 to 18.8      |
| Urban population                                                                     | Reference   | Reference         | Reference   | Reference         |
| Other (eg, serves entire state or multiple geographies)                               | −1.2        | −9.6 to 7.1       | −0.6        | −8.2 to 6.9       |
| Primary program area                                                                 |             |                   |             |                   |
| Communicable disease control                                                         | 11.9        | −1.1 to 22.7<sup>h,c</sup> | 4.4         | −6.0 to 14.9      |
| Chronic disease and injury prevention                                                | 4.7         | −4.5 to 14.0      | 0.4         | −8.5 to 7.6       |
| Environmental public health                                                          | 5.8         | 3.6 to 15.3       | 6.9         | −14.9 to 1.0      |
| Maternal, child, and family health                                                   | 20.3        | 6.8 to 33.9<sup>n</sup> | 6.5         | −4.2 to 17.2      |
| Access to and linkage with clinical care                                             | 8.4         | −3.9 to 20.8      | 2.9         | −8.3 to 14.2      |
| Surveillance and emergency preparedness                                              | 8.0         | −2.2 to 18.3      | 1.0         | −10.5 to 8.3      |
| Administrative and support services                                                  | Reference   | Reference         | Reference   | Reference         |
| All or others                                                                        | 6.6         | −27.3 to 40.5     | −0.4        | −20.2 to 19.2     |
| Years at current organization                                                       |             |                   |             |                   |
| <4                                                                                   | 0.1         | −9.1 to 9.4       | 4.0         | −4.2 to 12.4      |
| 4-7                                                                                  | 2.8         | −13.4 to 7.8      | 7.5         | −2.5 to 17.7      |
| 7-10                                                                                 | 3.2         | −7.4 to 14.0      | 2.2         | −6.2 to 10.7      |
| >10                                                                                  | Reference   | Reference         | Reference   | Reference         |
| Years in current position                                                            |             |                   |             |                   |
| <4                                                                                   | 7.7         | −2.5 to 17.9      | 8.8         | 0.3 to 17.3<sup>d</sup> |
| 4-7                                                                                  | 4.9         | −7.2 to 17.1      | 3.1         | −6.8 to 13.1      |
| 7-10                                                                                 | 13.1        | 0.0 to 26.3       | 8.6         | −1.9 to 19.1      |
| >10                                                                                  | Reference   | Reference         | Reference   | Reference         |
| Employment status                                                                    |             |                   |             |                   |
| Full-time                                                                            | Reference   | Reference         | Reference   | Reference         |
| Part-time or others (consultant, volunteer etc)                                      | 2.3         | −7.8 to 12.4      | −2.7        | −6.1 to 11.6      |
| Time to retirement                                                                   |             |                   |             |                   |
| <3 y                                                                                 | Reference   | Reference         | Reference   | Reference         |
| 3-5 y                                                                                | 6.7         | −10.2 to 23.7     | 5.8         | −6.0 to 17.6      |
| >5 y                                                                                 | 5.9         | −9.4 to 21.3      | 8.7         | −1.8 to 19.3      |
| Role by organizational level                                                         |             |                   |             |                   |
| Frontline/entry level                                                                | −3.9        | −11.7 to 3.9      | 0.7         | −5.7 to 7.2       |
| Program management/supervisory level                                                 | Reference   | Reference         | Reference   | Reference         |
| Senior/executive level                                                               | −1.2        | −10.6 to 8.2      | −6.0        | −15.1 to 3.0      |
| Supervisory role                                                                     |             |                   |             |                   |
| No                                                                                   | 9.1         | 0.9 to 17.4<sup>c</sup> | 6.1         | −1.1 to 13.4      |
| Yes                                                                                  | Reference   | Reference         | Reference   | (continues)        |

