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Local Public Health Workforce Benchmarks

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Executive Summary

This report offers a blueprint for the development of benchmarks to assist local health departments (LHDs) in meeting current staffing standards and inform workforce development activities by facilitating the identification of local public health practice workforce needs and gaps. Commissioned by the National Association of County and City Health Officials (NACCHO), this project was guided by NACCHO's Workforce and Leadership Development Committee.

A review of historical and currently available measures of the local public health workforce provides context for the assessment of LHD characteristics and other factors that may affect staffing levels and composition. Included in this review were Emerson's landmark examinations of the national public health system in the 1940s, ongoing surveys of government employment levels and standard occupational categories conducted by federal agencies, and recommendations of public health professional organizations. NACCHO's series of National Profile of Local Health Departments (Profile) studies emerged as the most comprehensive and appropriate foundation for local public health workforce benchmarking applications. Preliminary analyses of Profile data identified governance pattern and the provision of specific clinical services as major influences on the number and types of public health workers in LHDs serving populations of all sizes. Other possible influences merit further investigation.

An initial benchmarking strategy for two applications is proposed. One application compares an LHD's existing staffing, in terms of all staff and 13 occupations, to benchmarks specific for key LHD characteristics. Initially these benchmarks reflect the median full-time equivalent (FTE) worker to population ratios for LHDs with similar population, governance, and clinical service characteristics. After a sufficient number of LHDs are accredited, these benchmarks will reflect the median FTE worker to population ratios for accredited LHDs with similar population, governance, and clinical service characteristics. As other influences are identified, these would be incorporated into the initial model described in this report.

A second benchmarking application allows for comparing the existing U.S. local public health workforce, including specific occupations, to levels consistent with those for fully accredited LHDs. The benchmarks for this application reflect the number of FTE local public health workers needed if the total U.S. population were served by an accredited LHD.

Four recommendations to further develop and refine this benchmarking initiative are offered: (1) develop and deploy an initial LHD staffing application; (2) proceed toward the development of a U.S. local public health workforce adequacy application; (3) plan revisions of future Profile survey questions related to the local public health workforce data sources and identify beneficial enhancements of existing federal data systems in order to advance these benchmarking applications; and (4) increase public health systems research in this area.

Local Public Health Workforce Benchmarks

I. Introduction: Issue and Relevance

Despite the public health workforce's central role in protecting and promoting the health of the public, it has received little attention in efforts to establish local public health practice standards. Although the workforce is universally considered a key component of the public health infrastructure, little guidance exists as to the appropriate size, composition, and skill sets of the workforce for local health departments (LHDs). Conventional wisdom within the public health community has viewed public health agencies, especially LHDs, as more different than alike in their activities. For too long, some people believed that "If you've seen one local health department, you've seen one local health department"—a view suggesting that local public health staffing standards are neither useful nor feasible.

Across public and private sector organizations, benchmarks serve as reference points for measurement and comparison and as vital tools in efforts to improve performance and results. Benchmarks could potentially contribute to strengthening the local public health workforce in several ways. At one level, staffing benchmarks can inform and guide LHDs in organizing and structuring the programs and services offered in the communities they serve. Such benchmarks can identify staffing gaps and facilitate recruitment, retention, and career development activities. At another level, benchmarks would allow for the identification of local, regional, state, or national gaps and shortages for specific public health occupations and the national public health workforce. At yet another level, benchmarks serve as standards that promote consistent quality in practice and as a template for performance improvement and more effective workforce development strategies. Greater consistency in staffing patterns can facilitate more meaningful research into the relationship between staffing patterns and the policies, programs, and services that are developed by LHDs to improve population health within their jurisdictions. Elucidating the links between inputs (such as staffing), outputs (programs and services), and outcomes in the community remains the central challenge for the public health systems research agenda.

Yet, staffing benchmarks are only proxy measures for the capacity of workers to carry out the important work of their organization. Quantitative benchmarks—such as the number of full-time equivalent employees (FTEs) or the number of nurses, health educators, epidemiologists, environmental health specialists, etc. or ratios of FTE workers to population—may not fully convey key aspects of human resource capacity. Measures of proficient performance—such as skill and competency levels for entry-, mid-, and advanced-level workers—can augment quantitative benchmarks but remain elusive to identify and apply in the real world. Ultimately, systems of work-doing must focus on three key elements: the worker, the work, and the work organization with staffing benchmarks conveying important information for all three. For local public health practice, the scope and content of the work to be performed, as well as strategies for delegating duties and roles, are continuously evolving. In this light, benchmarks become moving targets.

Benchmarks are not merely standards (either minimal or optimal) to be met; rather they serve as a basis for comparisons that serve specific purposes. An early set of benchmarks for LHD staffing is apparent in the work of the American Public Health Association's (APHA) Committee on Administrative Practice (CAP) in the 1930s and 1940s. CAP's landmark report[1] in 1945 (often called the Emerson Report because of the influence of the committee's chair, Haven Emerson) provided a blueprint for the establishment of a national network of LHDs. The Emerson report also projected LHD workforce staffing needs for its proposed national network based on an assessment of actual LHD staffing patterns in 1942 (Table 1).

[1] Emerson, H. and Luginbuhl, M. American Public Health Association, Committee on Administrative Practice, Subcommittee on Local Health Units. (1945). *Local Health Units for the Nation*. New York, NY: The Commonwealth Fund.

Table 1. Existing and Suggested Personnel and Expenditures for Local Health Services[1]

TABLE C. EXISTING AND SUGGESTED PERSONNEL AND EXPENDITURES FOR LOCAL HEALTH SERVICES

Personnel	Existing (1942) Total	Existing (1942) FT	Existing (1942) PT	Suggested (minimum) Total	Suggested (minimum) FT	Suggested (minimum) PT
Total	40,782	29,201	11,581	63,865	54,357	9,508
Health officers	5,519	1,202	4,317	1,197	1,197	—
Other medical administrators	1,065	1,065	—	866	866	—
Clinicians, part time	4,656	—	4,656	6,145	—	6,145
Public health nurses	14,274	13,742	532	26,390	26,390	—
Total sanitary personnel	5,504	5,216	288	5,807	5,796	11
Professionally trained, including engineers and veterinarians	577	539	38	1,895	1,884	11
Sanitarians, not professionally trained, including inspectors of various types	4,927	4,677	250	3,912	3,912	—
Clerical and secretarial workers, including those with statistical training	5,279	4,830	449	8,933	8,933	—
Laboratory workers	1,350	1,198	152	3,535	3,535	—
Professional	321	290	31	431	431	—
Technical	720	615	105	1,569	1,569	—
Unskilled	309	293	16	1,535	1,535	—
Dentists	1,266	307	959	3,789	447	3,342
Dental hygienists	372	318	54	4,267	4,267	—
Health educators	44	44	—	543	533	10
Others	1,453	1,279	174	2,393	2,393	—

Expenditures	Existing (1942)	Suggested (minimum)
Total	$77,262,600	$127,391,000
Per capita	0.61	0.97
Salaries	62,722,600	99,698,500
Other expenses	14,540,000	27,692,500

FT = full time. PT = part time.

The benchmarks offered in the Emerson report may not be applicable to modern public health practice due to several considerations. One is that the scope of local public health practice in the 1940s was more limited than it is today. Local public health practice at the time was organized around six basic services (vital records, sanitation, communicable disease control, maternal and child health, health education, and laboratory services). Also, Emerson envisioned a network of LHDs nationally, with each serving a minimum population of 50,000. Within this framework, Emerson compared the number of existing local public health workers with what he and the Committee on Administrative Practice determined would be necessary to offer the Basic Six Services nationwide. The benchmarks derived from this examination readily translate into public health worker/population ratios. For example, in 1942 there were 30 LHD workers (or about 24 FTEs) per 100,000. The Emerson report determined that 47 workers (or about 42 FTEs) per 100,000 were needed. Notably, public health nurses comprised almost 50 percent of the number of full-time LHD staff, whether existing or recommended, in Emerson's report.

The Emerson report identified several occupation-specific benchmarks:

- Public health nurses (1 per 5,000);
- Environmental health workers (1 per 25,000 population);
- Clerical staff (1 per 15,000); and
- Part-time clinicians, dentists, dental hygienists, lab workers, health educators, and others "required by local conditions."

Despite this early attempt at LHD staffing benchmarks, the spotlight on local public health practice dimmed after APHA began to focus on broader public health issues beginning in the 1950s and 1960s and the activities of CAP came to an end. In subsequent decades, the scope of local public health practice expanded to include the following:

- Analysis and recording of health data;
- Health education and information;
- Supervision and regulation of various activities;
- Provision of direct environmental health services;
- Administration of personal health services, including comprehensive primary care;
- Operation of health facilities;
- Area-wide planning and coordination, including assessing the adequacy of health services;
- Behavioral health, substance abuse, and mental health services;
- Injury and violence prevention; and
- Emergency preparedness and response.

Only since the 1988 IOM Report on the Future of Public Health has attention on the governmental public health practice at the local level resurfaced, and only in the past few years has this reemergence included LHD staffing benchmarks. Current standards of local public health practice reflect the IOM report's formulation of three core functions—assessment, policy development, and assurance—as operationalized through the essential public health services (EPHS) framework and several panels of practice performance standards. These include the local standards component of the National Public Health Performance Standards initiative, NACCHO's standards for the operational definition of a functional LHD, and the LHD accreditation standards soon to be finalized by the Public Health Accreditation Board. Together these frameworks and standards offer a common composite job description for LHDs.

Unfortunately this new job description cannot be translated into units of work that can be assigned to individual workers such that specific staffing patterns and benchmarks become true markers of effective local public health practice.

II. Dimensions of the Local Public Health Workforce

This section provides background information on the classification of occupations within the overall economy, with a special focus on occupations that characterize the local public health workforce. Sources of data on occupations and employment compiled by government agencies and professional organizations are identified, to be examined in subsequent sections as to their relevance for possible LHD staffing benchmarking applications.

More than half (57%) of the public health workers in the United States are classified as professionals, similar to the proportion of professionals among all 15 million health workers in the United States today. Workers in technical occupations (19%), administrators (5%), and administrative support staff (19%) comprise the remaining 43 percent of public health workers.[2] Registered nurses (RNs) continue to be the largest single professional category within the public health workforce. Environmental health workers in both professional and technical categories constitute another large subset of the public health workforce.

The Department of Labor compiles information on occupations throughout the economy, including the public sector. An official taxonomy for occupations allows the Department of Labor's Bureau of Labor Statistics (BLS) to track information on more than 800 standard occupational categories (SOCs) in over 1,000 industrial categories. BLS also develops projections for the number of future positions for these occupational categories based on economic and employment trends. Most SOCs are not specific to any single industry, making it difficult to pinpoint trends and needs specific to the public sector or governmental public health system. For

[2] Gebbie, K., Merrill, J., B'toush, R., Cortazal, M. et al. (2000). *The Public Health Workforce Enumeration 2000.* Washington, DC; Health Resources and Services Administration (HRSA), Bureau of Health Professions, National Center for Health Workforce Information and Analysis and Center for Health Policy.

example, registered nurses are the largest health-related occupational category employed in the overall economy (2.6 million workers), with most registered nurses working in the healthcare industry. Relatively few registered nurses work for government (considered a separate industry) and only a tiny percentage of all registered nurses (fewer than 50,000) work in governmental public health agencies at the local level. Physicians, health services administrators, health educators, nutritionists, and many other occupations demonstrate similar employment profiles. Government and its governmental public health agencies, however, are the largest employers of several public health-related SOCs, such as environmental health specialists and epidemiologists.

The North American Industry Classification System (NAICS) is the standard used by federal agencies in classifying business establishments for the purpose of collecting, analyzing, and publishing statistical data related to the national business economy. Section 92 of NAICS covers Public Administration and within Section 92, subsection 92312 covers public health programs. NAICS category 923120 (Administration of Public Health Programs) is the industry classification that comprises government establishments primarily engaged in the planning, administration, and coordination of public health programs and services, including environmental health activities, mental health, categorical health programs, health statistics, and immunization services. Government establishments primarily engaged in conducting public health-related inspections are also included in this category. Notably, this category does not include government or military hospitals, ambulatory healthcare services, or the inspection of food, plants, animals, and other agriculture products.

In addition, the BLS Occupational Employment Statistics (OES) system has developed an industry sector (Sector 99) specifically for federal, state, and local government with eight subcategories (see Table 2). OES data tracks the number of workers in each SOC for each of these industry subcategories.

Table 2. Governmental Industry Categories for which SOC Data are Available

Code	Level of Government
99000	Federal, State, and Local Government
99001	Public Sector (Federal, State, and Local Government, including schools and hospitals)
99100	Federal Government
99101	Federal Government, including U.S. Postal Service
99200	State Government
99201	State Government, including schools and hospitals
99300	Local Government
99301	Local Government, including schools and hospitals

Selected SOCs relevant for public health are identified in the first column of Table 3. These occupational categories do not encompass all positions found in public health organizations; nor do they capture the entire scope of work undertaken by public health workers. BLS OES surveys conducted annually provide estimates of the total number of employed workers in each SOC (column 2) and the number employed in each industry, including the various levels of government. Column 3 provides the number employed by federal, state, and local government (excluding schools and hospitals) for each of these SOCs, while column 4 indicates the number employed only by local government. For comparison purposes, estimates derived from NACCHO's 2008 Profile survey for the number of FTE workers in selected occupational categories are provided in column 5.

The measures included in Table 3 represent potential benchmarks for various components of the governmental public health workforce, including local public health. One such potential benchmark is the number or ratio of workers in a particular standard occupational category (such as RNs, epidemiologists, or health educators) who work for agencies of local government (column 4). The form of this benchmark could compare, for example, the LHD's ratio of epidemiologists (or any of the other occupational title) to population to the national average ratio of epidemiologists employed by local government to population. One limitation of such a general benchmark is that some occupational titles used by LHDs may also be used by other agencies of local government, such as mental health, substance abuse, emergency management, environmental protection, and emergency medical services agencies. Registered nurses, social workers, counselors, and health educators are examples of occupational titles likely to be used by multiple local agencies. On the other hand, some occupational titles, such as epidemiologists, environmental health specialists, and nutritionists, may be primarily used by the LHD.

Table 3 offers several findings of note that afford insights as to the possible use of OES data for LHD staffing benchmarks. These are apparent in some of the comparisons between the number of workers in selected SOCs employed by local government (column 4) and Profile survey data from 2008 (column 5). Notably, the estimates for several SOCs are quite close (<10% difference) for titles employed by local government that would be expected to be found mainly in the LHD as opposed to other agencies of local government. These estimates suggest that a benchmark derived from the national average ratio of workers per population may be feasible for several of these occupations, especially epidemiologists, environmental health specialists, nutritionists, and health administrators. Adjustments would likely be necessary for other occupations such as registered nurses and health educators.

Table 3. Selected Bureau of Labor Statistics Standard Occupational Categories Relevant for Local Public Health and NACCHO 2008 Profile Best Estimates for Selected Occupations

Standard Occupational Category	Total Number of Workers Employed in this SOC	Number Employed by Federal, State, and Local Govern-ment (99,000)	Number Employed by Local Govern-ment (99,300)	NACCHO 2008 Profile Best Estimate for All LHDs (FTEs)
Health services managers/administrators	271,710	23,820	9,130	9,500
Emergency management specialists	13,060	8,240	6,870	1,400
Statisticians	21,370	6,240	420	N/A
Environmental engineering technicians	20,630	3,420	2,280	N/A
Environmental engineers	50,610	14,540	4,190	N/A
Occupational health and safety specialists	51,850	19,530	7,060	N/A
Occupational health and safety technicians	10,070	2,700	1,800	N/A
Microbiologists	16,260	4,690	610	N/A
Epidemiologists	4,610	2,750	1,260	1,200
Environmental scientists and specialists, incl. health	83,530	37,010	11,200	12,000
Environmental science and protection technicians	30,870	11,570	6,800	N/A
Substance abuse and behavioral disorder counselors	78,470	10,100	6,360	N/A
Mental health counselors	106,920	12,940	9,360	N/A
Medical and public health social workers	133,510	16,570	9,660	N/A
Mental health and substance abuse social workers	127,140	17,310	12,860	N/A
Health educators	63,320	13,550	7,030	4,400
Public relations specialists	242,670	20,780	10,270	430
Dentists, general	86,270	1,980	620	N/A
Dieticians and nutritionists	53,220	8,630	4,050	4,300
Pharmacists	267,860	8,900	940	N/A
Physicians and surgeons	575,490	37,290	5,810	2,000
Registered nurses	2,583,770	149,610	45,940	33,000
Veterinarians	54,130	2,000	220	N/A
Medical and clinical laboratory technologists	166,860	7,350	890	N/A
Medical and clinical laboratory technicians	152,420	5,210	870	N/A
Licensed practical and vocational nurses	728,670	47,940	17,990	N/A

Note: NACCHO's 2008 Profile also provided FTE "best estimates" for other environmental health scientists (3,200) that may include the following: SOCs such as environmental engineers and occupational health and safety specialists; behavioral health professionals (7,100) that may include SOCs such as substance abuse and behavioral disorder counselors, mental health counselor, medical and public health social workers, and mental health and substance abuse social workers; information system specialists (430), and clerical staff (36,000).

An especially important resource for understanding key dimensions of the public health workforce is *The Public Health Workforce: Enumeration 2000*[3] commissioned by the Health Resources and Services Administration (HRSA). This enumeration collected information on workers of federal, state, and local public health agencies in the year 2000 based on existing data, reports, and surveys. This enumeration study focused on occupational titles commonly used by governmental public health agencies, many of which were not consistent with the BLS SOCs. As such, it is as much a qualitative and descriptive enumeration as a quantitative one.

