Accounting for Population Health: A Profile of West Virginia's Public Health Workforce and Its Training Needs

Ian R.H. Rockett, PhD, MPH
Bethany C. McCunn, BA
Henry G. Taylor, MD, MPH

Department of Community Medicine
West Virginia University School of Medicine
Morgantown, West Virginia

Prepared for the West Virginia Bureau for Public Health, Department of Health and Human Resources

April 2006

TABLE OF CONTENTS

Introduction

In this era of evidence-based public health,[1,2] our capacity to anticipate and respond to public health problems in West Virginia has assumed paramount importance. The emergence of new communicable diseases and re-emergence of old ones in the closing decades of the twentieth century forcefully reminded us that a highly competent public health workforce, enabled and empowered by a viable infrastructure, is crucial to the maintenance and enhancement of the quality of life gains rendered by democracy and modernization. September 11 and international terrorism have generated potent reinforcement. In concert with the persistent health problems confronting West Virginians from injury and chronic disease, emergency preparedness has made assessment of the training needs of the public health workforce an imperative. In addressing that imperative, this report profiles the demographics, experience, and training needs of the workforce. Data derive from a computer-based survey that was conducted between 2004 and 2005.

Central to this workforce assessment are the core competencies for public health professionals, which were adopted in 2001 by the Council on Linkages Between Academia and Public Health Practice.[3] These competencies comprise eight skill domains:

(1) analytic assessment
(2) policy development and program planning
(3) communication
(4) cultural competency
(5) community dimensions of practice
(6) basic public health sciences
(7) financial planning and management
(8) leadership and systems thinking.

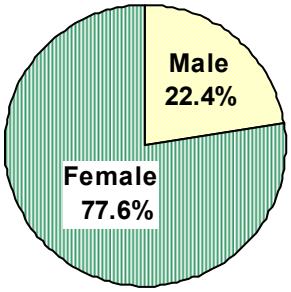
In turn, the competencies variously relate to ten essential public health services:

(i) identifying community health problems through monitoring health status
(ii) diagnosing and investigating community health problems and hazards
(iii) informing, educating, and empowering people on health issues
(iv) mobilizing community partnerships to identify and solve health problems
(v) developing policies and plans that support individual and community health efforts
(vi) enforcing laws and regulations that protect health and ensure safety
(vii) linking people to needed personal health services and assuring the provision of health care when otherwise unavailable
(viii) assuring a competent public health and personal health care workforce
(ix) evaluating the effectiveness, accessibility, and quality of personal and population-based health services
(x) conducting research to obtain new insights and innovative solutions to health problems.

People

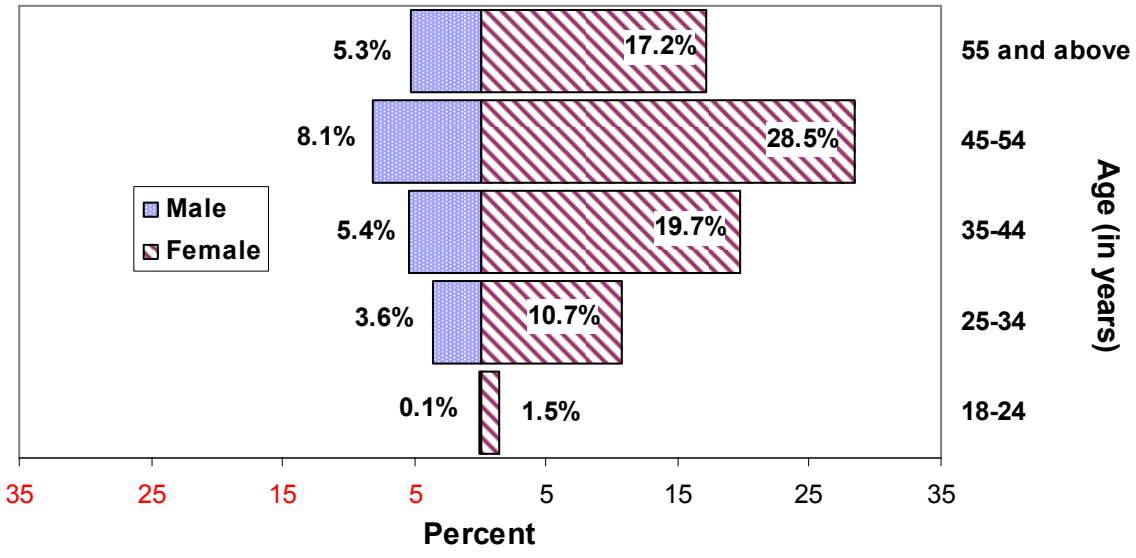
West Virginia has a predominantly female workforce. Females comprise over three-quarters of the public health employees in the State (Figure 1). By contrast, 51% of the State population is female.[4]