<sup>a</sup> ACHs: ACH = Area Health Center; CI = confidence interval; Reference = reference category; <sup>b</sup> <sup>c</sup> denotes statistical significance at the 0.05 level; <sup>d</sup> denotes statistical significance at the 0.10 level; <sup>n</sup> denotes statistical significance at the 0.01 level.
TABLE 4
Coefficients and 95% Confidence Interval Estimates of Training Gap in Selected Public Health Competencies (Continued)

| Demographic Characteristics | Financial Planning | Policy Development |
|-----------------------------|--------------------|--------------------|
|                             | Coefficient | 95% CI | Coefficient | 95% CI |
| Gender                      |             |       |             |       |
| Female                      | 10.4        | 3.7 to 17.2 | 7.0        | 1.5 to 12.6 |
| Male                        | Reference   | Reference | Reference   | Reference |
| Not reported                | 8.8         | -26.7 to 44.3 | -1.6       | -33.7 to 30.4 |
| Age, y                      |             |       |             |       |
| <30                         | 16.7        | 1.7 to 31.7 | 2.8        | -9.0 to 14.7 |
| 30-39                       | Reference   | Reference | Reference   | Reference |
| 40-49                       | -1.3        | -10.0 to 7.2 | -0.7       | -8.7 to 7.2 |
| 50-59                       | -6.9        | -15.5 to 1.8 | -3.0       | -11.0 to 4.8 |
| ≥60                         | -6.9        | -19.7 to 5.9 | -7.6       | -18.0 to 2.7 |
| Ethnicity/race              |             |       |             |       |
| Asian                       | 6.0         |       |       | -9.3 to 21.5 |
| Black/African American      | 11.4        |       |       | -0.7 to 23.5 |
| Hispanic (all race)         | 1.0         |       |       | -12.9 to 15.0 |
| White                       | Reference   |       | Reference |       |
| Other/Multiracial           | -1.7        |       |       | -11.1 to 7.6 |
| Highest level of education  |             |       |             |       |
| Less than college           | -3.3        | -4.8 to 8.2 |             |       |
| College degree              | -3.5        | -10.5 to 3.3 |             |       |
| Master’s/doctrinal degree   | Reference   |       | Reference |       |

Abbreviations: ACH, Accountable Community Health; CI, confidence interval.

a Other 5 ACHs: Olympic Community of Health ACH, Cascade Pacific Action Alliance ACH, Southwest ACH, North Central ACH, and Greater Columbia ACH.

b Multiple linear regression was used to calculate adjusted coefficient and 95% CI.

c P < .01.
d P < .05.
e P < .001.

higher than employees aged 30 to 39 years (95% CI, 1.7-31.7).

In simple regression models, training gaps scores for Policy Development were associated with all work, setting, and demographic characteristics, apart from education level. Years in current position and gender remained independently associated with gap scores in adjusted analyses (Table 4). Employees in their positions for less than 4 years had mean Policy Development gap scores of 8.8 percentage points higher those in their role longer than 10 years (95% CI, 0.3-17.3). Females had mean Policy Development gap scores of 7.0 percentage points higher than males (95% CI, 1.5-12.6).

Within the skill area of Quality Improvement, training gap scores were associated with all work, setting, and demographic characteristics in simple regression models, except employment status. Washington region and agency, primary program area, time to retirement, organizational level, supervisory role, and gender remained independently associated with gap scores in the multiple regression model (Table 5). The largest differences in mean Quality Improvement gap scores were by Washington region, agency, and primary program. Employees working in LHDs across 5 Washington ACHs (Olympic Community of Health, Cascade Pacific Action Alliance, Southwest, North Central, and Greater Columbia) had gap scores of 17.5 percentage points higher than state health department employees (95% CI, 8.2-28.5). Similarly, employees working in LHDs in the North Sound and Pierce County ACHs had gap scores of 13.8 percentage points higher than state health department employees (95% CIs, 3.4-24.4 and 1.8-25.8, respectively). Employees working in Access to and Linkage with Clinical Care had mean Quality Improvement training gaps scores of 14.5 percentage points higher than those working in Administrative and Support Services (95% CI, 4.5-24.5).