The year 2000 public health workforce enumeration identified a total of 448,000 public health workers. Occupational categories could not be established for 112,000 public health workers, making it difficult to determine with any precision the actual number of workers in specific categories, such as public health nurses or epidemiologists. This study identified 152,500 local public health workers, but a disproportionate number of local public health workers lacked occupational information because many states were unable to report this information. This enumeration did not attempt to estimate state employees working in local health units of the state health agency, a number that could be in the 25,000–50,000 range.

The inattention paid to the public health workforce throughout the fourth quarter of the 20th century partly explains the dearth of information on the public health workforce prior to the 2000 enumeration report. One often cited reference placed the total number of public health workers in the United States at 500,000 in 1980. When compared with the 448,000 figure reported by the 2000 public health workforce enumeration study, it appears that the public health workforce shrank during the final two decades of the 20th century. Substantial differences in assumptions and methodologies between the 1980 and 2000 studies limit comparisons and provide little insight into actual public health workforce trends over these two decades. For example, the 1980 study provides absolutely no information on the number of public health workers at the local level. National public health organizations, however, continue to cite the 1980 study as evidence of a shrinking workforce and an impetus for renewed interest and increased resources for public health workforce development initiatives. Other sources argue that no such decline occurred and that the state and local public health workforce has actually grown faster than the overall population between 1980 and 2008, as illustrated in Figure 1. A longitudinal study of LHDs responding to both the 2005 and 2008 Profile surveys documented a 4.5 percent increase in FTE workers during this three-year period.[4] Notably, this trend reversed beginning in 2009 (see Figure 1).

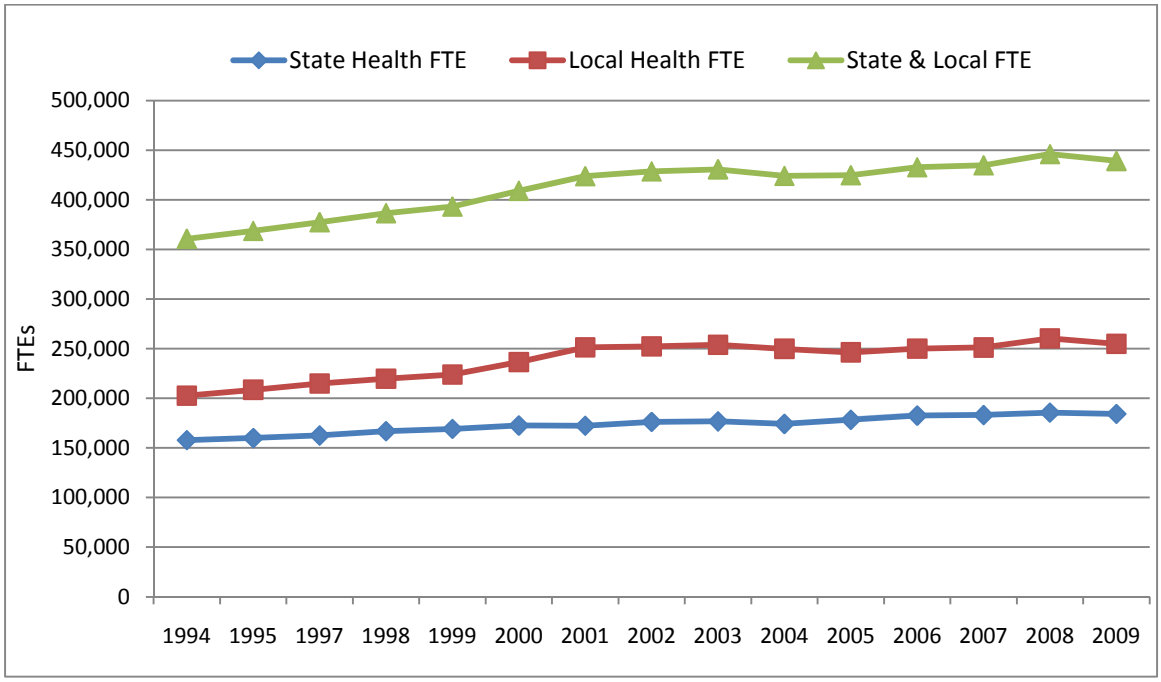
The source of the data in Figure 1 is the U.S. Census Bureau, which conducts government employment and payroll (GEP) surveys of federal, state, and local governmental agencies. Estimates of the number of FTE workers of health agencies of local government (Table 3, column 4) are derived from GEP data.[5] This category (health agencies of local government) includes LHDs captured in the Profile studies and other local governmental agencies providing emergency medical services, mental health, alcohol and drug abuse, outpatient clinics, visiting nurses, food and sanitary inspections, animal control and pollution control, and other environmental health activities.

[3] Gebbie, K., Merrill, J., B'toush, R., Cortazal, M. et al. (2000). *The Public Health Workforce Enumeration 2000.* Washington, DC; Health Resources and Services Administration (HRSA), Bureau of Health Professions, National Center for Health Workforce Information and Analysis and Center for Health Policy.

[4] National Association of County and City Health Officials. (2010). *The Local Health Department Workforce: Findings from the 2008 National Profile of Local Health Departments*. Washington, DC: NACCHO.

[5] U.S. Bureau of the Census, Federal, State, and Local Governments, Public Employment and Payroll Data. Available at www.census.gov/govs/apes/. Accessed February 8, 2011.

Figure 1. FTE Workers of State and Local Governmental Health* Agencies, 1994–2009, United States



*Health: public health services, emergency medical services, mental health, alcohol and drug abuse, outpatient clinics, visiting nurses, food and sanitary inspections, animal control, other environmental health activities (e.g., pollution control), etc.

Source: Data from U.S. Bureau of the Census, Federal, State, and Local Governments, Government Employment and Payroll Data. Available at www.census.gov/govs/apes/. Accessed March 13, 2011.

In 2009, FTE employees of local governmental health agencies numbered 255,000. GEP data are also available at the state level for health agencies of state government, local government, and state and local government combined. In some states, local public health services are provided by or through regional or district offices of the state health agency. In such cases, local public health workers may actually be employees of state government. The Association of State and Territorial Health Officials (ASTHO) reported that about 50,000 state health agency employees were deployed at the local or regional level in 2007.[6] Depending on the operational relationships existing among state and local public health agencies, either the number of FTE workers of health agencies of local government, or the total number of FTE workers of both state and local government could contribute to meaningful benchmarks.

Little guidance exists in published public health systems research as to the relationship between staffing levels and composition and other dimensions of LHD organizational practice. Using scaling techniques, Gerzoff and Baker identified two general patterns of LHD staffing that exist around a core set of employees.[7] One pattern focuses on clinical services, the other on more population-based programs. The core employees consist of dietitian/nutritionists, sanitarians/environmental specialists, administrators, lab specialists, and health educators. The clinical pattern adds physicians,

[6] Association of State and Territorial Health Officials. (2007). Profile of State Public Health, Volume One. Washington, DC: ASTHO. Available at www.astho.org/Display/AssetDisplay.aspx?id=4078. Accessed February 21, 2011.

[7] Gerzoff, R., and Baker, E. (1998). *The use of scaling techniques to analyze US local health department staffing structures, 1992–1993*. Proceedings of the Section on Government Statistics and Section on Social Statistics of the American Statistical Association.209–213.

nurses, and dental health workers. The population-based pattern includes epidemiologists, public health nurses, social workers, and program specialists. Associations between staffing and core function-related performance have not been identified. Logic suggests that staffing patterns will differ among similar sized LHDs that offer personnel-intensive services such as primary care and behavioral health services and those that do not. The lack of available evidence from public health systems research underscores the need to advance a research agenda that would inform efforts to develop public health workforce benchmarks.

III. Benchmarking Opportunities

Data and information available from federal agencies, especially the occupational employment statistics (OES) system from BLS and government employment census data from the U.S. Census Bureau, could be used for benchmarking purposes. For example, national-level data on the total number of epidemiologists employed by local government is readily available, allowing for the calculation of a national average of epidemiologists per 100,000. A similar benchmark could be calculated for RNs employed by local government. Data from the government employment census allows for the calculation of the number of FTE workers of health agencies of local government per 100,000. State-specific data from this same source would provide a state-specific ratio of FTE workers of health agencies of local government per 100,000. Table 4 demonstrates examples of LHD staffing benchmarks that could be derived from these sources and from the landmark reports generated by Emerson in 1945 and HRSA in 2000. Included is a benchmark advocated by the Association of State and Territorial Directors of Nursing (ASTDN) calling for a ratio of one public health nurse per 5,000,[8] virtually the same benchmark recommended in the Emerson report some 63 years earlier.

A significant limitation of the potential benchmarks identified in Table 4 is their congruence with and applicability for local public health practice. National or state averages may not be relevant to many LHDs due to the wide variation in size and structure apparent among LHDs in the United States. For example, consider the differences demonstrated among states in the ratio of FTE workers of health agencies of local government to population. Table 4 demonstrates an almost five-fold difference between Florida (37.86 per 100,000) and North Carolina (171.81 per 100,000). Florida's public health system differs from that of North Carolina in that many local health departments are units of the state health agency and these LHD employees are actually employed by state government. Considering FTE workers of health agencies of both state and local government together provides a somewhat different picture (Florida: 150.61 per 100,000; North Carolina: 226.92 per 100,000), narrowing the differential from 500 percent to about 50 percent. This smaller differential may be explained, in part, to different duties and services offered through state and local health departments in these two states. Differences in these states in the proportion of the population in urban versus rural settings, and the number and size of LHDs serving these populations may also influence these comparisons. The obvious implication is that some refinement and tailoring of the government employment census information will be needed for this source to be used for benchmarking applications that specify staffing levels for different types of LHDs. NACCHO's series of surveys profiling LHD structure and activities over the past 20 years represents a unique source of information that facilitates an understanding of the various influences on LHD staffing patterns and generate meaningful benchmarks.

Estimates derived from both NACCHO's 2005 and 2008 Profiles[9] pegged the number of LHD workers at about 155,000 FTEs. Both surveys also provided information on FTEs for a dozen or more common public health occupational

[8] Association of State and Territorial Directors of Nursing. (2008). Report on a Public Health Nurse to Population Ratio. Washington, DC: ASTDN.

[9] National Association of County and City Health Officials. (2006). *2005 National Profile of Local Health Departments*. Washington, DC: NACCHO. National Association of County and City Health Officials. (2009). *2008 National Profile of Local Health Departments*. Washington, DC: NACCHO.

titles in LHDs serving different population sizes. Tables 5 through 7 from the 2008 Profile study demonstrate the importance of jurisdiction size, documenting an increase in the number of staff and occupational titles employed as the size of the population served by the LHD increases. The variability within population size categories in Table 7 is noteworthy, however, with a three- to four-fold difference in the interquartile range (25th–75th percentiles) for virtually all population categories.

Table 4. Potential Local Public Health Workforce Benchmarks

Potential Benchmarks	Workers per 100,000 population	Population per Worker
Public Health Nurses		
LHD public health nurses—actual (Emerson 1942)	10.59	9,443
LHD public health nurses—needed (Emerson 1945)	19.58	5,107
Public health nurses—needed (ASTDN 2008)	20.00	5,000
LHD FTE registered nurses (NACCHO Profile Best Estimate 2008)	10.75	9,302
Registered nurses employed by local government (OES 2009)	14.97	6,680
Public Health Administrators		
LHD managers—actual (Emerson 1942)	4.88	20,492
LHD managers—needed (Emerson 1945)	1.53	65,359
LHD FTE managers (NACCHO Profile Best Estimate 2008)	3.09	32,362
Health services managers employed by local government (OES 2009)	2.97	33,670
Epidemiologists		
LHD FTE epidemiologists (NACCHO Profile Best Estimate 2008)	0.39	256,410
Epidemiologists employed by local government (OES 2009)	0.41	243,902
Environmental Health Workers		
LHD environmental health workers—actual (Emerson 1942)	4.08	24,510
LHD environmental health workers—needed (Emerson 1945)	4.31	23,202
LHD environmental health professionals—actual (Emerson 1942)	0.43	232,558
LHD environmental health professionals—needed (Emerson 1945)	1.41	70,921
LHD FTE environmental specialists (NACCHO Profile Best Estimate 2008)	3.91	25,575
Environmental specialists employed by local government (OES 2009)	3.65	27,397
Total Local Public Health Workers		
Local health department workforce—actual (Emerson 1942)	30.25	3,306
Local health department workforce—needed (Emerson 1945)	47.20	2,119
Local public health workforce (PH Enumeration 2000)	54.16	1,846
LHD FTE workers (NACCHO Profile Best Estimate 2008)	50.49	1,980
FTE workers of local government health agencies (GEP 2009)	82.73	1,209
Total State Public Health Workers (selected states)		
FTE workers of AL local government health agencies (GEP 2009)	115.61	865
FTE workers of FL local government health agencies (GEP 2009)	37.86	2,641
FTE workers of IL local government health agencies (GEP 2009)	63.18	1,583
FTE workers of MA local government health agencies (GEP 2009)	48.62	2,057
FTE workers of MD local government health agencies (GEP 2009)	86.19	1,160
FTE workers of MO local government health agencies (GEP 2009)	63.48	1,575
FTE workers of NC local government health agencies (GEP 2009)	171.81	582
FTE workers of OH local government health agencies (GEP 2009)	154.50	647
FTE workers of VA local government health agencies (GEP 2009)	67.13	1,490
FTE workers of WA local government health agencies (GEP 2009)	61.02	1,639
FTE workers of WI local government health agencies (GEP 2009)	112.33	891

Table 5. Percentage of LHDs with Employees in Selected Occupational Categories by Size of Population Served (Source: 2008 NACCHO Profile of LHDs)

		Population Served							
	All LHDs	<10,000	10,000–24,999	25,000–49,999	50,000–99,999	100,000–249,999	250,000–499,999	500,000–999,999	>999,999
Health Service Manager/Director	91%	79%	89%	94%	96%	97%	100%	97%	100%
Registered Nurse	94%	82%	94%	96%	97%	98%	100%	97%	100%
Physician	42%	15%	24%	41%	52%	69%	79%	85%	94%
Environmental Health (EH) Specialist	80%	54%	78%	86%	90%	92%	93%	88%	88%
Other EH Scientist/Technician	27%	7%	17%	24%	32%	41%	6%	69%	70%
Epidemiologist	23%	4%	7%	11%	19%	50%	78%	91%	100%
Health Educator	56%	25%	40%	57%	70%	78%	87%	96%	97%
Nutritionist	51%	15%	24%	41%	52%	69%	79%	85%	94%
Information Systems Specialist	24%	4%	9%	16%	24%	49%	69%	86%	88%
Public Information Specialist	19%	6%	7%	12%	20%	30%	50%	80%	88%
Emergency Preparedness Coordinator	57%	38%	43%	52%	66%	77%	94%	96%	100%
Behavioral Health Professional	33%	6%	22%	26%	47%	49%	68%	80%	71%
Administrative/Clerical	95%	85%	95%	97%	97%	100%	100%	100%	100%

Table 6. Median FTEs in Selected Occupational Categories Employed by LHDs by Size of Population Served (Source: 2008 NACCHO Profile of LHDs)

	Population Served							
	<10,000	10,000–24,999	25,000–49,999	50,000–99,999	100,000–249,999	250,000–499,999	500,000–999,999	>999,999
All LHD Staff	3	8	15	31	66	147	305	585
Health Service Manager/Director	1	1	1	1	4	7	12	18
Registered Nurse	1	3	5	8	14	25	52	86
Physician	0	0	0	0	1	1	1	7
Environmental Health (EH) Specialist	0	1	2	3	8	16	20	31
Other EH Scientist/Technician	0	0	0	0	0	1	3	6
Epidemiologist	0	0	0	0	0	1	2	5
Health Educator	0	0	1	1	1	4	5	9
Nutritionist	0	0	0	1	2	4	8	19
Information Systems Specialist	0	0	0	0	0	1	3	5
Public Information Specialist	0	0	0	0	0	0	1	1
Emergency Preparedness Coordinator	0	0	0	1	1	1	1	1
Behavioral Health Professional	0	0	0	0	0	3	8	11
Administrative/Clerical	1	2	4	7	16	31	67	136

Table 7. Percentiles for Number of Workers (FTEs) by Size of Population Served (Source: 2008 NACCHO Profile of LHDs)

	Population Served							
Percentile	All LHDs	<25,000	25,000–49,999	50,000–99,999	100,000–249,999	250,000–499,999	500,000–999,999	>999,999
90th	111	22	45	85	160	314	705	2,634
75th	43	12	27	55	108	200	500	1,221
50th (median)	15	6	15	32	66	147	305	584
25th	6	3	9	18	37	88	149	377
10th	2	1	6	10	19	45	58	224

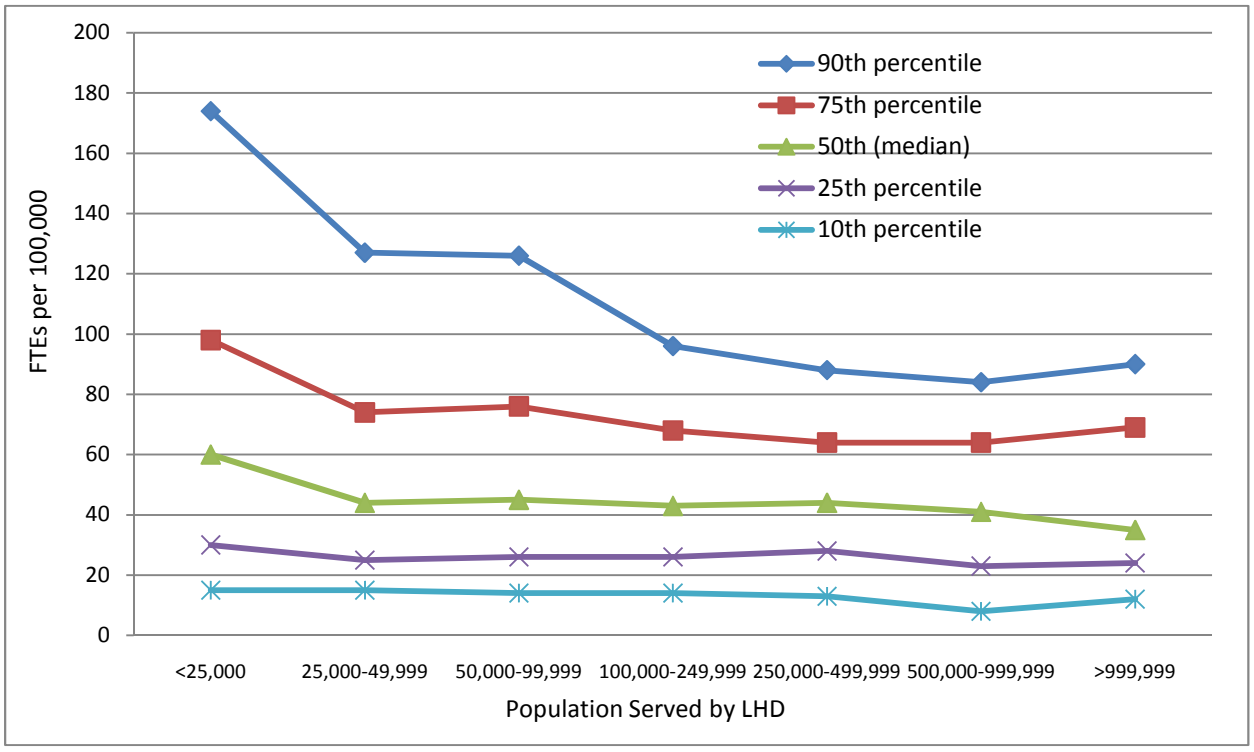
The influence of population size is also apparent in Table 8 and Figure 2, which track the median FTE worker/population ratio rather than the number of FTEs. Table 8 suggests that the ratio of total workers to population is fairly consistent (within 10%) for LHDs serving populations of between 25,000 and 1 million. LHDs serving populations under 25,000 have worker to population ratios about 35 percent greater than LHDs serving larger populations.