Figure 1. Gender of Public Health Employees (n=955)



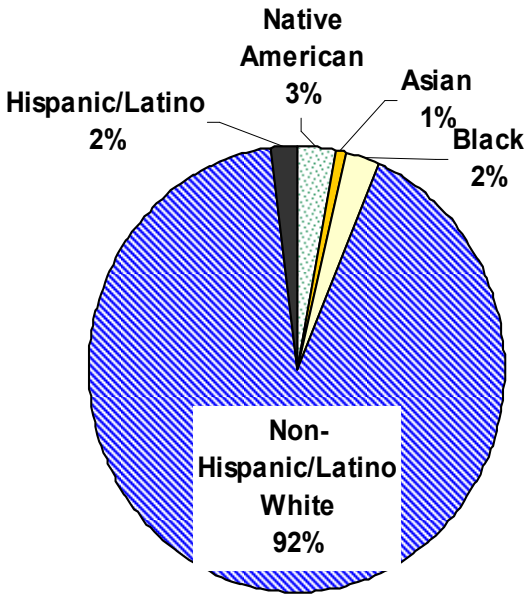
Disaggregation of the workforce by age, as well as gender, shows that approximately 80% of public health employees are ages 35 years and older, and 0% are at least 45 (Figure 2). Proportional age distributions are generally similar across gender.

Figure 2. Age of Public Health Employees by Gender (n=944)



Ninety-two percent of the West Virginia public health workforce is white, with a small representation of Native Americans, Blacks, Latinos, and Asians (Figure 3). This breakdown approximates the racial-ethnic composition of the State population. According to the 2000 census, the West Virginian population was 94.6% non-Hispanic/Latino white, 3.2% black, 0.7% Hispanic/Latino, 0.5% Asian, 0.2% Native American, and 0.8% other.[4]

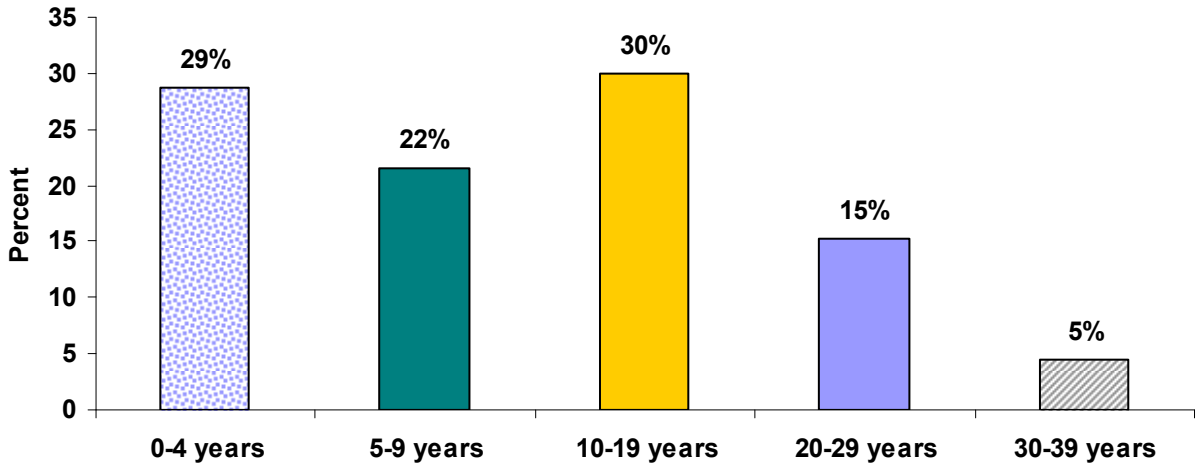
Figure 3. Race of Public Health Employees (n=996)



Experience and Education

A fifth of the workforce has been engaged in a public health occupation for twenty years or more (Figure 4). Thirty percent have been public health employees for 10-19 years. This means that half of West Virginian public health employees possess less than 10 years of relevant experience.