Finally, in simple regression models, training gap scores in the skill area Developing Effective Communication Campaigns were associated with all work,
## TABLE 5

| Work Characteristics | Quality Improvement | Developing Effective Communication Campaigns |
|----------------------|---------------------|-----------------------------------------------|
|                      | Coefficient 95 % CI | Coefficient 95 % CI                           |
| **Quality Improvement** |                     |                                               |
| **Developing Effective Communication Campaigns** |                     |                                               |
| **Work Characteristics** |                     |                                               |
| Washington State region and agency |                     |                                               |
| King County Healthier Here ACH | 8.0 0.5 to 15.4 | 8.4 −1.5 to 18.5 |
| Better Health Together ACH | 6.9 −2.2 to 16.1 | 3.8 −7.2 to 4.9 |
| North Sound ACH | 13.8 3.4 to 24.2 | 11.5 −0.1 to 23.3 |
| Pierce County ACH | 13.8 1.8 to 25.8 | 3.7 −10.7 to 18.2 |
| Local health department in 5 remaining ACHs | 17.5 8.2 to 26.8 | 11.0 0.9 to 21.2 |
| State health department | Reference | Reference | Reference | Reference |
| Nongovernmental institution (tribal, hospital, university, etc) | 8.8 −5.2 to 21.2 | 10.6 −5.8 to 27.1 |
| **Service population** |                     |                                               |
| Rural population | −6.6 −15.3 to 2.1 | −7.9 −17.8 to 2.0 |
| Suburban population | −2.2 −10.6 to 6.1 | 0.4 −9.5 to 10.4 |
| Urban population | Reference Reference | Reference Reference | Reference Reference |
| Other (e.g., serves entire state or multiple geographies) | −3.9 −10.1 to 2.2 | 0.1 −8.2 to 8.3 |
| **Primary program area** |                     |                                               |
| Communicable Disease Control | 4.7 −3.9 to 13.4 | 17.0 6.0 to 27.9 |
| Chronic Disease and Injury Prevention | 8.6 1.4 to 15.7 | 7.8 −9.9 to 16.5 |
| Environmental Public Health | 3.7 −3.4 to 10.9 | 10.0 1.4 to 18.6 |
| Maternal, Child, and Family Health | 5.7 −3.7 to 15.1 | 19.1 7.8 to 30.3 |
| Access to and Linkage with Clinical Care | 14.5 4.5 to 24.5 | 11.8 −2.5 to 26.2 |
| Surveillance and Emergency Preparedness | 6.0 −1.9 to 14.1 | 11.4 −0.2 to 22.7 |
| Administrative and Support Services | Reference Reference | Reference Reference | Reference Reference |
| All or Others | 8.3 −13.7 to 30.5 | 23.9 −28.2 to 76.0 |
| **Years at current organization** |                     |                                               |
| <4 | 2.8 −4.4 to 10.1 |
| 4-7 | 2.6 −6.0 to 11.3 |
| 7-10 | 2.5 −4.3 to 11.4 |
| >10 | Reference Reference |
| **Years in current position** |                     |                                               |
| <4 | 3.8 −4.2 to 11.8 | 6.3 −2.4 to 15.1 |
| 4-7 | 3.6 −5.9 to 13.3 | −0.4 −10.6 to 9.8 |
| 7-10 | 8.4 −0.3 to 17.2 | 10.8 −0.2 to 21.9 |
| >10 | Reference Reference | Reference Reference | Reference Reference |
| **Employment status** |                     |                                               |
| Full-time | Reference Reference |
| Part-time or others (consultant, volunteer etc) | Reference Reference | Reference Reference | Reference Reference |
| **Time to retirement** |                     |                                               |
| <3 y | Reference Reference |
| 3-5 y | 11.1 −0.1 to 22.3 |
| >5 y | 10.7 0.8 to 20.8 |
| **Role by organizational level** |                     |                                               |
| Frontline/entry level | −6.4 −12.3 to −0.6 | −0.7 −8.5 to 7.1 |
| Program management/supervisory level | Reference Reference | Reference Reference | Reference Reference |
| Senior/executive level | −8.0 −18.1 to 2.1 | −2.4 −15.0 to 10.2 |
| **Supervisory role** |                     |                                               |
| No | Reference Reference |
| Yes | 12.3 6.1 to 18.4 | 6.3 −2.8 to 15.4 |
| (continues) |                     |                                               |
setting, and demographic characteristics, apart from years at current organization, employment status, time to retirement, gender, and education level. Washington region and agency, primary program area, and age remained independently associated with gap scores in adjusted analyses (Table 5). Specifically, employees working in LHDs across the same 5 Washington ACHs listed previously had mean gap scores of 11.0 percentage points higher than state health department employees (95% CI, 0.9-21.2). Employees working in Maternal, Child, and Family Health and Communicable Disease Control had the largest differences in Developing Effective Communication Campaigns gap scores relative to employees working in Administrative and Support Services ($\beta$: 19.1; 95% CI, 7.8-30.3 and $\beta$: 17.0; 95% CI, 6.8-27.9). Employees aged 40 to 49 years had mean gap scores of 8.8 percentage points higher than employees aged 30 to 39 years (95% CI, 0.1-17.6).