Figure 2 again shows considerable variability within the interquartile range for LHDs in each population size category, although the worker to population ratios for the 10th, 25th, 75th, and 90th percentiles are consistent across all population size categories. Despite this consistent pattern (except for LHDs serving populations under 25,000), the mix of occupational titles differs for LHDs serving different size populations. For example, the ratio of nurses, environmental health specialists, and emergency preparedness coordinators decreases with increasing population size. Some occupational titles, such as epidemiologists, information system specialists, public information officers, and behavioral health professionals, are found only in the largest LHDs. Larger LHDs appear to use a greater number of occupational titles, perhaps reducing the need to rely on professional occupations such as nurses and sanitarians. For LHDs serving smaller jurisdictions, available personnel are likely called upon for professional expertise in areas outside their occupational specialty. For example, a portion of a nurse's time may be devoted to activities that a health educator or epidemiologist or nutritionist would perform if one were employed by that agency. In effect, the delegation and deployment of work likely differs in LHDs that have only a few employees.

Table 8. Median FTE workers per 100,000 in Selected Occupational Categories Employed by LHDs by Size of Population Served (Source: 2008 NACCHO Profile of LHDs)

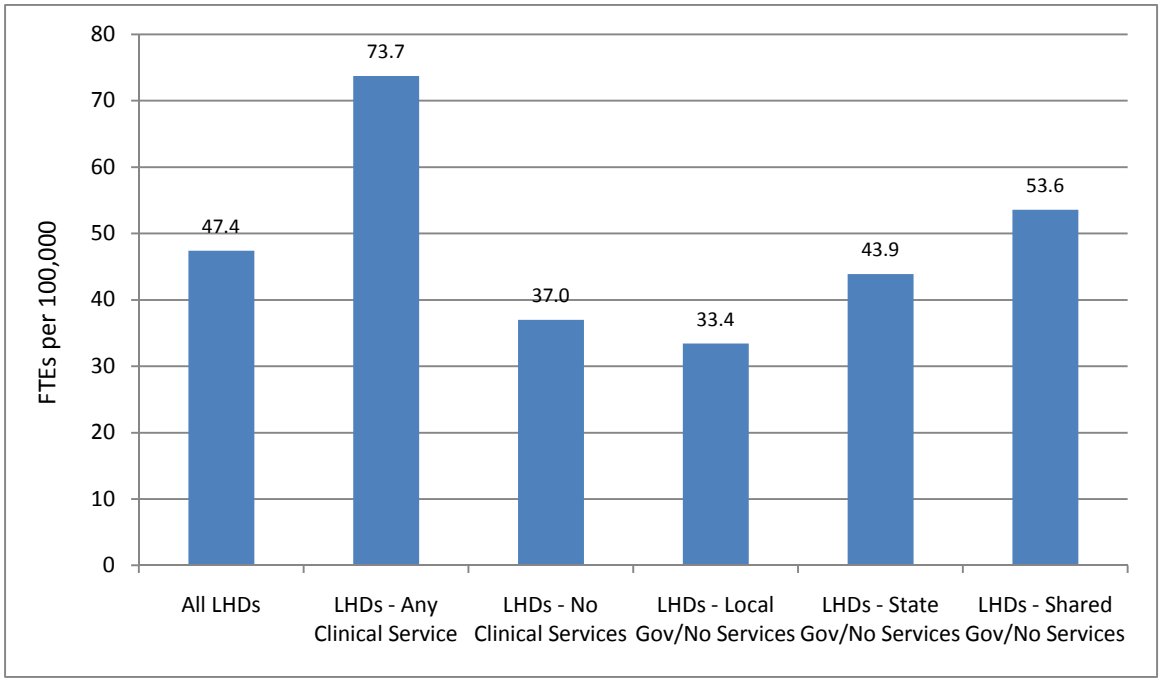
	Population Served						
Occupation	**<25,000**	**25,000–49,999**	**50,000–99,999**	**100,000–249,999**	**250,000–499,999**	**500,000–999,999**	**>999,999**
All LHD staff	59.81	43.81	44.54	43.43	43.52	41.49	34.98
Health service managers/directors	6.37	2.95	1.90	2.67	2.25	1.73	1.07
Registered nurses	19.21	13.26	12.00	9.48	7.78	7.53	5.07
Physicians	0.00	0.00	0.00	0.42	0.28	0.20	0.44
Environmental health (EH) specialists	4.59	4.50	4.67	4.82	4.39	2.99	2.29
Other EH scientists and technicians	0.00	0.00	0.00	0.00	0.34	0.38	0.56
Epidemiologists	0.00	0.00	0.00	0.00	0.33	0.25	0.29
Health educators	0.00	1.30	1.34	0.95	1.15	0.80	0.72
Nutritionists	0.00	0.00	1.27	1.50	1.18	1.30	1.15
Information systems specialists	0.00	0.00	0.00	0.00	0.35	0.51	0.28
Public information specialist	0.00	0.00	0.00	0.00	0.00	0.15	0.08
Behavioral health professional	0.00	0.00	0.00	0.00	0.72	1.33	0.75
Emergency preparedness coordinator	0.00	0.24	0.78	0.56	0.32	0.17	0.08
Clerical staff	16.67	11.42	9.72	10.67	8.61	9.19	8.35

Figure 2. Percentiles for Number of Workers (FTEs) per 100,000 by Size of Population Served (Source: 2008 NACCHO Profile of LHDs)



As important as population size may be, there are other LHD characteristics that may influence the number and types of workers needed. For example, although there are no standard performance expectations that are required for all LHDs, the Centers for Disease Control has promoted a national Public Health Performance Standards Program, NACCHO has developed standards for an Operational Definition of a Local Health Department, and the Public Health Accreditation Board is rolling out a national voluntary accreditation program for LHDs in late 2011. It is likely that LHDs perform at various levels relative to these standards and conceivable that these different performance profiles influence the number and types of staff employed. Ideally, LHD staffing benchmarks should characterize staffing patterns appropriate to meet current public health performance standards. This ideal, however, may prove difficult to achieve at least over the short term.

Figure 3. Median FTEs per 100,000 for LHDs with Selected Governance and Clinical Service Characteristics



An initial examination of median FTEs per 100,000 for selected LHD characteristics is provided in Figure 3. Two types of measures appeared to impact median FTEs per population: governance type and specific clinical services. In situations in which the LHD is a unit of the state health agency, or even when governance is shared between the state and local authorities, the LHD may take on expanded duties or roles that require staffing patterns that differ from LHDs governed only by local government. A significant proportion (27%) of LHDs falls into the state or shared governance category. Similarly, not all LHDs provide the same package of services in their jurisdictions. Only about one in 10 LHDs provides personal health services such as primary care, behavioral health, or substance abuse services and one in four provides home health services. The staffing pattern for LHDs that offer one or more of these services will likely differ from those that do not. Small LHDs are less likely than large LHDs to provide primary care and behavioral health services, but small LHDs are more likely to offer home health services. As a result, small LHDs would likely employ relatively fewer physicians and behavioral health professionals than larger LHDs. On the other hand, small LHDs that

provide home health services may well have higher ratios of total workers and nurses per 100,000 population than similar sized LHDs that do not provide this service. Table 9 illustrates considerable variability across population categories for the mix of characteristics discussed in this section. This may partly explain the variability noted within the various population categories.

Table 9. Percentages of LHDs with Selected Characteristics by Size of Population Served (Source: 2008 NACCHO Profile of LHDs)

	Population Served					
LHD Characteristic	**All LHDs**	**<25,000**	**25,000–49,999**	**50,000–99,999**	**100,000–499,999**	**>499,999**
Local Governance	73%	75%	73%	74%	69%	73%
Completed CHA in past three years	63%	53%	66%	67%	73%	80%
Completed CHIP in past three years	49%	43%	51%	53%	53%	60%
Provide Home Health Services	25%	28%	25%	26%	18%	11%
Provide Primary Care Services	11%	7%	9%	16%	16%	25%
Provide Mental/Behavioral Health Services	9%	5%	9%	12%	13%	27%
Provide Substance Abuse Services	7%	4%	7%	8%	9%	24%
Provide Laboratory Services	25%	16%	21%	24%	42%	64%

In addition to governance, services, and overall performance, extrinsic factors may impact LHD staffing patterns. As previously noted, FTE worker to population ratios are highest for the smallest LHDs and there is especially great variability within this group. This variability may in part be related to population density differences. An LHD serving a rural or frontier population of 5000 in a large geographic area with a low population density may well have different staffing needs than an LHD serving 5000 residents in small town or township setting. Yet another consideration may be population risk status. For LHDs serving similar sized populations, the staffing needs for an inner city LHD may differ from that of LHD serving an affluent suburban community. Little formal research has elucidated these relationships, although merging Profile data with other data sets may offer some initial insights.

Table 10 tracks median FTE workers per 100,000 for several of these potential influences based on 2008 Profile data.[10] This composite table demonstrates a consistent median worker to population ratio for LHDs in all size categories except the smallest (<25,000) and the largest (one million and over). It is possible that these extreme size categories are affected by somewhat different influences than the other categories. With 43 percent of LHDs serving populations under 25,000 (18% percent serve populations under 10,000), but only a few percent serving populations of one million or more, a better understanding of the influences on the smallest LHDs will be especially important for the development of staffing benchmark applications. Table 10 offers additional insights as to how LHD characteristics relate to LHD staffing for total workers as well as for specific occupations.

All LHD Staff

Both governance and clinical services emerge from the data in the All LHD Staff section of Table 12 as characteristics that likely influence the total FTEs employed by LHDs. The median total FTE worker to population ratios are higher for LHDs in the state and shared governance categories than for those in the local governance category. For each of the three governance

[10] The use of the median (50th percentile) in Table 10 is arbitrary and is intended to demonstrate the possible use of some agreed upon level in a benchmarking application. This benchmarking application could conceivably use a different level, such as the 60th or 75th percentile, that may be determined to be more appropriate for the objectives of the benchmarking application.

categories, LHDs that provide clinical services have higher FTE worker to population ratios than those that do not offer these services. Comparisons of LHDs providing a single clinical service (whether primary care, home health, or behavioral health) with all other LHDs also indicates that these services increase the median FTE to population ratios. Provision of either primary care or home health has a substantial impact on staffing for LHDs serving populations under 500,000. These findings suggest that governance and service profiles strongly influence LHD staffing and should be considered in benchmarking models.

On the other hand, controlling for services delivered and using completion of community health assessments (CHAs) and community health improvement plans (CHIPs) within the past three years as a proxy definition of high performing LHDs does not uncover differences in median FTE to population ratios, except for LHDs serving populations under 25,000. The comparison of non-clinical service providing LHDs that have completed community health assessments and community health highlights with those that have not also demonstrates lower median FTE worker to population ratios than for all LHDs. Additional influences, such as the degree of population density or population risk characteristics merit further investigation. A series of further analyses and research questions are identified in the recommendations section of this report.

Table 10. Median FTE Workers per 100,000 in Selected Occupations Employed by LHDs with Selected Service and Governance Characteristics by Size of Population Served (Source: 2008 NACCHO Profile of LHDs Dataset)

	Population Served						
Occupation	**<25,000**	**25,000–49,999**	**50,000–99,999**	**100,000–249,999**	**250,000–499,999**	**500,000–999,999**	**>999,999**
All LHD staff							
All LHDs (n=2205)	**59.81**	**43.81**	**44.54**	**43.43**	**43.52**	**41.49**	**34.98**
Local governance (n=1619)	49.65	38.74	42.43	42.72	35.61	38.62	42.97
State governance (n=374)	66.41	55.51	53.02	39.84	43.33	30.61	4.51
Shared governance (n=212)	72.96	99.16	65.24	78.51	59.64	59.75	37.92
No clinical services (n=1276)	43.97	35.67	32.32	35.90	32.24	24.18	25.57
CHA/CHIP completed (n=497)	58.15	39.26	26.69	36.46	32.77	22.79	24.53
CHS/CHIP not completed (n=719)	39.57	32.18	36.85	35.73	32.57	28.65	31.20
Local governance (n=1020)	36.91	31.13	29.98	35.29	27.99	28.09	26.91
State governance (n=139)	60.53	40.07	37.94	39.74	40.36	21.16	4.46
Shared governance (n=117)	62.68	52.43	40.38	34.93	51.53	29.68	34.68
Any clinical service (n=883)	97.53	67.82	73.04	65.91	60.97	56.55	58.02
Primary care only service – yes (n=145)	71.81	69.55	67.91	61.62	71.42	42.56	54.38
Primary care only service – no (n=2060)	58.15	41.90	42.46	42.21	39.97	39.90	34.68
Home health only service – yes (n=407)	96.77	66.76	82.06	61.55	60.97	53.61	*
Home health only service – no (n=1798)	51.21	41.32	40.69	41.63	39.92	41.40	34.98
MH &/or SA only service – yes (n=157)	90.71	51.22	49.10	54.41	39.97	55.17	35.26
MH &/or SA only service – no (n=2048)	59.26	42.74	44.53	42.21	43.60	37.29	34.98
Health service managers/directors							
All LHDs	6.37	2.95	1.90	2.67	2.25	1.73	1.07
No clinical services	5.89	2.91	1.83	2.47	1.69	1.26	0.65
CHA/CHIP completed	6.30	2.84	1.90	2.61	2.28	1.13	0.64
CHS/CHIP not completed	5.51	3.05	1.81	2.48	1.11	1.29	0.65
Local governance	6.11	2.90	1.88	2.67	1.36	1.34	0.71
State governance	3.87	2.81	1.73	1.65	1.69	0.58	0.13
Shared governance	5.32	3.23	1.07	1.87	2.98	1.20	0.81
Primary care only service	5.03	2.88	1.76	2.66	3.32	1.79	1.29
Home health only service	9.37	3.54	1.89	4.84	2.32	1.59	*
MH and/or SA only service	7.01	2.72	2.71	1.86	2.71	3.23	1.13