Figure 4. Years Worked in Public Helath by Public Health Employees (n=701)



Fourteen percent of public health employees have worked in their current department for at least 20 years, and over one-third for less than five years (Figure 5).

Figure 5. Years Worked at Current Department by Public Health Employees (n=700)

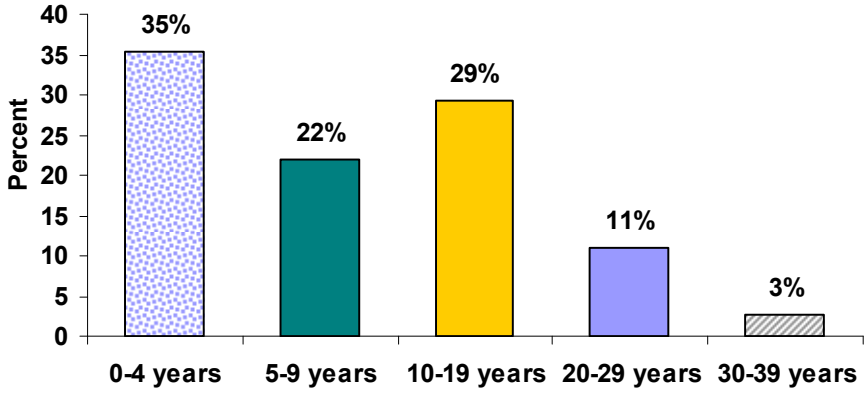
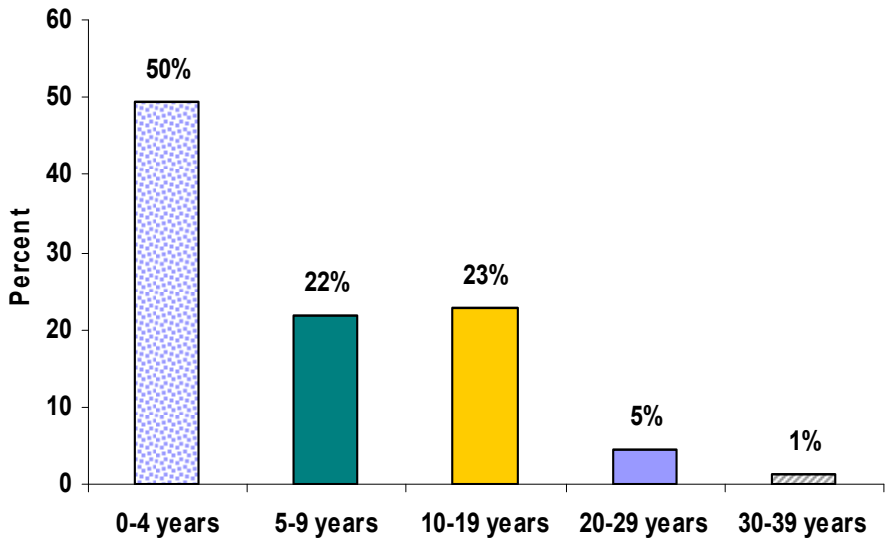


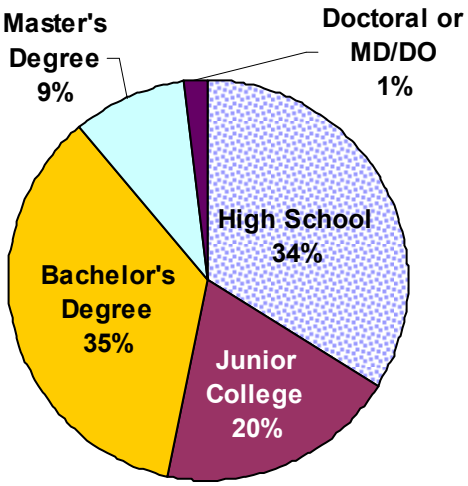
Figure 6. Years Worked at Current Position by Public Helath Employees (n=692)



Fifty percent of public health employees in West Virginia have worked in their current position for less than five years (Figure 6). For 6%, duration has been 20 years or more.