### Discussion

Washington public health staff had the highest training gap scores in Financial Planning, Policy Development, Quality Improvement, and Developing Effective Communication Campaigns. Also, LHD employees working in select Washington regions and respondents working in the specialized areas of Communicable Disease Control and Maternal, Child, and Family Health had particularly large training gaps across several competency domains and skill areas compared with state health department employees and employees working in Administrative and Support Services, respectively. We did not, however, observe significant differences in training gap scores by service population (rural, suburban, urban, or serving multiple geographies).

The training gaps we identified in Washington are largely consistent with findings from the 2017 PH WINS survey, which identified Budget and Financial

### TABLE 5

| Demographic Characteristics | Quality Improvement | Developing Effective Communication Campaigns |
|-----------------------------|---------------------|-----------------------------------------------|
|                             | Coefficient | 95% CI | Coefficient | 95% CI |
| Gender                      |             |       |             |       |
| Female                      | 10.1        | 5.1 to 15.2 | Reference | Reference |
| Male                        | Reference   |       | Reference   |       |
| Not reported                | -3.1        | -23.4 to 17.0 | Reference | Reference |
| Age, y                      |             |       |             |       |
| <30                         | -0.3        | 11.3 to 10.7 | -7.1      | -17.2 to 2.8 |
| 30-39                       | Reference   |       | Reference   |       |
| 40-49                       | -2.6        | -9.6 to 4.3 | Reference | Reference |
| 50-59                       | -1.2        | -8.2 to 5.6 | 7.4       | -0.6 to 15.5 |
| ≥60                         | -1.0        | -10.9 to 8.9 | 9.7      | -0.9 to 20.4 |
| Ethnicity/race              |             |       |             |       |
| Asian                       | -7.3        | -17.1 to 2.5 | -4.7      | -16.3 to 7.0 |
| Black/African American      | -1.9        | -14.0 to 10.1 | 7.2       | -6.5 to 21.1 |
| Hispanic (all race)         | -6.5        | -17.6 to 4.5 | 7.5       | -4.8 to 19.9 |
| White                       | Reference   |       | Reference   |       |
| Other/multiracial (American Indian, Alaska Native, etc) | -6.7 | -15.8 to 2.3 | -3.7 | -14.8 to 7.2 |
| Highest level of education  |             |       |             |       |
| Less than college           | 6.4         | -1.9 to 10.1 | Reference | Reference |
| College degree              | 4.5         | -0.6 to 9.7 | Reference | Reference |
| Master’s/doctoral degree    |             |       |             |       |

Abbreviations: ACH, Accountable Community Health; CI, confidence interval.