Occupation	Population Served						
	<25,000	25,000–49,999	50,000–99,999	100,000–249,999	250,000–499,999	500,000–999,999	>999,999
Registered nurses							
All LHDs	19.21	13.26	12.00	9.48	7.78	7.53	5.07
No clinical services	14.58	10.03	7.91	7.13	5.37	4.67	3.03
CHA/CHIP completed	18.08	10.83	8.25	8.08	5.24	4.62	3.18
CHS/CHIP not completed	12.96	8.67	7.76	6.39	5.51	5.24	2.54
Local governance	11.94	8.75	7.07	6.71	4.05	3.56	3.03
State governance	17.87	11.93	9.64	9.64	10.02	6.53	2.61
Shared governance	22.66	17.36	11.60	7.01	9.19	6.99	4.30
Primary care only service	22.82	17.97	16.92	12.01	14.16	8.28	7.33
Home health only service	34.84	23.33	20.67	16.31	9.63	12.51	*
MH and/or SA only service	18.07	16.33	10.81	9.53	8.47	9.96	8.46
Physicians							
All LHDs	0.00	0.00	0.00	0.42	0.28	0.20	0.44
No clinical services	0.00	0.00	0.00	0.24	0.22	0.15	0.24
CHA/CHIP completed	0.00	0.00	0.00	0.05	0.22	0.10	0.25
CHS/CHIP not completed	0.00	0.00	0.00	0.29	0.21	0.19	0.24
Local governance	0.00	0.00	0.00	0.26	0.18	0.16	0.26
State governance	0.00	0.00	0.00	0.45	0.33	0.12	0.02
Shared governance	0.00	0.09	0.00	0.00	0.74	0.11	0.37
Primary care only service	2.76	2.07	1.48	1.31	1.01	0.73	1.19
Home health only service	0.00	0.00	0.00	0.00	0.17	0.25	*
MH and/or SA only service	0.00	0.00	0.18	0.55	0.28	0.26	0.67
EH specialists							
All LHDs	4.59	4.50	4.67	4.82	4.39	2.99	2.29
No clinical services	4.57	4.18	4.62	4.80	3.46	1.87	0.87
CHA/CHIP completed	5.08	4.00	4.07	4.74	3.19	1.54	0.56
CHS/CHIP not completed	4.24	4.05	4.68	5.04	3.91	1.87	2.81
Local governance	4.29	4.35	4.83	4.81	2.94	1.74	2.47
State governance	1.78	2.25	1.89	4.48	4.87	2.34	0.12
Shared governance	6.20	6.10	4.89	4.82	2.60	3.78	0.39
Primary care only service	4.95	4.48	4.87	3.50	5.86	3.94	^
Home health only service	4.44	4.55	4.52	5.96	6.33	4.39	*
MH and/or SA only service	4.73	3.15	5.24	5.68	5.76	3.75	2.92
Other EH scientists/technicians							
All LHDs	0.00	0.00	0.00	0.00	0.34	0.38	0.56
No clinical services	0.00	0.00	0.00	0.00	0.34	0.32	0.18
CHA/CHIP completed	0.00	0.00	0.00	0.00	0.54	0.48	0.06
CHS/CHIP not completed	0.00	0.00	0.00	0.00	0.09	0.00	0.56
Local governance	0.00	0.00	0.00	0.00	0.35	0.34	0.56
State governance	0.00	0.00	0.00	0.00	0.28	0.00	0.00
Shared governance	0.00	0.00	0.00	0.00	0.37	1.58	3.41
Primary care only service	0.00	0.00	0.00	0.44	0.62	0.29	0.19
Home health only service	0.00	0.00	0.00	0.00	0.00	1.55	*
MH and/or SA only service	0.00	0.00	0.00	0.00	0.27	0.76	0.49
Epidemiologists							
All LHDs	0.00	0.00	0.00	0.00	0.33	0.25	0.29
No clinical services	0.00	0.00	0.00	0.24	0.34	0.21	0.29
CHA/CHIP completed	0.00	0.00	0.00	0.40	0.36	0.20	0.28
CHS/CHIP not completed	0.00	0.00	0.00	0.00	0.29	0.21	0.30
Local governance	0.00	0.00	0.00	0.00	0.35	0.23	0.31
State governance	0.00	0.00	0.00	0.54	0.29	0.15	0.06
Shared governance	0.00	0.00	0.00	0.00	0.35	0.52	1.91
Primary care only service	0.00	0.00	0.00	0.00	0.30	0.29	0.14
Home health only service	0.00	0.00	0.00	0.00	0.21	0.28	*
MH and/or SA only service	0.00	0.00	0.00	0.29	0.55	0.50	0.19

Health educators							
All LHDs	0.00	1.30	1.34	0.95	1.15	0.80	0.72
No clinical services	0.00	0.73	1.09	0.94	1.03	0.58	0.43
CHA/CHIP completed	0.00	1.99	1.50	1.04	1.14	0.47	0.33
CHS/CHIP not completed	0.00	0.00	0.85	0.63	0.62	0.79	0.47
Local governance	0.00	0.36	1.20	1.04	1.06	0.79	0.52
State governance	1.72	1.85	0.00	0.58	0.29	0.26	0.06
Shared governance	0.00	0.00	0.00	0.00	1.22	0.69	0.66
Primary care only service	3.72	2.75	2.02	1.11	2.18	0.50	1.90
Home health only service	0.00	0.00	1.22	0.96	2.10	0.75	*
MH and/or SA only service	2.19	2.00	1.41	0.84	1.18	1.32	0.88
Nutritionists							
All LHDs	0.00	0.00	1.27	1.50	1.18	1.30	1.15
No clinical services	0.00	0.00	0.42	1.41	1.14	0.73	1.09
CHA/CHIP completed	000	0.68	1.04	1.15	1.16	0.52	0.74
CHS/CHIP not completed	0.00	0.00	0.00	1.51	1.26	1.36	1.41
Local governance	0.00	0.00	0.00	1.03	0.41	0.55	1.41
State governance	0.82	2.79	1.67	1.76	1.14	0.89	0.00
Shared governance	0.00	0.00	2.45	1.65	2.79	2.20	1.29
Primary care only service	0.00	2.89	1.79	1.61	1.54	2.25	1.86
Home health only service	0.00	0.00	1.78	1.90	1.96	1.35	*
MH and/or SA only service	1.18	1.03	0.50	0.94	0.95	0.94	1.11
Information systems specialists							
All LHDs	0.00	0.00	0.00	0.00	0.35	0.51	0.28
No clinical services	0.00	0.00	0.00	0.00	0.26	0.25	0.12
CHA/CHIP completed	0.00	0.00	0.00	0.00	0.36	0.35	0.09
CHS/CHIP not completed	0.00	0.00	0.00	0.00	0.24	0.19	0.16
Local governance	0.00	0.00	0.00	0.00	0.10	0.31	0.16
State governance	0.00	0.00	0.00	0.00	0.24	0.17	0.06
Shared governance	0.00	0.00	0.00	0.76	1.04	0.79	0.66
Primary care only service	0.00	0.00	0.00	0.66	0.61	1.01	^
Home health only service	0.00	0.00	0.00	0.00	0.84	0.64	*
MH and/or SA only service	0.00	0.00	0.00	0.00	0.36	0.67	0.72
Public information specialists							
All LHDs	0.00	0.00	0.00	0.00	0.00	0.15	0.08
No clinical services	0.00	0.00	0.00	0.00	0.00	0.13	0.07
CHA/CHIP completed	0.00	0.00	0.00	0.00	0.03	0.15	0.05
CHS/CHIP not completed	0.00	0.00	0.00	0.00	0.00	0.13	0.09
Local governance	0.00	0.00	0.00	0.00	0.03	0.16	0.08
State governance	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Shared governance	0.00	0.00	0.00	0.00	0.30	0.16	0.10
Primary care only service	0.00	0.00	0.00	0.00	0.24	0.14	0.01
Home health only service	0.00	0.00	0.00	0.00	0.00	0.16	*
MH and/or SA only service	0.00	0.00	0.00	0.00	0.21	0.17	0.08
Behavioral health professionals							
All LHDs	0.00	0.00	0.00	0.00	0.72	1.33	0.75
No clinical services	0.00	0.00	0.00	0.00	0.00	0.28	0.11
CHA/CHIP completed	0.00	0.00	0.00	0.00	0.36	0.29	0.09
CHS/CHIP not completed	0.00	0.00	0.00	0.00	0.00	0.17	0.75
Local governance	0.00	0.00	0.00	0.00	0.00	0.28	0.32
State governance	0.00	0.00	0.00	0.00	0.89	0.17	0.00
Shared governance	0.00	0.00	0.00	0.00	2.08	0.32	3.49
Primary care only service	0.00	0.00	2.11	0.74	1.96	0.90	1.29
Home health only service	0.00	0.00	1.37	0.89	1.92	2.42	*
MH and/or SA only service	3.65	2.50	1.81	1.95	1.50	3.80	3.97
Emergency preparedness coordinators							
All LHDs	0.00	0.24	0.78	0.56	0.32	0.17	0.08
No clinical services	0.00	0.00	0.72	0.54	0.33	0.16	0.08
CHA/CHIP completed	0.00	0.00	0.81	0.58	0.32	0.16	0.07
CHS/CHIP not completed	0.00	0.71	0.68	0.52	0.31	0.16	0.09
Local governance	0.00	0.61	0.75	0.54	0.35	0.17	0.11

State governance	0.00	0.00	0.00	0.57	0.29	0.16	0.06
Shared governance	0.00	0.37	0.13	0.00	0.35	0.16	0.17
Primary care only service	0.00	0.00	1.03	0.66	0.30	0.19	0.14
Home health only service	0.00	0.90	0.95	0.58	0.36	0.20	*
MH and/or SA only service	1.54	0.00	0.66	0.46	0.34	0.17	0.28
Clerical staff							
All LHDs	16.67	11.42	9.72	10.67	8.61	9.19	8.35
No clinical services	12.41	8.81	6.46	8.54	6.48	5.60	6.98
CHA/CHIP completed	15.13	9.68	6.70	8.99	6.85	2.44	6.30
CHS/CHIP not completed	10.18	7.99	5.45	8.39	6.32	6.86	7.30
Local governance	8.94	7.98	5.82	7.30	4.68	5.28	7.30
State governance	19.77	11.27	9.08	12.85	9.82	6.27	1.08
Shared governance	22.85	20.45	15.66	13.15	17.51	16.92	12.30
Primary care only service	24.22	17.66	17.35	15.38	18.07	17.83	5.28
Home health only service	21.42	15.00	16.72	13.84	13.83	14.90	*
MH and/or SA only service	21.27	14.23	8.24	13.57	9.62	10.60	11.71

Notes: * = no LHDs serving populations >999,999 provided home health as only clinical service; ^ data not available

Key Occupations

Profile data allow for analysis of 13 occupations commonly employed by LHDs. Table 10 includes a section for each of these occupations. Data as to median FTE workers per 100,000 (worker to population ratios) are provided for each occupation further categorized by size of population served and LHD governance and service profiles.

Health service managers/directors: The median FTE worker to population ratio declines as the size of the population served increases. This is consistent with administrative practice in both the public and private sectors. As the size of an organization's workforce increases, the proportion of administrative staff or overhead generally declines. The provision of clinical services appears to have only a modest impact on the need for additional managers across the various population categories. LHDs providing only home health services have a notably higher manager to population ratio for LHDs in the under 50,000 population categories. The manager to population ratio is also somewhat lower for state governed LHDs. Overall the factors that influence total LHD staffing appear to have only a slight influence on managers and directors.

Registered nurses: As the largest category of professional staff, influences on nurse to population ratios are especially important for local public health practice. The nurse to population ratio declines substantially and steadily as the size of the population served increases. This occurs for LHDs that do not offer clinical services and those that do. As would be expected, clinical services have a substantial impact on nurse to population ratios, more than doubling the nurse to population ratio in virtually all population categories. Notably, among LHDs that do not provide clinical services, locally governed LHDs employ fewer nurses than LHDs in the state or shared governance categories. Overall, the presence or absence of specific clinical services has a substantial impact on the size of LHD nursing staffs, often increasing the nurse to population ratio by 5–20 per 100,000.

Physicians: In comparison to nurses, few physicians are employed by LHDs. Physicians are generally not found in LHDs serving populations under 100,000 unless primary care services are provided. LHDs in the state and shared governance categories employ more physicians than LHDs that are locally governed. Physician presence in an LHD appears to be very much related to primary care. For LHDs not providing clinical services the physician to population ratio is steady for LHDs serving 100,000 people or more.

Environmental health specialists (sanitarians) and other environmental health scientists and technicians: The environmental health specialist to population ratio is consistent for small and medium-sized LHDs serving populations under 500,000. There is little difference in the environmental health specialist to population ratio between LHDs providing clinical services and those that do not. Smaller LHDs in the shared governance category that do not provide

clinical services and some LHDs providing clinical services have higher environmental health specialist to population ratios for unknown reasons. On the other hand, state-governed LHDs appear to have fewer environmental health specialists. The differences noted across these categories may require modest adjustment in a benchmarking process. The category for other environmental health scientists and technicians shows no clear pattern and actually has very few workers, indicating this category may not require any adjustments in a benchmarking activity.

Epidemiologists: Although an important public health professional category, epidemiologists are scarce in LHDs serving populations under 250,000. There is a consistent ratio of epidemiologists to population in the larger LHD categories. LHDs in the shared governance category have higher ratios while state governed LHDs have lower ratios.

Health Educators: Except for LHDs serving populations less than 25,000, health educators are found in all LHD size categories with a declining ratio of health educators to population noted as population size increases. LHDs that are locally governed have somewhat higher ratios, although the highest ratios are noted for LHDs providing primary care and mental health/substance abuse services. Health educator to population ratios are low for LHDs in the state or shared governance categories. The differences across categories suggest that modest adjustments may be needed for health educators in a benchmarking activity.

Nutritionists: A reasonably steady ratio of nutritionists to population is noted for LHDs in the 50,000 to one million or more categories, somewhat higher for LHDs in the state and shared governance categories, and for larger LHDs offering primary care. The differences indicate that some adjustments may be necessary in a benchmarking activity.

Information System Specialists and Public Information Specialists: Neither of these occupations is found in smaller LHDs. Information system specialists are not found in LHDs serving populations under 250,000 and public information specialists are rare in LHDs serving populations under 500,000. Small numbers and no apparent relationship to governance or services suggest these occupations require little consideration in adjustments for a benchmarking activity.

Behavioral Health Professionals: An emerging component of the LHD workforce, behavioral health professionals are scarce in LHDs serving populations under 250,000 unless mental health/substance abuse services are offered. The behavioral health professional to population ratio is highly related to the provision of these services and to the provision of primary care and home health. The differences across categories suggest that adjustments for this occupation may be important in a benchmarking application.

Emergency Preparedness Coordinators: Similar to the pattern for managers, the ratio of emergency preparedness coordinators to population steadily declines for LHD population categories at the 50,000 level and above. The highest ratios are noted for LHDs providing clinical services; the lowest for LHDs in the shared and state governed categories. Minimal differences across categories suggest that adjustments for this occupation may also be minimal.

Clerical Staff: Along with nurses, the occupational grouping for clerical staff has the highest worker to population ratios for LHDs of all sizes. As with managers and emergency preparedness coordinators, the clerical worker to population ratio steadily declines from the smallest through the largest LHD population categories. The highest ratios are found where clinical services, especially primary care services, are offered. The lowest ratios are noted for locally governed LHDs that provide no clinical services. Significant differences suggest that adjustments for this occupation may be necessary in a benchmarking model.

These findings suggest that one possible approach would be to develop LHD staffing benchmarks based initially on values (median FTEs/100,000) for LHDs in the appropriate three governance category (local, state, shared) that offer no clinical services. These values (median FTEs/100,000) for all workers and each occupational category would then be adjusted based on which clinical services (home health, primary care, behavioral health) are provided.

The adjustment for each clinical service is the difference between the values for LHDs in the population/governance subcategory that provide a specific service and LHDs in the same subcategory not providing any clinical services. In effect, the values for a reference group are adjusted based on the additional staffing necessary to provide specific services such as home health, primary care, or behavioral health services. Table 11 illustrates this adjustment process for a locally governed LHD serving a population of 38,000 and providing home health (but not primary care or behavioral health services). Additional illustrations of this benchmarking application for small, mid-sized, and large LHDs using different governance and service package combinations are provided in the Appendix.

One potential limitation of this strategy is the small number of LHDs in the larger population size categories for LHDs that are either state or shared governed and provide no clinical services. For example, for the 250,000–499,999 category, there are only 10 state-governed LHDs and eight that have shared governance. For the 500,000–999,999 category, only six are state governed and two have shared governance. For LHDs serving populations of one million or more, four are state governed and only one has shared governance. The usefulness of this benchmarking strategy may be limited in these instances. Fortunately, only two percent of all LHDs serve populations greater than 250,000 and have either state or shared governance.

Table 11. Staffing Benchmark Illustration for Locally Governed LHD "X" Serving Population of 38,000; Scenario 2: LHD "X" Provides Home Health Services

Occupation	Reference Group* Median FTEs per 100,000	Home Health Adjustment (FTEs per 100,000)	Adjusted FTEs per 100,000	Benchmark FTEs
Health service managers/directors	2.90	0.63	3.53	1.34
Registered nurses	8.75	13.30	22.05	8.38
Physicians	0.00	0.00	0.00	0.00
Environmental health (EH) specialists	4.35	0.00	4.35	1.65
Other EH scientists/technicians	0.00	0.00	0.00	0.00
Epidemiologists	0.00	0.00	0.00	0.00
Health educators	0.36	0.00	0.36	0.14
Nutritionists	0.00	0.00	0.00	0.00
Information systems specialists	0.00	0.00	0.00	0.00
Public information specialists	0.00	0.00	0.00	0.00
Behavioral health professionals	0.00	0.00	0.00	0.00
Emergency preparedness coordinators	0.61	0.90	1.51	0.57
Clerical staff	7.98	6.19	14.17	5.39
Staff in these 13 occupations	**24.94**	**21.02**	**45.96**	**17.47**
All LHD staff	**31.13**	**31.09**	**62.22**	**23.64**

*Reference Group = LHDs with local governance serving populations between 25,000 and 49,999; n=226

Tables 12, 13, and 14 further demonstrate how this approach establishes LHD staffing benchmarks for three hypothetical LHDs with five different service package scenarios examined for each: (1) providing no clinical services; (2) providing only home health services; (3) providing only primary care services; (4) providing home health and primary care services; and (5) providing home health, primary care, and behavioral health services. A locally governed small LHD serving a population of 38,000 is examined in Table 12. Table 13 provides similar information for a state-governed mid-size LHD serving a population of 175,000, and Table 14 examines a large LHD with shared governance serving a population of 750,000. Adjustments to the table for specific occupations are derived from the difference between the median FTE workers to population ratio for LHDs providing a specific service minus the ratio for LHDs not providing any clinical services. This approach demonstrates that much of the difference in staffing size and configuration is due to the provision of specific services and involves relatively few occupational categories. All data used in these scenarios are derived from Table 10. The calculations summarized in Tables 12 through 14 are available in Appendix tables.