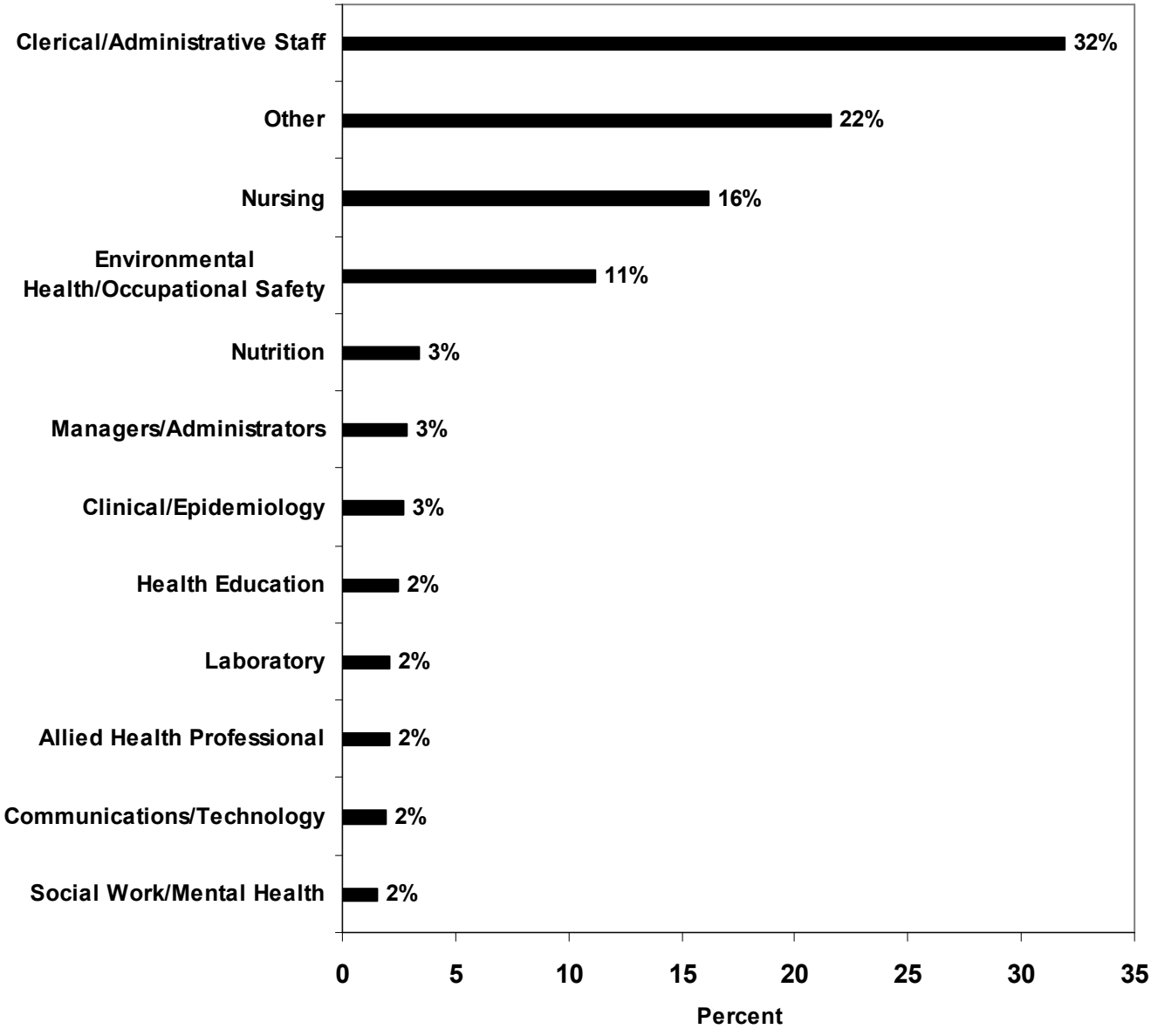
Forty-five percent of West Virginia's public health employees who completed high school hold a baccalaureate or more advanced degree (Figure 7). Only one percent holds a doctoral degree. Nine percent earned a master's degree. Twenty percent have an associates' degree as their highest qualification, and 34% a high school diploma.