* Other 5 ACHs: Olympic Community of Health ACH, Cascade Pacific Action Alliance ACH, Southwest ACH, North Central ACH, and Greater Columbia ACH.

$^a$ Multiple linear regression was used to calculate adjusted coefficient and 95% CI.

$^b$ $P < .01$.

$^c$ $P < .001$.

$^d$ $P < .05$. 

Copyright © 2020 Wolters Kluwer Health, Inc. Unauthorized reproduction of this article is prohibited.
Management, Systems Thinking, and Strategic Thinking as areas with the largest training gaps nationally and in federal Health & Human Services’ (HHS) Region 10, which includes Washington.4,15 Developing workforce competencies in Financial Planning and Policy Development, in particular, could positively impact public health professionals’ ability to effectively manage limited funds and engage in critical resource allocation activities that impact the health of whole populations and marginalized communities.16 In our NWCPHP survey, items within the Financial Planning domain included competencies, such as determining budget priorities and developing sustainable financial models for programs. Policy Development items included analyzing policy options and interacting with policy makers.

Similarly, addressing training gaps in Quality Improvement and Developing Effective Communication Campaigns skills could impact effectiveness in evaluating, measuring, and improving systems or communicating effectively during public health emergencies. Our Quality Improvement items asked about establishing performance management systems and using quality improvement tools. Developing Effective Communication Campaigns items asked about public service announcements and social media.

Our results suggest that LHD employees working in specific Washington regions have larger training gaps across some competencies and skills than state health department employees. This could be due, in part, to more staff with advanced degrees, a greater emphasis on workforce development, and dedicated workforce development positions at the state-level, relative to smaller-budget LHDs. Differences in the ability to prioritize workforce development may also explain variation in training gaps by Washington region and agency. Specifically, some ACHs were represented by very small LHDs with limited resources.

Employees working in specialized areas such as Communicable Disease Control and Maternal, Child, and Family Health also had higher training gaps relative to those in Administrative and Support Services. Employees in specialized program areas are more likely to receive discipline-specific training17-19 and may be expected to execute broad public health competencies and skills less often, thus, perceiving these competencies and skills as less needed.

We found that female respondents had higher training gaps than their male counterparts across many competencies and skills. Women represent 79% of the US public health workforce, with 2% of them having executive status.4,20 Women are, therefore, more often in frontline or entry-level positions. Similarly, among our 1067 female respondents, only 4.5% held executive-level positions compared with 10.5% of male respondents. Unlike previous studies, we did not find significant variations in training gaps by organizational level (eg, frontline versus management level).21-23 Thus, it is possible that gender-related differences in self-assessment systematically influenced ratings of confidence and training needs across competencies and skills in our sample.10,23 Further research should explore variations in training needs by gender.

Our study also examined small, rural LHDs.24 We did not, however, find significant differences in training gaps by service population (ie, employees serving urban, rural, suburban, and multiple geographies). The lack of significant differences could reflect our limited representation of LHDs serving rural populations. Only 13.4% of respondents reported serving rural populations and we lacked participation from 6 of the 10 Washington LHDs serving populations less than 25 000.4,25 Despite these gaps in data, we know that rural LHDs face severe budget and workforce development limitations.26 Our study demonstrates that it is difficult, but possible, to collect data from small LHDs and compare training needs by service population. It also highlights the importance of further research efforts focusing on the rural public health workforce.