Table 12. Staffing Benchmark Illustration for Local Governance LHD "X" Serving Population of 38,000; Comparison of FTE Workers in Selected Occupations for Five Service Scenarios

Occupation	Scenario 1: No Clinical Services	Scenario 2: Home Health Only	Scenario 3: Primary Care Only	Scenario 4: Home Health and Primary Care	Scenario 5: Home Health, Primary Care, and Behavioral Health
Health service managers/directors	1.10	1.34	1.10	1.34	1.34
Registered nurses	3.32	8.38	6.34	11.40	13.79
Physicians	0.00	0.00	0.79	0.79	0.79
Environmental health (EH) specialists	1.65	1.65	1.65	1.65	1.65
Other EH scientists/technicians	0.00	0.00	0.00	0.00	0.00
Epidemiologists	0.00	0.00	0.00	0.00	0.00
Health educators	0.14	0.14	0.90	0.90	1.39
Nutritionists	0.00	0.00	1.10	1.10	1.49
Information systems specialists	0.00	0.00	0.00	0.00	0.00
Public information specialists	0.00	0.00	0.00	0.00	0.00
Behavioral health professionals	0.00	0.00	0.00	0.95	0.95
Emergency preparedness coordinators	0.23	0.57	0.23	0.57	0.57
Clerical staff	3.03	5.39	6.40	8.75	10.81
Staff in these 13 occupations	**9.48**	**17.47**	**18.51**	**26.50**	**32.78**
All LHD staff	**11.83**	**23.64**	**24.70**	**36.52**	**42.43**

This benchmarking illustration results in different staffing levels and patterns for these three hypothetical LHDs across these five scenarios. For small LHDs (Table 12), registered nurses and clerical staff are the largest occupational categories in all five service scenarios and the categories most affected by different service package options. Provision of home health services has an especially large impact on the number of nursing positions in an LHD. The number of FTEs employed in the 13 categories doubles if one clinical service is offered and more than triples when all three clinical services are provided. The numbers of health educators, nutritionists, and behavioral health professionals are only modestly affected. As would be expected, the need for managers, environmental health specialists, and emergency preparedness coordinators is not greatly affected by the different service scenarios. Behavioral health professionals are added only when behavioral services are offered in the LHD's jurisdiction. Physicians are hired only when primary care services are offered. Small LHDs seldom employ epidemiologists.

Table 13. Staffing Benchmark Illustration for State Governance LHD "X" Serving Population of 175,000; Comparison of FTE Workers in Selected Occupations for 5 Service Scenarios

Occupation	Scenario 1: No Clinical Services	Scenario 2: Home Health Only	Scenario 3: Primary Care Only	Scenario 4: Home Health and Primary Care	Scenario 5: Home Health, Primary Care, and Behavioral Health
Health service managers/directors	2.89	7.04	3.22	7.37	7.37
Registered nurses	16.87	32.94	25.41	41.48	45.68
Physicians	0.79	0.79	2.66	2.66	3.22
Environmental health (EH) specialists	7.84	9.87	7.84	9.87	11.41
Other EH scientists/technicians	0.00	0.00	0.77	0.77	0.77
Epidemiologists	0.95	0.95	0.95	0.95	1.03
Health educators	1.02	1.05	1.31	1.35	1.35
Nutritionists	3.08	3.97	3.43	4.32	4.32
Information systems specialists	0.00	0.00	1.16	1.16	1.16
Public information specialists	0.00	0.00	0.00	0.00	0.00
Behavioral health professionals	0.00	1.56	1.30	2.85	6.27
Emergency preparedness coordinators	1.00	1.07	1.21	1.28	1.28
Clerical staff	22.49	31.76	34.46	43.73	52.54
Staff in these 13 occupations	**56.91**	**90.98**	**83.70**	**117.78**	**136.36**
All LHD staff	**69.55**	**114.43**	**114.56**	**159.44**	**191.84**

A similar pattern is evident for the hypothetical mid-sized LHD as demonstrated in Table 13. Registered nurses and clerical staff are the primary categories that are affected by different service scenarios. The number of FTE nurses again doubles if one service is offered and nearly triples when all three are provided. The provision of clinical services only slightly increases the number of nutritionists and health educators employed by the LHD. The need for managers increases especially when two or more services are provided. The various service scenarios do not affect the number of epidemiologists, environmental health specialists, or emergency preparedness coordinators but do impact the need for information system specialists and behavioral health professionals. In terms of all workers in these 13 occupational categories, offering one service increases FTE workers by about 50 percent and offering two or three services results in a doubling of FTEs.

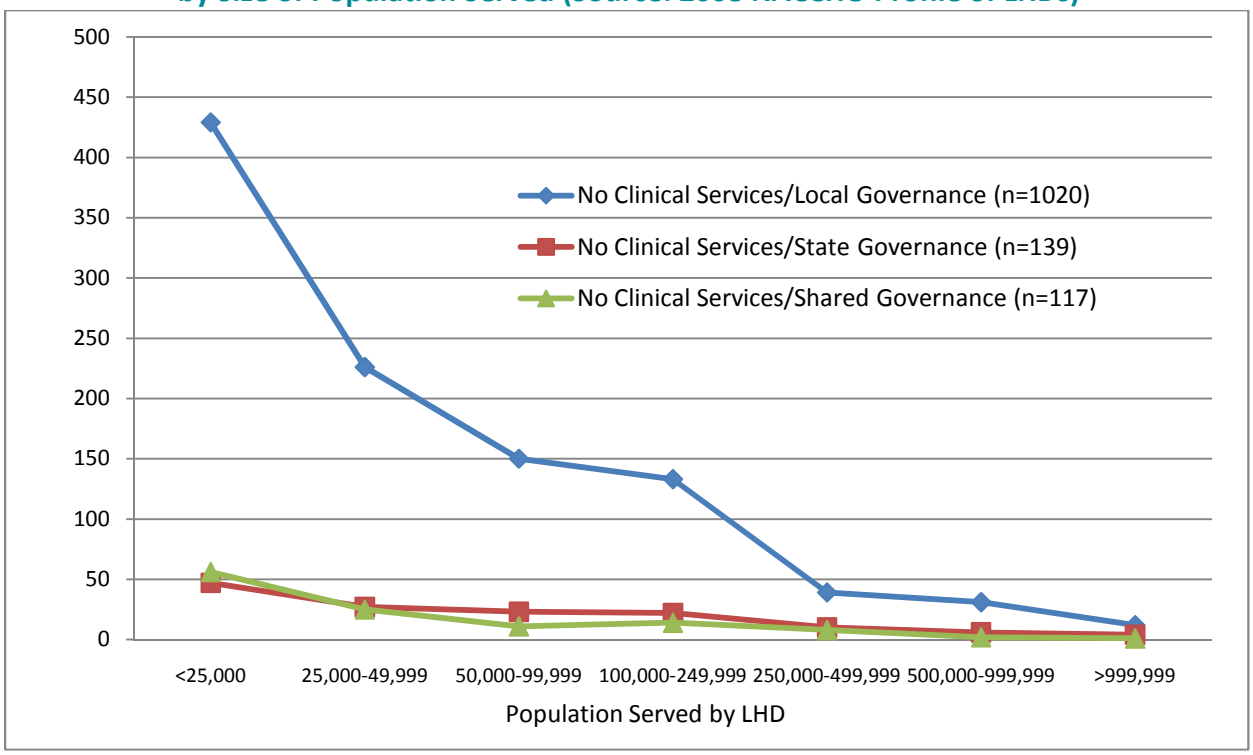
Table 14. Staffing Benchmark Illustration for Shared Governance LHD "X" Serving Population of 750,000; Comparison of FTE Workers in Selected Occupations for Five Service Scenarios

Occupation	Scenario 1: No Clinical Services	Scenario 2: Home Health Only	Scenario 3: Primary Care Only	Scenario 4: Home Health and Primary Care	Scenario 5: Home Health, Primary Care, and Behavioral Health
Health service managers/directors	9.00	11.48	12.83	15.30	30.08
Registered nurses	52.43	111.23	79.50	138.30	177.98
Physicians	0.83	1.58	5.18	5.93	6.75
Environmental health (EH) specialists	28.35	47.25	43.88	62.78	76.88
Other EH scientists/technicians	11.85	22.08	11.85	21.08	24.38
Epidemiologists	3.90	4.43	4.50	5.03	7.20
Health educators	5.18	6.45	5.18	6.45	12.75
Nutritionists	16.50	21.15	27.90	32.55	34.13
Information systems specialists	5.93	8.85	11.63	14.55	17.70
Public information specialists	1.20	1.43	1.28	1.50	1,80
Behavioral health professionals	2.40	19.50	4.70	23.25	50.25
Emergency preparedness coordinators	1.20	1.50	1.43	1.73	1.80
Clerical staff	126.90	189.15	218.63	280.88	318.38
Staff in these 13 occupations	**265.67**	**444.00**	**430.80**	**609.15**	**760.05**
All LHD staff	**222.60**	**443.33**	**360.45**	**561.18**	**813.60**

Many of the trends identified for the hypothetical mid-sized LHD are even more pronounced for the hypothetical large LHD examined in Table 14. The number of clinical services offered by the LHD results in a doubling and tripling the FTE workers in the registered nurse and clerical staff categories. When clinical services are provided, the number of FTES for virtually all other categories also increases. The number of FTEs in these 13 categories for large LHDs offering all three clinical services is nearly three times the number needed by LHDs that provide no clinical services. The discrepancy between the number of all LHD staff and the staff in the 13 occupations is likely due to the small number of LHDs (n=2) in this reference group. Notably, several other reference groups are also subject to this small number problem. These are the larger population categories for the state and shared governance groups.

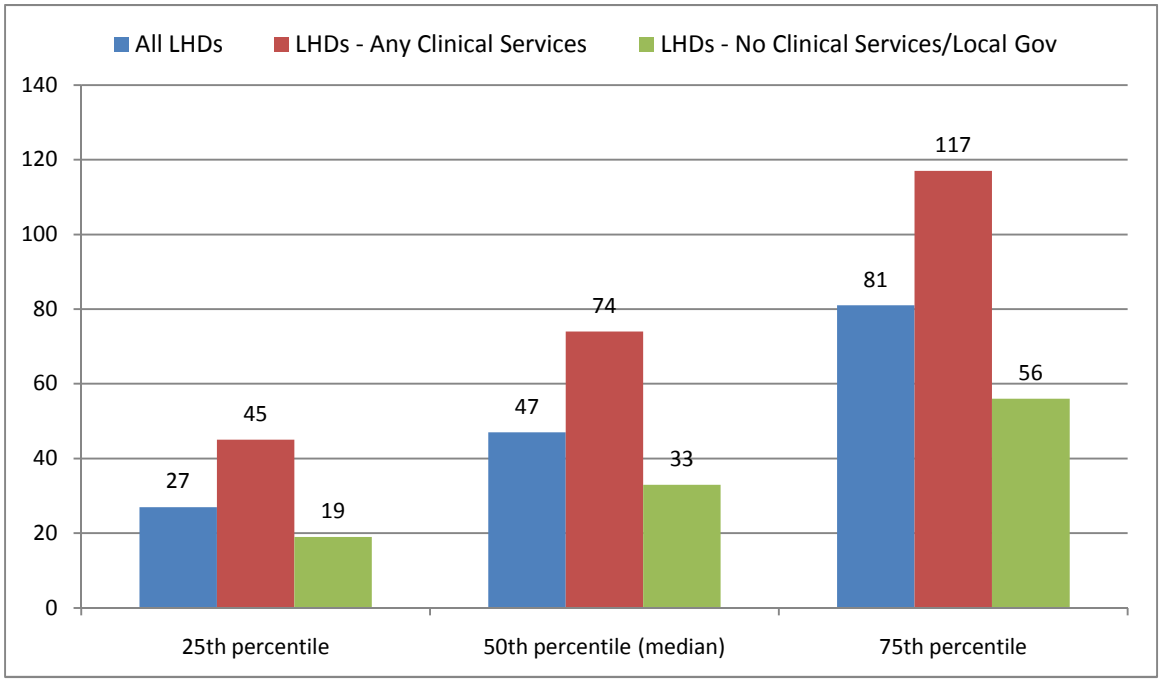
Figure 4 illustrates the considerable differences in the size of the reference groups should this benchmarking application use standard population categories. Reference groups would include 10 or fewer LHDs for state governed and shared governance LHDs serving populations above 250,000. Only 2.8 percent of LHDs responding to the 2008 Profile survey had this combination of population, governance, and clinical service characteristics. Instead of using specific population categories (such as the seven categories used throughout this report), it may be desirable to use equal intervals, such as deciles, in developing reference groups for this benchmarking application.

Figure 4. Number of LHDs in Benchmarking Application Reference Group by Size of Population Served (Source: 2008 NACCHO Profile of LHDs)



These examples demonstrate that some of the variability among LHDs in FTEs per 100,000 is related to governance type and clinical service profile. Figure 5 provides information on the 25th and 75th percentiles (components of the interquartile range) for FTEs per 100,000 for all LHDs, LHDs providing any clinical service, and LHDs that provide not clinical services and are locally governed. The interquartile range for all LHDs is 54 per 100,000 but is 72 per 100,000 for LHDs providing any clinical service and only 37 for locally governed LHDs that provide no clinical services. Although the precise contribution of these influences has not been determined, and the influence of other factors has not been established, controlling for governance and services appears to be an important component of an LHD staffing benchmarking application.

Figure 5. 25th and 75th Percentiles for FTEs per 100,000 for LHDs with Selected Governance and Clinical Service Characteristics



These initial analyses underscore the potential of using Profile data as the foundation for the development, enhancement, and application of local public health workforce staffing benchmarks. Building on NACCHO's Profile offers several interesting possibilities as to potential benchmarking applications and how these could be constructed, including the approach identified in the previous section of this report. But before focusing on specific benchmarking applications, several general considerations merit further discussion.

First, it is important to appreciate the implications of the different definitions and methods used in the various sources of data for public health occupations. As illustrated in Table 3, Profile data appears reasonably consistent with OES data for public health-related SOCs employed by local government for LHD managers, environmental health specialists, nutritionists, and epidemiologists. Profile data for registered nurses and health educators also comport with OES data to the extent that most workers employed by local government with these titles are found at LHDs, yet other agencies of local government might also employ workers in these categories. Since the majority of LHD professionals fall into these six SOCs, this general congruence with BLS OES data serves to validate using NACCHO's Profile as the template for an LHD staffing benchmarking process. This congruence also suggests there may be a role for BLS OES data in selected benchmarking applications.

The NACCHO Profile occasionally modifies terms and definitions used in previous surveys. For example, the 2010 survey changed the term for environmental health worker from *environmental health specialist* (2008 survey) to *environmental health worker* and eliminated the category *other environmental health scientists and technicians*. This change has several implications. The 2008 Profile best estimate for environmental health specialists (12,000) was quite close to the OES figure for environmental health scientists and specialists employed by local government (11,200). The 2008 Profile also provided a best estimate for other environmental health scientists (3,200). It is not clear which SOCs might be covered by this title, although environmental health technicians, environmental engineers and occupational health and safety specialists and technicians are reasonable possibilities. Broadening the term to

environmental health worker would likely cover these SOCs. As a result, this category will likely include both professional and technical SOCs when 2010 data is reported. A similar change took place as the occupational category for *emergency preparedness coordinators* (2008 Profile) was replaced by *emergency preparedness staff* in the 2010 Profile survey. Indeed the 2010 data may better characterize the number of workers devoted to environmental health and emergency preparedness activities. This gain may come, however, at the cost of reduced comparability with data from previous surveys.

The 2008 Profile survey also includes some subtler changes that merit scrutiny. The category *physicians* became *public health physicians* and *registered nurses* was changed to *public health nurses*. It is not clear how LHDs will respond to these revisions. It is possible that some physicians will not be considered public health physicians and that some registered nurses will be counted as public health nurses. Whether and where these physicians and nurses will be reported merits attention and could generate additional revisions in future Profile survey instruments.

A related consideration is whether other key SOCs are being missed. Recent NACCHO Profile surveys have not included laboratory workers and have only in 2008 begun to collect information on behavioral health professionals. In 2008, 25 percent of LHDs reported providing laboratory services although BLS data indicates that only 890 and 870 lab technologists and technicians were employed by local government in 2009. These low numbers suggest that inclusion of laboratory workers among the LHD staffing categories may not be productive. On the other hand, about two-thirds of LHDs serving populations of 500,000 or more provide lab services and may comprise a significant part of the workforce for these large LHDs.

Behavioral health professionals appear to have become a prominent subset of the LHD workforce, now ranking only behind registered nurses, environmental health specialists, and managers—and ahead of health educators and nutritionists. This has occurred despite the relatively small percentage (<10%) of LHDs offering mental, behavioral, and substance abuse services. In order to ensure more complete reporting of behavioral health professionals, it may be desirable for future Profile surveys to list representative SOCs (substance abuse and behavioral disorder counselors, mental health counselors, public health and medical social workers, mental health and substance abuse social works) in defining the behavioral health professional category.

Benchmarking physicians in the local public health workforce also presents major challenges. Table 3 aggregates the figures for the various SOCs that BLS uses for different physician specializations (family and general practitioners, general internists, obstetricians/gynecologists, general pediatricians, psychiatrists, surgeons, and all other physicians and surgeons). If physicians employed by LHDs fell mainly were mainly family and general practitioners and general pedestrians, the Profile 2008 best estimate of 2000 FTEs might be reasonably close to the 2660 figure derived from OES data. As some of these physicians would be part-time workers, the difference between the two indicators shrinks.