Figure 7. Highest Degree Obtained by Public Health Employees (n=654)



Occupational breakdown of the public health workforce reveals a predominance of clerical and administrative staff (Figure 8). These staff account for approximately one-third of the positions, followed by nurses at 16% and environmental health and occupational safety professionals at 11%. Aside from the category labeled Other, which accounts for over a fifth of the workers, the remainder is evenly, albeit thinly, distributed over eight occupational classes.

Figure 8. Occupational Classification Reported by Public Health Employees (n=1085)



Consistent with their occupational representation, nurses predominate among that segment of the public health workforce holding a diploma or degree (Figure 9). These data pertain to post-secondary education.

Figure 9. Educational Fields in which Public Health Employees Hold Degrees (n=613)

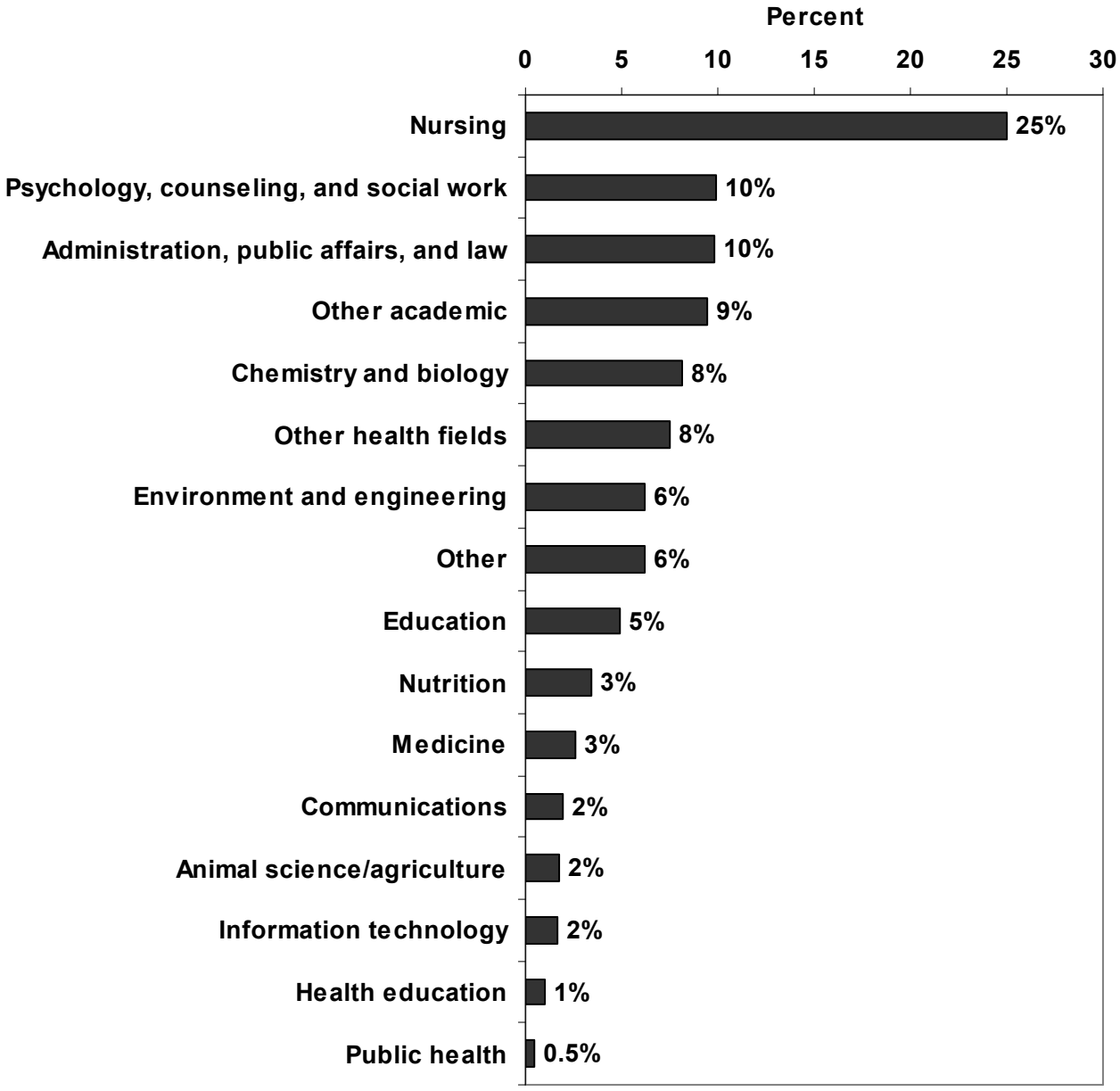