Finally, we expected that level of education would be inversely associated with training gaps for competencies and skills. We did not, however, identify significant differences between training gaps and employees’ educational attainment, perhaps due to the limitations of our examination by the small numbers of

---

**Implications for Policy & Practice**

- These results provide specific evidence of training gaps in public health competencies and skills among public health professionals in Washington State.
- These results further illustrate the training gaps in Financial Planning and Policy Development.
- These results are useful for designing and implementing public health training systems and plans.
- This study demonstrates the potential for assessing the competency and skill gaps among public health professionals working in small LHDs, which were underrepresented in prior national research.
- Comparison studies should be conducted that depict large, multistate samples of small, rural LHDs for comparison with large and midsized LHDs as a means to guide more nuanced workforce planning and resources for rural public health jurisdictions.
responses to the public health degree item. Nor did we find variation in training gaps across career stage.27,28 Although literature reviews report Leadership: Systems Thinking as having the highest training gap in the public health workforce among executive-level employees, we did not find significant gaps among executives in this domain.11,25-28

Our study’s limitations include the length of our survey, which contributed to missing data. Survey data were also self-reported, with respondents potentially misestimating their training needs and/or confidence. Finally, our study examined data from a single state and had low numbers of rural-serving and nonjurisdictional representatives, limiting our analyses and generalizability. Nonetheless, our sample generally represented the demographic makeup of Washington governmental public health staff and of those nationally. Also, HHS Region 10 findings for PH WINS in 2017 were found to be similar to the national findings, suggesting that the Washington public health workforce might be similar to other states.4

References

1. The Public Health National Center for Innovations (PHNCI). Foundational Public Health Services. Foundational Public Health Services. FPFS factsheet. https://phnci.org/uploads/resource-files/FPFS-Factsheet-November-2018.pdf. Accessed May 11, 2019.

2. Halverson PK. Ensuring a strong public health workforce for the 21st century: reflections on PH WINS 2017. J Public Health Manag Pract. 2019;25(2):1-3.

3. Alejos A, Weingartner A, Scharff DP, et al. Ensuring the success of local public health workforce assessments: using a participatory-based research approach with a rural population. Public Health. 2008;122(12):1447-1455.

4. Public Health Workforce Interests and Needs Survey (PH WINS). 2017 national findings. The de Beaumont Foundation. Regional summary report—Region 10. https://www.debeaumont.org/ph-wins/reports/2017/PHWINS-Region10. Published 2017. Accessed May 11, 2019.

5. Leider JP, Pineau V, Bogaert K, Ma Q, Sellers K. The methods of PH WINS 2017: approaches to refreshing nationally representative state-level estimates and creating nationally representative state-level estimates of public health workforce interests and needs. J Public Health Manag Pract. 2019;25(suppl 2):S49-S57.

6. Robin N, Castrucci BC, McGinty MD, Edmiston A, Bogaert K. The first nationally representative benchmark of the local governmental public health workforce: findings from the 2017 public health workforce interests and needs survey. J Public Health Manag Pract. 2019;25(suppl 2):S26-S37.

7. National Association of County & City Health Officials (NACCHO). 2016 national profile of local health departments. http://nacchoprofilestudy.org/wp-content/uploads/2017/10/ProfileReport_Aug2017_final.pdf. Published 2017. Accessed May 11, 2019.

8. Ratcliffe M, Burd C, Fields A. Defining Rural at US Census Bureau: American Community Survey and Geography Brief. https://www.census.gov/content/dam/Census/library/publications/2016/acs/acsgeo-1.pdf. Published 2016. Accessed May 11, 2019.

9. McKeever J, Leider JP, Alford AA, Evans D. Regional training needs assessment: a first look at high-priority training needs across the United States by region. J Public Health Manag Pract. 2019;25(suppl 2):S166-S176.

10. Juliano C, Castrucci BC, Leider JP, McGinty MD, Bogaert K. The governmental public health workforce in 26 cities: PH WINS results from big cities health coalition members. J Public Health Manag Pract. 2019;25(suppl 2):S38-S48.

11. Bekemeier B, Park S, Backonja U, Ormeias I, Turner AM. Data, capacity-building, and training needs to address rural health inequities in the Northwest United States: a qualitative study. J Am Med Inform Assoc. 2019;26(8-9):825-834.