A few other occupations tracked in the Profile surveys also merit a brief discussion. It is not clear whether an LHD public information specialist fits the BLS SOC for public relations specialist. Similarly, it is not clear into which SOC the title of public health informatics specialist best fits. The number of FTE positions for each of these titles (fewer than 500) appears to be quite small in comparison with the other titles tracked by NACCHO, but these may emerge as categories that merit attention for longitudinal tracking efforts in the future. As with behavioral health professionals, it may be desirable to more closely align Profile survey terms and instructions with appropriate SOC definitions.

An overarching issue is the role of population size in benchmarking design. It is not surprising that the number of LHD FTEs is highly correlated with the size of a local health jurisdiction's population, although there is considerable variability even within population size categories, as demonstrated in Table 8. The worker to population ratio, however, demonstrates a different pattern. Table 8 suggests that, except for the smallest and largest

LHD population categories, the worker to population ratio is reasonably consistent across the other five population size categories, although each category again varies considerably (Figure 2). The consistency in median FTE worker to population ratios for LHDs in all but the smallest and largest LHD population categories, and in the interquartile range for these categories, implies that these population size categories may be influenced by some common factors. An initial examination suggests that the provision of clinical services and governance structure are two such factors and that performance levels, population density, and population risk status could possibly be others.

As indicated in prior sections, evidence of the influence of performance of public health core functions and essential public health services is currently lacking. NACCHO surveys do not directly measure different performance levels, and proxy definitions based on recent completion community health assessment and community health improvement plans have not identified differences in staffing levels. Additional insights and information may be available from states currently developing or enhancing state-based LHD accreditation initiatives. Some may have already examined LHD staffing standards or analyzed staffing issues related to achieving accreditation status. The experiences of these states could well inform the development of national LHD staffing benchmarks.

IV. Possible LHD Staffing Benchmark Applications

Among possible applications involving LHD staffing benchmarks, two emerge from this analysis as especially feasible. One application would facilitate comparisons of current or proposed staffing with that appropriate for a well-functioning LHD serving a jurisdiction of similar size and offering a similar array of services. A second application of LHD staffing benchmarks would facilitate determination of the number and types of local public health workers needed to serve a state or national population, which could then be compared with existing or projected levels. Data and sources are currently in place to initiate the development of both benchmarking applications, although consensus around basic principles and implementation strategies will be necessary in order to move forward.

1. LHD Staffing Application ("My LHD" app)
A benchmarking application that facilitates comparisons of current or proposed staffing with a standard or desired staffing pattern can be established based on the following principles:

- NACCHO's Profile should serve as the foundation and template
- Staffing benchmarks should be consistent with those derived from high functioning LHDs as defined by accreditation standards and/or other standards related to the essential public health services (EPHS) or operational definition of a functional local health department
- Benchmarks should incorporate adjustments for factors that have a demonstrated influence on LHD staffing (such as governance type and service packages) and possibly other influences (such as population density and health risk characteristics) based on further investigations.

BENCHMARK 1
Initially, median FTE worker to population ratios for LHDs with similar governance and clinical service characteristics. After a sufficient number of LHDs are accredited, median FTE worker to population ratios for accredited LHDs with similar governance and clinical service characteristics.

NACCHO Profile data from recent national surveys of LHDs (especially 2008 and 2010) offer a solid foundation for developing a framework for LHD staffing benchmarks. The 2008 Profile report provides data on the percentage of LHDs, stratified by size of population served, with employees in selected occupations and the median number of FTEs employed in selected occupations for these same LHD categories.[11] A companion report focusing specifically on the LHD workforce tracks changes in selected occupations between 2005 and 2008, provides information on the demographics of the local public health workforce, and identifies interquartile ranges for LHD FTEs and FTEs to population ratios.[12] Profile data also allow for a comparison of the racial and ethnic composition of the LHD workforce with that of the jurisdiction that it serves, a measure of workforce diversity, another possible staffing benchmark for future consideration.

The data underlying these measures, together with the Profile's extensive information on programs and services provided by LHDs, allow for an examination of the relationship between staffing (FTE worker to population ratios for specific occupational titles or groupings of these titles) and the scope of public health programs and services provided in their jurisdictions. Several Profile questions address the performance of core functions and essential public health services in the community, compatible with concepts measured in the national voluntary accreditation program for state and local health agencies. Analysis of staffing patterns alongside performance of key public health functions, programs, and services can contribute to the development of preliminary staffing benchmarks. The key question underlying this analysis is whether employment of specific occupational titles (or the level of workers employed in these specific occupational titles) is associated with overall LHD performance and or the provision of specific public health services. Or stated from a systems perspective, what types, levels or patterns of human resources as inputs will affect these organizational outputs relative to current expectations and standards of practice?

Profile data can be merged with other available data sets to examine other possible influences on LHD staffing patterns. LHDs serving primarily rural and frontier populations may have special staffing needs based on distance and population density considerations. Merging information on rural status and population density with Profile staffing data may allow for an initial assessment of this possible association. LHDs serving populations with different health risk profiles may experience different staffing needs. This could be assessed by merging data from the county health profiles[13] with NACCHO Profile data, although a substantial number of LHDs are not organized at the county level. Incorporating measures that have been identified as major overall influences on population health status such as poverty, smoking, and high school graduation rates[14] represents another option.

[11] National Association of County and City Health Officials. (2009). 2008 National Profile of Local Health Departments. Washington, DC: NACCHO.

[12] National Association of County and City Health Officials. (2010).The Local Health Department Workforce: Findings from the 2008 National Profile of Local Health Departments. Washington, DC: NACCHO.

[13] Robert Wood Johnson Foundation and the University of Wisconsin Population Health Institute. County Health Rankings. Available at www.countyhealthrankings.org/ Accessed February 22, 2011.

[14] Muennig, P., Fiscella, K., Tancredi, D., and Franks, P. (2010). The relative health burden of selected social and behavioral risk factors in the United States: implications for policy. *Am J Public Health,* 100:1758–1764.

Table 15. My LHD App—Benchmark Strategy (Using LHD example from Table 11 and Table 12, Scenario 2)

Input Questions (using 2008 Profile categories)	**Input Data***		**Relevant Benchmarks** (FTEs)**
1. Total workers (FTEs)?	1. 15	*LHD inputs for Total Workers and Occupations converted to FTE workers per 100,000 population* ➔➔➔➔ *Benchmarks developed from worker/population ratio for population size and governance, adjusted for services provided, and then converted back to FTEs.*	1. 23.64
2. Health service managers/directors?	2. 1		2. 1.34
3. Registered nurses?	3. 5		3. 8.38
4. Physicians?	4. 0		4. 0.00
5. Environmental health (EH) specialists?	5. 2		5. 1.65
6. Other EH scientists/technicians?	6. 0		6. 0.00
7. Epidemiologists?	7. 0		7. 0.00
8. Health educators?	8. 1		8. 0.14
9. Nutritionists?	9. 0		9. 0.00
10. Information system specialists?	10. 0		10. 0.00
11. Public information specialists?	11. 0		11. 0.00
12. Behavioral health professionals?	12. 0		12. 0.00
13. Emergency preparedness coordinators?	13. 0		13. 0.57
14. Administrative support / clerical?	14. 4		14. 5.39
15. Population served?	15. 38,000		
16. Governance type?	16. Local		Total for worker categories 2–14 = 17.47
17. Primary care services?	17. No		
18. Home health services?	18. Yes		
19. Behavioral health (MH and/or SA) services?	19. No		
20. Accredited (to be added after 2013)?	20. NA		

Notes: * Input data for questions 1–14 represents 25–50k category values from Table 7; **Benchmark data reflect Table 11 and Table 12 Scenario 2 example (only home health services provided).

An advantageous facet of NACCHO's Profile is that future surveys can be modified to incorporate refined indicators such as additional or more precise occupational classifications, service delivery packages and performance measures (such as accreditation status) in order to refine local public health workforce staffing benchmarks over time. The NACCHO Profile program carries a high level of visibility and credibility among LHDs, as well as among public health researchers, suggesting the public health community would likely understand, support, and use benchmarks derived from this effort.

The exact form or format of an LHD staffing application will depend on the specific variables incorporated, but at least conceptually, could allow an LHD administrator to plug in data at a designated website, or even into a hand-held device using an iPhone or Android operating system app (My LHP app). Table 15 illustrates how such an application could identify appropriate staffing benchmarks for an LHD based on the size of the jurisdiction's population, form of governance, and whether clinical services are provided by that LHD. In concept, key data elements could be entered into a simple program that would then compute the desirable size and staffing composition (i.e., benchmarks) for that LHD using the approach demonstrated in Tables 12 through 14. When a substantial number of LHDs are accredited by the Public Health Accreditation Board (perhaps by 2014), the subset of accredited LHDs could be used as the basis for this benchmarking application. One strategy to promote the "My LHD" application would be for future Profile surveys to provide immediate feedback after the LHD enters its workforce information. This feedback could be in the form of a simple report such as that suggested in Table 16.

2. Local Public Health Workforce Adequacy Application ("U.S. Local Public Health Workforce" app)

A second benchmarking application that would facilitate determination of the number and types

of public health workers needed to serve a state or national population will likely require more time and effort for implementation. More time will be needed because it will be several years until a substantial number of LHDs successfully complete the national LHD accreditation process so that this group of LHDs can be used as the basis for desirable FTEs to population ratios. Additional effort will also be required to modify existing data systems to support this application. Nonetheless, a local public health workforce adequacy application can be established based on the following principles:

- For national-level public health workforce assessments, NACCHO Profile data should serve as the foundation and template, with BLS OES and U.S. Census Bureau government employment data serving as ancillaries measures, although some important modifications are needed in order to make these sources more specific and useful.
- Benchmarks developed at a state or sub-national level should incorporate adjustments for factors that have a demonstrated influence on local public health workforce staffing (possible influences include state to state differences, limitations of current definitions and categories, as well as governance types and service packages , and possibly population risk characteristics and population density features).

BENCHMARK 2

Number of FTE local public health workers needed if total U.S. population were served by an accredited LHD.

Key to the development of the LHD staffing benchmark application described in the previous section is the distribution of worker to population ratios for LHDs with various characteristics, including population size, governance type, and service packages. These characteristics reflect current local public health practice, rather than a desired level such as that associated with demonstrated superior performance. The roll out of the Public Health Accreditation Board's national program for LHD accreditation begins in the second half of 2011 with perhaps 50 percent or more of all LHDs likely to seek accreditation between 2011 and 2014. Should this occur, the pool of accredited LHDs can serve as the basis for identifying FTE to population ratios to be used as national benchmarks for comparison with current levels. This second benchmarking application could use these national or state-level desirable levels in comparisons with existing national or state-level measures derived from Profile data, perhaps validated with ongoing federal government survey activities. The recommended option would rely primarily on Profile data but would use adjustments to the federal government survey activities for validation or for tracking between Profile surveys, which may take place only every two or three years.

In addition to NACCHO's Profile surveys, several official sources of useful information on the public health workforce can potentially contribute to a U.S. local public health workforce benchmarking application. The U.S. Census Bureau conducts an ongoing survey of government employment that includes information on the number of FTE workers of health agencies of federal, state, and local governments. The Bureau of Labor Statistics conducts ongoing surveys of employers in order to track changes in SOCs. Although only a few SOCs are public health-specific, SOCs for several may be useful in establishing benchmarks. These include epidemiologists, environmental health specialists, managers, educators, nutritionists, and possibly even registered nurses, nutritionists, and emergency management coordinators. Information from these government sources may contribute to the development of population-based benchmarks, such as the number of epidemiologists employed by local government per 100,000 or the number

of FTE workers of local governmental health agencies per 100,000. The use of the latter as measures of the current local public health workforce within states should be approached cautiously as some state employees provide local public health services in some states. Further, additional investigations are needed in order to better understand other factors that may account for the substantial differences in state rates (Table 5) identified previously.

Completeness and accuracy of the Profile information on the local health workforce is yet another important issue for this benchmarking application. There should be efforts to increase the number of LHDs that respond fully and accurately to workforce-related survey questions. Perhaps immediate feedback via the My LHD app would serve as an incentive.

Notwithstanding these considerations, an application that assesses gaps or needs for specific public health-related occupations appears feasible. The framework or strategy for such an application is outlined in Table 16. Basically, national-level measures, with necessary adjustments, would characterize current workforce levels, while desired levels would be established based on Profile survey data for the group of accredited LHDs. Table 16 illustrates this benchmarking application using a fabricated panel of worker to population ratios as proxies for accredited LHDs (since these will not be available for several years). The hypothetical reference group used for illustration purposes in Table 16 raises the question of whether the benchmarks should be developed from mean, rather than median, values and whether the benchmark should be constructed by summing the median worker to population ratios across seven population categories.

This general approach allows for consideration of the impact of different benchmark standards, such as using only accredited LHDs serving populations greater than 50,000 (or some other threshold) in order to identify workforce gaps under different scenarios. This discussion about comparing existing with desired levels, and the apparent resource implications that differ based on whether less efficient staffing levels for small LHDs are carried forward, draws parallels with Emerson's work in the 1940s.

Ideally, this benchmarking application would also use available data from federal data sources such as the Census Bureau's Government Employment Census and the Bureau of Labor Statistics' Occupational Employment data. It might appear that one advantage of this strategy would be that annual tracking would be possible. Unfortunately, these data systems would require adjustments and modifications to be used for this purpose. For example, the timeliness of reports from these sources is a potential problem. Government employment data from the Census Bureau for any given year is not published until 20 months after the year ends, and not finalized for another five months. Similarly, BLS occupational employment statistics (OES) are published each year with data available approximately 12 months after the survey is completed. In addition, government employment data as to the number of FTE workers employed by health agencies of local government would need be adjusted to (1) include only workers of public health agencies at the local level and (2) add in workers of health agencies at the state level who provide local public health services. This adjusted figure could then be used as the existing number of local public health workers. This could perhaps be more easily done at the state level especially for the large number of states that do not use state employees to provide local public health services. The same limitations exist in trying to use BLS OES data for standard occupational categories instead of Profile data for occupations. As a result, these obstacles would limit the usefulness of government survey data for these benchmarking applications, other than to possibly serve as an early warning system for changes in a few public health-specific SOCs.

Table 16. Local Public Health Workforce Adequacy Benchmark Illustration

(Notes: This table is only an illustration of the process; there are no actual benchmark data. Also, the "gap" refers to the number of FTE local public health workers needed nationally, rather than the number needed for current LHDs)

Occupation (2008 Profile categories)	NACCHO 2008 Profile Best Estimate FTEs	NACCHO 2008 Profile Best Estimate FTEs per 100,000	Hypothetical Reference Group* FTEs per 100,000	Hypothetical Benchmark*	Gap [Benchmark minus Best Estimates]
All Staff	155,000	50.32	59.98	184,738	29,738
Health service managers/directors	9,500	3.08	6.37	19,620	10,120
Registered nurses	33,000	10.71	19.21	59,167	26,167
Physicians	2,000	0.65	0.44	1,355	(645)
Environmental health (EH) specialists	12,000	3.90	4.82	14,846	2,846
Other EH scientists/technicians	3,200	1.04	0.56	1,725	(1,475)
Epidemiologists	1,200	0.39	0.33	1,016	(184)
Health educators	4,400	1.43	1.34	4,127	(273)
Nutritionists	4,300	1.40	1.50	4,620	320
Information systems specialists	1,600	0.52	0.51	1,571	(29)
Public information specialists	430	0.14	0.15	462	32
Behavioral health professionals	7,100	2.31	1.33	4,096	(3,004)
Emergency preparedness coordinators	1,400	0.45	0.78	2,402	1,002
Clerical staff	36,000	11.69	16.67	51,344	15,344

*Hypothetical reference group used here reflects each occupation's highest median FTEs per 100,000 across the seven population size categories. Note: Proposed benchmark to be derived from worker/population ratios for fully accredited LHDs applied to total U.S. population. In this illustration, benchmark data are fabricated as there are no actual benchmark data.

These two proposed LHD benchmarking applications are compatible with recommendations of a recent examination of staffing benchmarks for community health centers. This effort identified two potential benchmarks: the median staffing configuration for all community health centers and an adjusted measure reflecting the staffing configurations utilized by other comparable health care systems (such as HMOs and the Veterans Administration).[15] An analysis of the characteristics of these different benchmarks allowed for the projection of staffing needs under various scenarios that reflected expansion of community health centers to serve additional populations. Although the community health center benchmarks address only two occupational categories, this effort offers insights into problems and issues likely to arise in establishing and using benchmarks for LHD staffing. The use of more than one source of staffing data is a common feature in both the community health center and LHD staffing benchmark activities. Blending the optimal characteristics from different data systems in benchmarking initiative requires a thoughtful and open discussion involving key stakeholders, including the public health systems research community. Ultimately, refinement of these two applications could lead to the identification of an ideal or recommended staffing pattern based on best practices as well as the identification of national gaps and workforce development priorities.

[15] National Association of Community Health Centers. Access Transformed: Building a Primary Care Workforce for the 21st Century. Available at http://www.nachc.org/client/documents/ACCESS%20Transformed%20full%20report.pdf Accessed February 22, 2011.

V. Pathway to Developing Local Public Health Staffing Benchmarking Applications

In sum, powerful arguments exist for building two benchmarking applications on the foundation of the NACCHO Profile. This is an important step that breaks new ground, but it will need to be approached carefully and thoughtfully. Several preparatory steps are necessary to advance these benchmarking applications. These include a series of research questions that can be examined incrementally, in batches, or comprehensively. As many of these would benefit from use of the most recent Profile survey data, waiting until 2010 Profile data become available before proceeding with some of these research activities may be desirable. This should not deter efforts to complete some initial assessments using 2008 Profile data such as that contributing to the development of this report (especially Table 12).