Figure 10 relates employee age to educational attainment. These findings are unremarkable given the age distribution of the workforce reported in Figure 2. Figure 11 displays the licensing data.

Figure 10. Educational Attainment by Age of Public Health Employees (n=658)

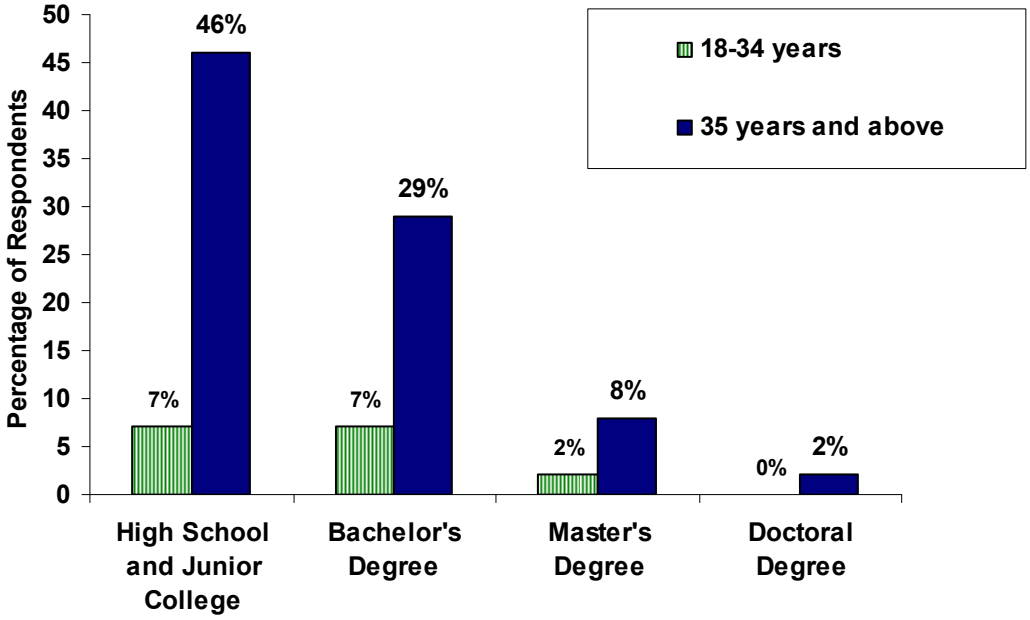


Figure 11. Number of Public Health Employees with Licenses, Certificates, and Other Credentials

Licensed	
Registered Nurse	128
Social worker	22
Licensed Practical Nurse	12
Advanced Practical Nurse	10
Physician	9
Dentist	4
Attorney/Hearing Officer	1
Physician Assistant	1

Certified	
Public Health Nutritionist	37
Medical Technologist	23
Laboratory Scientist/Technician	23
Certified Engineer	10
Dental Worker	6
Nursing Aide	3
Dietician	1

Other Credentials	
Registered Sanitarian	63
Certified Health Education Specialist	7
Environmental Safety/Health Specialist	1

The educational backgrounds associated with each professional group are displayed in Figure 12.