12. Council on Linkages Between Academia and Public Health Practice. Core Competencies for Public Health Professionals. Washington, DC: Public Health Foundation; 2014. http://www.phf.org/resourcestoools/pages/core_public_health_competencies.aspx. Accessed May 11, 2019.

13. Issel ML, Baldwin KA, Lyons RL, Madamal K. Self-reported competencies of public health nurses and faculty in Illinois. Public Health Nurs. 2006;23(2):168-177.

14. National Consortium for Public Health Workforce Development. Building Skills for a More Strategic Public Health Workforce: A Call to Action: Executive Summary. Bethesda, MD: de Beaumont Foundation; 2017. https://www.debeaumont.org/wp-content/uploads/2019/04/Building-Skills-for-a-More-Strategic-Public-Health-Workforce.pdf. Accessed May 11, 2019.

15. Healthier Washington. Washington State Health Care Authority. Accountable communities of health: the fact sheet. https://www.hca.wa.gov/assets/programs/achfactsheet.pdf. Published 2017. Accessed May 11, 2019.

16. Bogaert K, Castrucci BC, Gould E, Rider N, Whang C, Corcoran E. Top training needs of the governmental public health workforce. J Public Health Manag Pract. 2019;25(suppl 2):S134-S144.

17. McGinty MD, Castrucci BC, Rios DM. Assessing the knowledge, skills, and abilities of public health professionals in big city governmental health departments. J Public Health Manag Pract. 2018;24(5):465-472.

18. Bogaert K, Castrucci BC, Gould E, et al. The Public Health Workforce Interests and Needs Survey (PH WINS 2017): an expanded perspective on the state health agency workforce. J Public Health Manag Pract. 2019;25(suppl 2):S16-S25.

19. Kaufman NJ, Castrucci BC, Pearsol J, et al. Thinking beyond the silos: emerging priorities in workforce development for state and local government public health agencies. J Public Health Manag Pract. 2014;20(6):557-565.

20. Vaglier VA, Wissinkiewicz JM, Chapple-McGrueter T, Castrucci BC, Gould E. Public health workforce self-identified training needs by jurisdiction and job type. J Public Health Manag Pract. 2019;25(2):181-190.

21. Joly BM, Coronado F, Bickford BC, et al. A review of public health training needs assessment approaches: opportunities to move forward. J Public Health Manag Pract. 2018;24(4):571-585.

22. Sellers K, Leider JP, Harper E, et al. The public health workforce interests and needs survey: the first national survey of state health agency employees. J Public Health Manag Pract. 2015;21(suppl 6):S13-S27.

23. Harper E, Castrucci BC, Bhanthapudi K, Sellers K. Job satisfaction: a critical, understudied facet of workforce development in public health. J Public Health Manag Pract. 2015;21(suppl 6):S46-S55.

24. Bogaert K, Leider JP, Castrucci BC, Sellers K, Whang C. Considering leaving, but deciding to stay: a longitudinal analysis of intent to leave in public health. J Public Health Manag Pract. 2019;25(suppl 2):S78-S86.

25. Barlee T, Winnail SD, Olsen SE, Diaz C, Blevens JA. Assessing competencies of the public health workforce in a frontier state. J Community Health. 2003;28(6):459-469.

26. Beck AJ, Leider JP, Coronado F, Harper E. State health agency and local health department workforce: identifying top development needs. Am J Public Health. 2017;107(9):1418-1424.

27. Hajat A, Stewart K, Hayes KL. The local public health workforce in rural communities. J Public Health Manag Pract. 2003;9(6):384-398.

28. Aidala AA, Cavaliere B, Cinnick S. Strategies and tools for public health workforce training needs assessments in diverse and changing population health contexts. J Public Health Manag Pract. 2019;25(5):490-497.