Four recommendations are offered: (1) develop and deploy the "My LHD" app; (2) proceed toward the development of the "U.S. Local Public Health Workforce" app; (3) plan revisions of Profile survey questions related to the local public health workforce data sources and identify beneficial enhancements of existing federal data systems in order to advance these benchmarking applications; and (4) increase public health systems research in this area.

Recommendation 1:
Develop the "My LHD" app
The basic strategy for the "My LHD" application is to establish benchmarks based on NACCHO Profile data, stratifying by LHD size, governance type, and service package for total FTE and the dozen occupational categories included in the Profile surveys. Further increasing the number of occupational categories may prove unwieldy as the total numbers of workers in these categories will likely be small (1,000 or fewer), although some consideration to the inclusion of laboratory workers appears warranted. Factors responsible for differences in the worker to population ratios for very small and very large LHDs need further investigation. Variability within current population categories needs more precise explanation in terms of which factors may be important for different LHD population categories. Ultimately, multivariate analysis may be necessary to characterize these relationships more precisely.

Little guidance exists in the published public health systems research literature as to the relationship between local public health staffing and other dimensions of LHD organizational practice. This report incorporates preliminary investigations for several potential influences on LHD staffing but does not attempt to definitively answerthe underlying research questions. One investigation that may offer additional insights is the examination of the distribution of FTEs to population ratios (similar to that in Table 10) for all workers and for each occupation for each of the variable options under study.[16] Important research questions include the following:

- Are there differences in staffing patterns (distribution of FTEs per 100,000 population for total employees and selected occupational categories) for LHDs stratified by population size and (1) governance, (2) personal clinical services offered, (3) population density, (4) population risk status, and (5) performance?
- What combination of variables should drive the development of LHD staffing benchmarks?

After the national accreditation program has been operational for several years, benchmarks should be derived from LHDs meeting national accreditation standards. There is no current evidence that high performing LHDs have different staffing needs and patterns than low performing LHDs, although this important research question merits continuing attention as developments occur.

Population size and the unequal distribution of LHDs across the seven commonly used population categories is another consideration for further studies. Nearly two-thirds (64%) of

[16] Figure 2 illustrates the distribution of median FTEs per 100,000 population for all LHDs. Replicating this information for the combinations of the key variables would result in 24 tables for all workers: (two performance types: high, low) x (three governance types: local, state, shared) x (four service types: primary care, home health, behavioral/mental/substance abuse alone, more than one) and a similar number for each occupational category.

LHDs serve populations less than 50,000 (two of the seven size categories) and the remaining 36 percent is divided across the remaining five categories. The number of LHDs in each category varies widely, from only several dozen serving populations of one million or more to nearly 500 serving populations between 10,000 and 24,999. It is not clear whether future analyses would benefit from using a greater number of more equally sized LHDs, especially because the population range for the highest category would be quite wide.

Recommendation 2: Proceed toward the development of the "U.S. Local Public Health Workforce" app

As documented throughout this report, considerable information is already available on important aspects of the local public health workforce at both the national and state level. Census Bureau data on government employment and Bureau of Labor Statistics data on SOCs for occupations employed by LHDs allow for longitudinal tracking of workforce trends on an annual basis. Some data elements show remarkable consistency with NACCHO Profile data. Others will require adjustments based on different definitions and contexts for use. It may prove useful to conduct a full-scale examination of the comparability of these different data sources to ensure greater consistency in the national aggregate data for specific public health occupations working for units of local (or state and local) governments. This would promote more meaningful assessments of workforce needs and gaps in view of the many different configurations of service delivery, functional performance, and state-local and regional relationship profiles. One component of this assessment should investigate whether BLS can develop a composite national picture of the number of workers in specific SOCs employed by local government (and possibly state government) as well as state-specific tallies for each of the 50 states. Although this information is useful at the level of "health agencies" of local or state government, it would be particularly useful at the level for the NAICS category for administration of public health programs (NAICS code 923120). In addition to facilitating comparisons among existing, projected, and needed numbers of local public health workers in selected occupations, a "watch list" could be generated for national local public health workforce needs for key occupational categories (based in part on national data and extrapolated Profile data) including managers, environmental health, epidemiologists, health educator, nutritionists, and emergency preparedness staff.

Better understanding of the nuances and differences among the current data sources is needed. Studies comparing data within the same state would be especially useful. For example, state by state investigations into the differences between the number of workers reported by LHDs in NACCHO Profile surveys and government employment data within that state could elucidate new insights. Comparisons of BLS data for sentinel public health occupations employed by local government with NACCHO Profile survey data could allow one source or the other to contribute to national staffing benchmarking applications. In addition, the large variation across states in the government employment data for the worker to population ratio for workers of health agencies of local government merits attention and explanation.

Recommendation 3: Plan revisions to future NACCHO Profile surveys and identify beneficial enhancements of existing OES and Government Employment Census data reports.

Throughout this report, the usefulness of NACCHO Profile data is documented. Each Profile survey is carefully planned and executed. Considerable input goes into the review of previous survey questions and into revisions and additions to be included in the next survey cycle. Possible revisions for future Profile surveys have been suggested in various sections of this report. These largely relate to two issues: (1) capturing information on LHD accreditation status and other possible measures of overall LHD performance of LHDs; and (2) enhancing information on the LHD occupational categories.

The national Public Health Accreditation Board (PHAB) plans to initiate a process for accrediting LHDs in the second half of 2011. It is not clear how many LHDs will seek PHAB accreditation, and it is not clear what PHAB's capacity will be in terms of being able to review and accredit LHDs seeking to be accredited. In any event, it will likely be several years before a sufficient number of LHDs are accredited and

workforce data from accredited LHDs can be captured through Profile surveys. Information from accredited LHDs will be necessary for both benchmarking applications proposed in this report. In the meantime, examining Profile data for other possible proxies of performance may be desirable. Although recent completion of community health assessments and community health improvement plans does not appear to affect LHD staffing, this possible relationship could be further examined using a variety of measures and definitions. These could be included in the next iteration of the Profile survey in 2012 or 2013. Alternatively, the proposed interim benchmark reflecting existing worker to population ratios may be sufficient until a benchmark based on accredited LHDs becomes available.

Several changes to the 2010 Profile survey instrument should be noted. Two occupational categories used in the 2008 Profile survey (*environmental health specialists* and *other environmental health scientists*) were collapsed into a new category (*environmental health worker*) and a similar change was introduced for another category (*emergency preparedness coordinator* was changed to *emergency preparedness staff*). These changes diminish the compatibility of the Profile workforce categories with specific BLS SOCs but result in the inclusion of more LHD staff in the reported categories. Both professionals and technicians will likely now be included in the data reported by LHDs. These changes may result in more complete information on LHD staffing and more useful benchmarks. Another change, but one not expected to affect reporting, was the inclusion of "*public health*" before the *manager*, *nurse*, and *physician* categories. As planning for the next Profile survey gets underway, it will be important to consider the workforce information to be collected in terms of its impact on these benchmarking applications.

Table 17. Key Research Questions for Refining LHD Staffing and U.S. Local Public Health Workforce Benchmarks

Questions	Evidence	Plan
Does LHD population size influence staffing (total and specific occupations)?	• Number and types of staff increase as population served increases • Ratio of workers to population shows consistent pattern except for smallest and largest LHDs	• Examine distribution of worker to population ratios for occupations
Does LHD governance influence staffing (total and specific occupations)?	• Local governance LHDs have lower worker to population ratios than state or shared governance regardless of service profile	• Examine distribution of worker to population ratios for occupations for the various governance categories for insights into different roles and duties
Do LHD personal health services profile influence staffing (total and specific occupations)?	• LHDs providing one or more personal health services have higher worker to population ratios than LHDs that do not provide personal health services	• Develop additional service profiles • Examine distribution of worker to population ratios for total workers and occupations • To what extent do the findings for specific occupations explain differences in the number of total workers, as well?
Does LHD performance influence staffing (total and specific occupations)?	• Using CHA and CHIP completion as proxies for performance, no differences in worker to population ratios detected	• Develop additional performance profiles • Examine distribution of worker to population ratios for total workers and occupations
Does LHD population density influence staffing (total and specific occupations)?	• Great variability among smallest LHDs in worker to population ratios is suggestive	• Identify data source for population density for LHD jurisdictions • Merge new data source with Profile data • Examine distribution of worker to population ratios for occupations
Do LHD population risk characteristics influence staffing (total and specific occupations)?	• Variability among largest LHDs in worker to population ratios is suggestive	• Identify data source for population density for LHD jurisdictions • Merge new data source with Profile data • Examine distribution of worker to population ratios for occupations
Using multivariate analyses, which factors have the greatest influence the size and composition of the LHD workforce?	• Mix of influences varies across LHD population categories suggesting the impact of specific influences may also vary for these categories	• Multivariate analysis could be incorporated in formal public health systems research proposal

Do states differ in the distribution of worker to population ratios for similar LHD population categories?	• LHD staffing differences among states may exist but have not yet been examined • Government employment data suggest considerable variability exists across states	• Profile data allow for examining similar LHD population categories across the 50 states for differences in worker to population ratios
Are aggregate Profile data for LHD staffing compatible with Census Bureau and BLS data?	• Profile best estimates and OES SOC data for local government are close for managers, epidemiologists, environmental health specialists, nutritionists	• Further investigation is needed into the availability of Government Employment and OES data at the NAICS 923120 code level
What accounts for the differences across states in government employment and payroll data?	• No information available other than speculation as to different roles and duties	• Further investigation is needed into differences that may exist from the state to state in (1) the activities captured in the government employment data and (2) the way data are collected for that state
Are state-specific Profile data compatible with state-specific government employment data?	• No information that such comparisons have been made	• Further investigation is needed into this question on a state by state basis
Are state-specific Profile data compatible with state-specific BLS data for selected SOCs employed by local government?	• No information that such comparisons have been made	• Further investigation is needed into this question on a state by state basis

Recommendation 4: Increase Public Health Systems Research Focusing on the Workforce

This report identifies the dearth of information on the relationship of the public health workforce to other aspects of the public health infrastructure and to the outputs and outcomes of local public health practice. NACCHO and other national public health organizations should vigorously encourage public and private sector entities to support and fund public health systems research focusing on the workforce. Table 17 summarizes some of the key research questions, available evidence, and suggested next steps to inform the further development and refinement of the two benchmarking applications proposed in this report.

Limitations

The analysis and recommendations offered in this report have several limitations. NACCO Profile data are widely recognized as a valuable resource for public health systems research, but the data are not perfect. For purposes of local public health workforce benchmarking applications, the completeness and accuracy of reporting clinical services will be important. Profile survey questions regarding the presence or absence of these services, and entities offering them, could be misunderstood, contributing to variability in the construction of reference groups for the proposed My LHD app. In addition, there may be other services that should be considered in identifying appropriate reference groups, such as the scope of environmental health, communicable disease control, or chronic disease prevention services.

An important caution is the notion of benchmarks themselves. As previously discussed, benchmarks are simply arbitrary reference points for measurement and not necessarily desired or optimal standards of practice. The proposed LHD staffing benchmark uses the typical (median) staffing configuration for LHDs with similar governance and clinical service characterizes serving a similar sized population. This does not assume or imply that such typical benchmarks are appropriate models for other LHDs, only that such a typical LHD offers a reasonable basis for comparison. Other circumstances could well justify staffing patterns that differ, with more or less staff or different

staff, from that of the benchmark. This report does propose the use of accredited LHDs as the basis for reference group development after a substantial number of LHDs receive PHAB accreditation status. This will make this benchmarking application more focused on quality than not distinguishing between LHDs based on performance as an interim strategy.

VI. Summary

Two new benchmarking applications and benchmarks are proposed in this report. One application compares an LHD's existing staffing to a benchmark specific for key LHD characteristics. A second application allows for comparing the existing local public health workforce, including specific occupations, to levels consistent with those for accredited LHDs. Steps needed to further the development of these two benchmarking applications are identified. These benchmarking activities are feasible through use of data from the NACCHO Profile series and will be enhanced with modest revisions to future Profile survey questions. Although useful for the local public health practice community in general, and LHDs in particular, the issues raised in this benchmark-development process are both important and longstanding. Ultimately, any workforce benchmarking activity will be influenced by what the work of public health is and how it is organized, deployed, delegated, and managed. Emerson's early studies in the 1940s in this area led to recommendations for minimum LHD population size (>50,000) that may need to be revisited. Current local public health resource deployment strategies may be inefficient in that the many small LHDs (with 43% serving populations under 25,000) have relatively higher staffing levels (higher worker to population ratios) than a larger and more efficiently organized public health system would require. Benchmarks may ultimately be useful in helping to rationalize and restructure the deployment of the public health system's increasingly scarce human resources.

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Appendix 1: Tables

Appendix Table 1a. Staffing Benchmark Illustration for Locally Governed LHD "X" Serving Population of 38,000; Scenario 1: LHD "X" Provides No Clinical Services

Occupation	Reference Group* Median FTEs per 100,000	Adjustment (FTEs per 100,000)	Adjusted FTEs per 100,000	Benchmark FTEs
Health service managers/directors	2.90	0.00	2.90	1.10
Registered nurses	8.75	0.00	8.75	3.32
Physicians	0.00	0.00	0.00	0.00
Environmental health (EH) specialists	4.35	0.00	4.35	1.65
Other EH scientists/technicians	0.00	0.00	0.00	0.00
Epidemiologists	0.00	0.00	0.00	0.00
Health educators	0.36	0.00	0.36	0.14
Nutritionists	0.00	0.00	0.00	0.00
Information systems specialists	0.00	0.00	0.00	0.00
Public information specialists	0.00	0.00	0.00	0.00
Behavioral health professionals	0.00	0.00	0.00	0.00
Emergency preparedness coordinators	0.61	0.00	0.61	0.23
Clerical staff	7.98	0.00	7.98	3.03
Staff in these 13 occupations	**24.95**	**0.00**	**24.95**	**9.48**
All LHD staff	**31.13**	**0.00**	**31.13**	**11.83**

*Reference Group = LHDs with local governance serving populations between 25,000 and 49,999; n=226

Appendix Table 1b. Staffing Benchmark Illustration for Locally Governed LHD "X" Serving Population of 38,000; Scenario 2: LHD "X" Provides Home Health Services

Occupation	Reference Group* Median FTEs per 100,000	Home Health Adjust-ment (FTEs per 100,000)	Adjusted FTEs per 100,000	Benchmark FTEs
Health service managers/directors	2.90	0.63	3.53	1.34
Registered nurses	8.75	13.30	22.05	8.38
Physicians	0.00	0.00	0.00	0.00
Environmental health (EH) specialists	4.35	0.00	4.35	1.65
Other EH scientists/technicians	0.00	0.00	0.00	0.00
Epidemiologists	0.00	0.00	0.00	0.00
Health educators	0.36	0.00	0.36	0.14
Nutritionists	0.00	0.00	0.00	0.00
Information systems specialists	0.00	0.00	0.00	0.00
Public information specialists	0.00	0.00	0.00	0.00
Behavioral health professionals	0.00	0.00	0.00	0.00
Emergency preparedness coordinators	0.61	0.90	1.51	0.57
Clerical staff	7.98	6.19	14.17	5.39
Staff in these 13 occupations	**24.94**	**21.02**	**45.96**	**17.47**
All LHD staff	**31.13**	**31.09**	**62.22**	**23.64**

*Reference Group = LHDs with local governance serving populations between 25,000 and 49,999; n=226

Appendix Table 1c. Staffing Benchmark Illustration for Locally Governed LHD "X" Serving Population of 38,000; Scenario 3: LHD "X" Provides Primary Care Services

Occupation	Reference Group* Median FTEs per 100,000	Primary Care Adjustment (FTEs per 100,000)	Adjusted FTEs per 100,000	Benchmark FTEs
Health service managers/directors	2.90	0.00	2.90	1.10
Registered nurses	8.75	7.94	16.69	6.34
Physicians	0.00	2.07	2.07	0.79
Environmental health (EH) specialists	4.35	0.00	4.35	1.65
Other EH scientists/technicians	0.00	0.00	0.00	0.00
Epidemiologists	0.00	0.00	0.00	0.00
Health educators	0.36	2.02	2.38	0.90
Nutritionists	0.00	2.89	2.89	1.10
Information systems specialists	0.00	0.00	0.00	0.00
Public information specialists	0.00	0.00	0.00	0.00
Behavioral health professionals	0.00	0.00	0.00	0.00
Emergency preparedness coordinators	0.61	0.00	0.61	0.23
Clerical staff	7.98	8.85	16.83	6.40
Staff in these 13 occupations	**24.94**	**23.77**	**48.71**	**18.51**
All LHD staff	**31.13**	**33.88**	**65.01**	**24.70**

*Reference Group = LHDs with local governance serving populations between 25,000 and 49,999; n=226

Appendix Table 1d. Staffing Benchmark Illustration for Locally Governed LHD "X" Serving Population of 38,000; Scenario 4: LHD "X" Provides Primary Care and Home Health Services