Figure 12. Educational Background of Public Health Employees by Occupational Classification

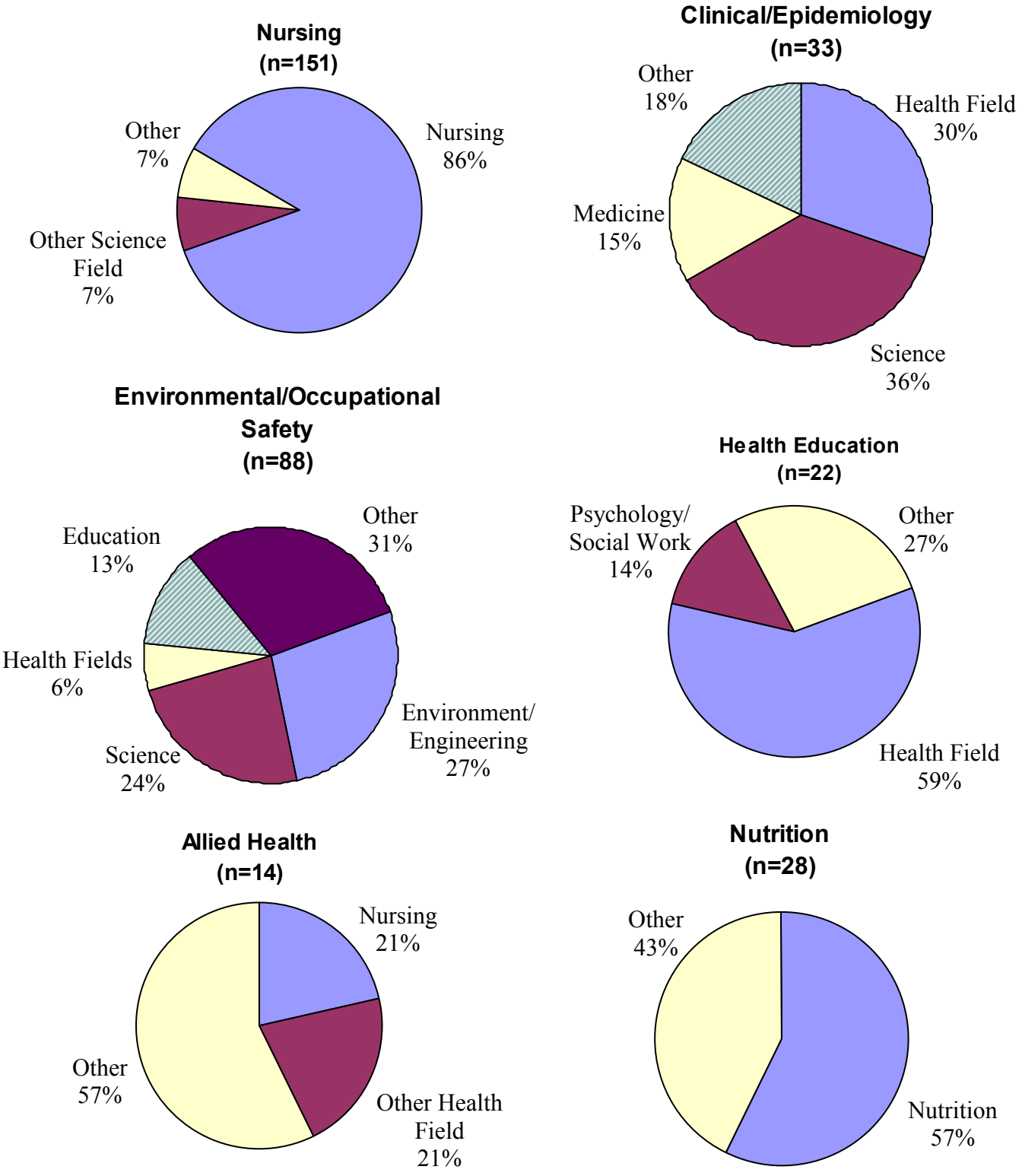