Occupation	Reference Group* Median FTEs per 100,000	Primary Care Adjust-ment (FTEs per 100,000)	Home Health Adjust-ment (FTEs per 100,000)	Adjusted FTEs per 100,000	Benchmark FTEs
Health service managers/directors	2.90	0.00	0.63	3.53	1.34
Registered nurses	8.75	7.94	13.30	29.99	11.40
Physicians	0.00	2.07	0.00	2.07	0.79
Environmental health (EH) specialists	4.35	0.00	0.00	4.35	1.65
Other EH scientists/technicians	0.00	0.00	0.00	0.00	0.00
Epidemiologists	0.00	0.00	0.00	0.00	0.00
Health educators	0.36	2.02	0.00	2.38	0.90
Nutritionists	0.00	2.89	0.00	2.89	1.10
Information systems specialists	0.00	0.00	0.00	0.00	0.00
Public information specialists	0.00	0.00	0.00	0.00	0.00
Behavioral health professionals	0.00	0.00	0.00	2.50	0.95
Emergency preparedness coordinators	0.61	0.00	0.90	1.51	0.57
Clerical staff	7.98	8.85	6.19	23.02	8.75
Staff in these 13 occupations	**24.94**	**23.77**	**21.02**	**69.73**	**26.50**
All LHD staff	**31.13**	**33.88**	**31.09**	**96.10**	**36.52**

*Reference Group = LHDs with local governance serving populations between 25,000 and 49,999; n=226

Appendix Table 1e. Staffing Benchmark Illustration for Locally Governed LHD "X" Serving Population of 38,000; Scenario 5: LHD "X" Provides Primary Care, Home Health, and Behavioral Health Services

Occupation	Reference Group* Median FTEs per 100,000	Primary Care Adjust-ment (FTEs per 100,000)	Home Health Adjust-ment (FTEs per 100,000)	MH - SA Adjust-ment (FTEs per 100,000)	Adjusted FTEs per 100,000	Benchmark FTEs
Health service managers/directors	2.90	0.00	0.63	0.00	3.53	1.34
Registered nurses	8.75	7.94	13.30	6.30	36.29	13.79
Physicians	0.00	2.07	0.00	0.00	2.07	0.79
Environmental health (EH) specialists	4.35	0.00	0.00	0.00	4.35	1.65
Other EH scientists/technicians	0.00	0.00	0.00	0.00	0.00	0.00
Epidemiologists	0.00	0.00	0.00	0.00	0.00	0.00
Health educators	0.36	2.02	0.00	1.27	3.65	1.39
Nutritionists	0.00	2.89	0.00	1.03	3.92	1.49
Information systems specialists	0.00	0.00	0.00	0.00	0.00	0.00
Public information specialists	0.00	0.00	0.00	0.00	0.00	0.00
Behavioral health professionals	0.00	0.00	0.00	2.50	2.50	0.95
Emergency prepare. coordinators	0.61	0.00	0.90	0.00	1.51	0.57
Clerical staff	7.98	8.85	6.19	5.42	28.44	10.81
Staff in these 13 occupations	**24.94**	**23.77**	**21.02**	**15.52**	**86.25**	**32.78**
All LHD staff	**31.13**	**33.88**	**31.09**	**15.55**	**111.65**	**42.43**

*Reference Group = LHDs with local governance serving populations between 25,000 and 49,999; n=226

Appendix Table 2a. Staffing Benchmark Illustration for State Governed LHD "X" Serving Population of 175,000; Scenario 1: LHD "X" Provides No Clinical Services

Occupation	Reference Group* Median FTEs per 100,000	Adjustment (FTEs per 100,000)	Adjusted FTEs per 100,000	Benchmark FTEs
Health service managers/directors	1.65	0.00	1.65	2.89
Registered nurses	9.64	0.00	9.64	16.87
Physicians	0.45	0.00	0.45	0.79
Environmental health (EH) specialists	4.48	0.00	4.48	7.84
Other EH scientists/technicians	0.00	0.00	0.00	0.00
Epidemiologists	0.54	0.00	0.54	0.95
Health educators	0.58	0.00	0.58	1.02
Nutritionists	1.76	0.00	1.76	3.08
Information systems specialists	0.00	0.00	0.00	0.00
Public information specialists	0.00	0.00	0.00	0.00
Behavioral health professionals	0.00	0.00	0.00	0.00
Emergency preparedness coordinators	0.57	0.00	0.57	1.00
Clerical staff	12.85	0.00	12.85	22.49
Staff in these 13 occupations	**32.52**	**0.00**	**32.52**	**56.91**
All LHD staff	**39.74**	**0.00**	**39.74**	**69.55**

*Reference Group = LHDs with state governance serving populations between 100,000 and 249,999; n=22

Appendix Table 2b. Staffing Benchmark Illustration for State Governed LHD "X" Serving Population of 175,000; Scenario 2: LHD "X" Provides Home Health Services

Occupation	Reference Group* Median FTEs per 100,000	Home Health Adjustment (FTEs per 100,000)	Adjusted FTEs per 100,000	Benchmark FTEs
Health service managers/directors	1.65	2.37	4.02	7.04
Registered nurses	9.64	9.18	18.82	32.94
Physicians	0.45	0.00	0.45	0.79
Environmental health (EH) specialists	4.48	1.16	5.64	9.87
Other EH scientists/technicians	0.00	0.00	0.00	0.00
Epidemiologists	0.54	0.00	0.54	0.95
Health educators	0.58	0.02	0.60	1.05
Nutritionists	1.76	0.51	2.27	3.97
Information systems specialists	0.00	0.00	0.00	0.00
Public information specialists	0.00	0.00	0.00	0.00
Behavioral health professionals	0.00	0.89	0.89	1.56
Emergency preparedness coordinators	0.57	0.04	0.61	1.07
Clerical staff	12.85	5.30	18.15	31.76
Staff in these 13 occupations	**32.52**	**19.47**	**51.99**	**90.98**
All LHD staff	**39.74**	**25.65**	**65.39**	**114.43**

*Reference Group = LHDs with state governance serving populations between 100,000 and 249,999; n=22

Appendix Table 2c. Staffing Benchmark Illustration for State Governed LHD "X" Serving Population of 175,000; Scenario 3: LHD "X" Provides Primary Care Services

Occupation	Reference Group* Median FTEs per 100,000	Primary Care Adjustment (FTEs per 100,000)	Adjusted FTEs per 100,000	Benchmark FTEs
Health service managers/directors	1.65	0.19	1.84	3.22
Registered nurses	9.64	4.88	14.52	25.41
Physicians	0.45	1.07	1.52	2.66
Environmental health (EH) specialists	4.48	0.00	4.48	7.84
Other EH scientists/technicians	0.00	0.44	0.44	0.77
Epidemiologists	0.54	0.00	0.54	0.95
Health educators	0.58	0.17	0.75	1.31
Nutritionists	1.76	0.20	1.96	3.43
Information systems specialists	0.00	0.66	0.66	1.16
Public information specialists	0.00	0.00	0.00	0.00
Behavioral health professionals	0.00	0.74	0.74	1.30
Emergency preparedness coordinators	0.57	0.12	0.69	1.21
Clerical staff	12.85	6.84	19.69	34.46
Staff in these 13 occupations	**32.52**	**15.31**	**47.83**	**83.70**
All LHD staff	**39.74**	**25.72**	**65.46**	**114.56**

*Reference Group = LHDs with state governance serving populations between 100,000 and 249,999; n=22

Appendix Table 2d. Staffing Benchmark Illustration for State Governed LHD "X" Serving Population of 175,000; Scenario 4: LHD "X" Provides Primary Care and Home Health Services

Occupation	Reference Group* Median FTEs per 100,000	Primary Care Adjust-ment (FTEs per 100,000)	Home Health Adjust-ment (FTEs per 100,000)	Adjusted FTEs per 100,000	Benchmark FTEs
Health service managers/directors	1.65	0.19	2.37	4.21	7.37
Registered nurses	9.64	4.88	9.18	23.70	41.48
Physicians	0.45	1.07	0.00	1.52	2.66
Environmental health (EH) specialists	4.48	0.00	1.16	5.64	9.87
Other EH scientists/technicians	0.00	0.44	0.00	0.44	0.77
Epidemiologists	0.54	0.00	0.00	0.54	0.95
Health educators	0.58	0.17	0.02	0.77	1.35
Nutritionists	1.76	0.20	0.51	2.47	4.32
Information systems specialists	0.00	0.66	0.00	0.66	1.16
Public information specialists	0.00	0.00	0.00	0.00	0.00
Behavioral health professionals	0.00	0.74	0.89	1.63	2.85
Emergency preparedness coordinators	0.57	0.12	0.04	0.73	1.28
Clerical staff	12.85	6.84	5.30	24.99	43.73
Staff in these 13 occupations	**32.52**	**15.31**	**19.47**	**67.30**	**117.78**
All LHD staff	**39.74**	**25.72**	**25.65**	**91.11**	**159.44**

*Reference Group = LHDs with state governance serving populations between 100,000 and 249,999; n=22

Appendix Table 2e. Staffing Benchmark Illustration for State Governed LHD "X" Serving Population of 175,000; Scenario 5: LHD "X" Provides Primary Care, Home Health, and Behavioral Health Services

Occupation	Reference Group* Median FTEs per 100,000	Primary Care Adjust-ment (FTEs per 100,000)	Home Health Adjust-ment (FTEs per 100,000)	Adjusted FTEs per 100,000	Benchmark FTEs	Occupation
Health service managers/directors	1.65	0.19	2.37	0.00	4.21	7.37
Registered nurses	9.64	4.88	9.18	2.40	26.10	45.68
Physicians	0.45	1.07	0.00	0.31	1.84	3.22
Environmental health (EH) specialists	4.48	0.00	1.16	0.88	6.52	11.41
Other EH scientists/technicians	0.00	0.44	0.00	0.00	0.44	0.77
Epidemiologists	0.54	0.00	0.00	0.05	0.59	1.03
Health educators	0.58	0.17	0.02	0.00	0.77	1.35
Nutritionists	1.76	0.20	0.51	0.00	2.47	4.32
Information systems specialists	0.00	0.66	0.00	0.00	0.66	1.16
Public information specialists	0.00	0.00	0.00	0.00	0.00	0.00
Behavioral health professionals	0.00	0.74	0.89	1.95	3.58	6.27
Emergency prepare. coordinators	0.57	0.12	0.04	0.00	0.73	1.28
Clerical staff	12.85	6.84	5.30	5.03	30.02	52.54
Staff in these 13 occupations	**32.52**	**15.31**	**19.47**	**10.62**	**77.92**	**136.36**
All LHD staff	**39.74**	**25.72**	**25.65**	**18.51**	**109.62**	**191.84**

*Reference Group = LHDs with state governance serving populations between 100,000 and 249,999; n=22

Appendix Table 3a. Staffing Benchmark Illustration for Shared Governance LHD "X" Serving Population of 750,000; Scenario 1: LHD "X" Provides No Clinical Services

Occupation	Reference Group* Median FTEs per 100,000	Adjustment (FTEs per 100,000)	Adjusted FTEs per 100,000	Benchmark FTEs
Health service managers/directors	1.20	0.00	1.20	9.00
Registered nurses	6.99	0.00	6.99	52.43
Physicians	0.11	0.00	0.11	0.83
Environmental health (EH) specialists	3.78	0.00	3.78	28.35
Other EH scientists/technicians	1.58	0.00	1.58	11.85
Epidemiologists	0.52	0.00	0.52	3.90
Health educators	0.69	0.00	0.69	5.18
Nutritionists	2.20	0.00	2.20	16.50
Information systems specialists	0.79	0.00	0.79	5.93
Public information specialists	0.16	0.00	0.16	1.20
Behavioral health professionals	0.32	0.00	0.32	2.40
Emergency preparedness coordinators	0.16	0.00	0.16	1.20
Clerical staff	16.92	0.00	16.92	126.90
Staff in these 13 occupations	**35.42**	**0.00**	**35.42**	**265.67**
All LHD staff	**29.68**	**0.00**	**29.68**	**222.60**

*Reference Group = LHDs with shared governance serving populations between 500,000 and 999,999; n=2

Appendix Table 3b. Staffing Benchmark Illustration for Shared Governance LHD "X" Serving Population of 750,000; Scenario 2: LHD "X" Provides Home Health Services

Occupation	Reference Group* Median FTEs per 100,000	Home Health Adjustment (FTEs per 100,000)	Adjusted FTEs per 100,000	Benchmark FTEs
Health service managers/directors	1.20	0.33	1.53	11.48
Registered nurses	6.99	7.84	14.83	111.23
Physicians	0.11	0.10	0.21	1.58
Environmental health (EH) specialists	3.78	2.52	6.30	47.25
Other EH scientists/technicians	1.58	1.23	2.81	22.08
Epidemiologists	0.52	0.07	0.59	4.43
Health educators	0.69	0.17	0.86	6.45
Nutritionists	2.20	0.62	2.82	21.15
Information systems specialists	0.79	0.39	1.18	8.85
Public information specialists	0.16	0.03	0.19	1.43
Behavioral health professionals	0.32	2.14	2.46	19.50
Emergency preparedness coordinators	0.16	0.04	0.20	1.50
Clerical staff	16.92	8.30	25.22	189.15
Staff in these 13 occupations	**35.42**	**23.78**	**59.20**	**444.00**
All LHD staff	**29.68**	**29.43**	**59.11**	**443.33**

*Reference Group = LHDs with shared governance serving populations between 500,000 and 999,999; n=2

Appendix Table 3c. Staffing Benchmark Illustration for Shared Governance LHD "X" Serving Population of 750,000; Scenario 3: LHD "X" Provides Primary Care Services

Occupation	Reference Group* Median FTEs per 100,000	Primary Care Adjustment (FTEs per 100,000)	Adjusted FTEs per 100,000	Benchmark FTEs
Health service managers/directors	1.20	0.51	1.71	12.83
Registered nurses	6.99	3.61	10.60	79.50
Physicians	0.11	0.58	0.69	5.18
Environmental health (EH) specialists	3.78	2.07	5.85	43.88
Other EH scientists/technicians	1.58	0.00	1.58	11.85
Epidemiologists	0.52	0.08	0.60	4.50
Health educators	0.69	0.00	0.69	5.18
Nutritionists	2.20	1.52	3.72	27.90
Information systems specialists	0.79	0.76	1.55	11.63
Public information specialists	0.16	0.01	0.17	1.28
Behavioral health professionals	0.32	0.62	0.94	4.70
Emergency preparedness coordinators	0.16	0.03	0.19	1.43
Clerical staff	16.92	12.23	29.15	218.63
Staff in these 13 occupations	**35.42**	**22.02**	**57.44**	**430.80**
All LHD staff	**29.68**	**18.38**	**48.06**	**360.45**

*Reference Group = LHDs with shared governance serving populations between 500,000 and 999,999; n=2

Appendix Table 3d. Staffing Benchmark Illustration for Shared Governance LHD "X" Serving Population of 750,000; Scenario 4: LHD "X" Provides Primary Care and Home Health Services

Occupation	Reference Group* Median FTEs per 100,000	Primary Care Adjust-ment (FTEs per 100,000)	Home Health Adjust-ment (FTEs per 100,000)	Adjusted FTEs per 100,000	Benchmark FTEs
Health service managers/directors	1.20	0.51	0.33	2.04	15.30
Registered nurses	6.99	3.61	7.84	18.44	138.30
Physicians	0.11	0.58	0.10	0.79	5.93
Environmental health (EH) specialists	3.78	2.07	2.52	8.37	62.78
Other EH scientists/technicians	1.58	0.00	1.23	2.81	21.08
Epidemiologists	0.52	0.08	0.07	0.67	5.03
Health educators	0.69	0.00	0.17	0.86	6.45
Nutritionists	2.20	1.52	0.62	4.34	32.55
Information systems specialists	0.79	0.76	0.39	1.94	14.55
Public information specialists	0.16	0.01	0.03	0.20	1.50
Behavioral health professionals	0.32	0.62	2.14	3.10	23.25
Emergency preparedness coordinators	0.16	0.03	0.04	0.23	1.73
Clerical staff	16.92	12.23	8.30	37.45	280.88
Staff in these 13 occupations	**35.42**	**22.02**	**23.78**	**81.22**	**609.15**
All LHD staff	**29.68**	**18.38**	**29.43**	**77.47**	**581.18**

*Reference Group = LHDs with shared governance serving populations between 500,000 and 999,999; n=2

Appendix Table 3e. Staffing Benchmark Illustration for Shared Governance LHD "X" Serving Population of 750,000; Scenario 5: LHD "X" Provides Primary Care, Home Health, and Behavioral Health Services

Occupation	Reference Group* Median FTEs per 100,000	Primary Care Adjust-ment (FTEs per 100,000)	Home Health Adjust-ment (FTEs per 100,000)	Behavioral Health Adjust-ment (FTEs per 100,000)	Adjusted FTEs per 100,000	Benchmark FTEs
Health service managers/directors	1.20	0.51	0.33	1.97	4.01	30.08
Registered nurses	6.99	3.61	7.84	5.29	23.73	177.98
Physicians	0.11	0.58	0.10	0.11	0.90	6.75
Environmental health (EH) specialists	3.78	2.07	2.52	1.88	10.25	76.88
Other EH scientists/technicians	1.58	0.00	1.23	0.44	3.25	24.38
Epidemiologists	0.52	0.08	0.07	0.29	0.96	7.20
Health educators	0.69	0.00	0.17	0.84	1.70	12.75
Nutritionists	2.20	1.52	0.62	0.21	4.55	34.13
Information systems specialists	0.79	0.76	0.39	0.42	2.36	17.70
Public information specialists	0.16	0.01	0.03	0.04	0.24	1,80
Behavioral health professionals	0.32	0.62	2.14	3.62	6.70	50.25
Emergency prepare. coordinators	0.16	0.03	0.04	0.01	0.24	1.80
Clerical staff	16.92	12.23	8.30	5.00	42.45	318.38
Staff in these 13 occupations	**35.42**	**22.02**	**23.78**	**20.12**	**101.34**	**760.05**
All LHD staff	**29.68**	**18.38**	**29.43**	**30.99**	**108.48**	**813.60**

*Reference Group = LHDs with shared governance serving populations between 500,000 and 999,999; n=2