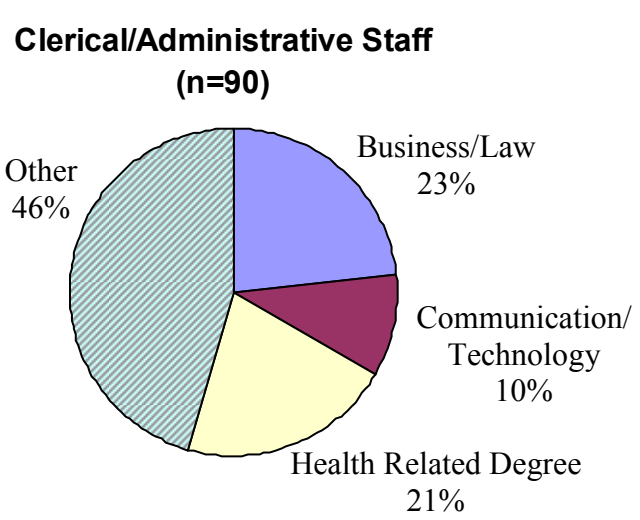
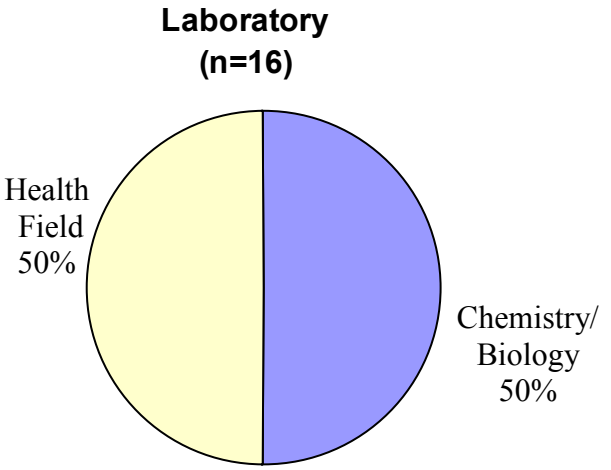
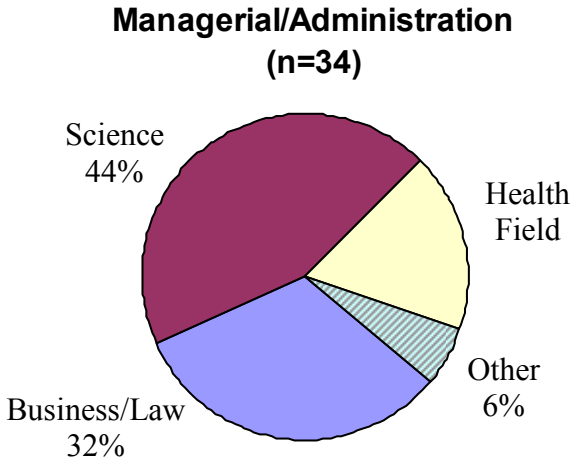
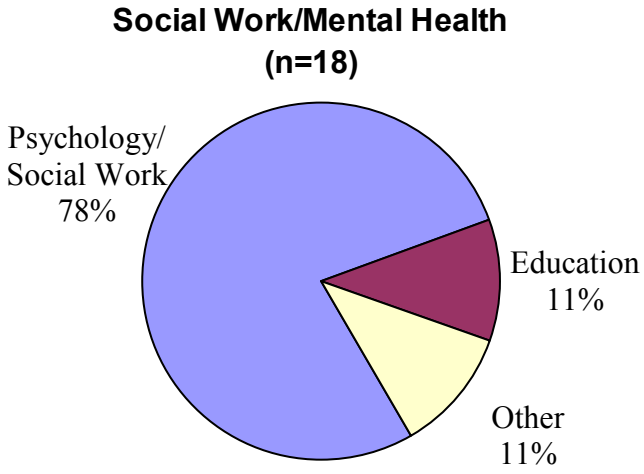


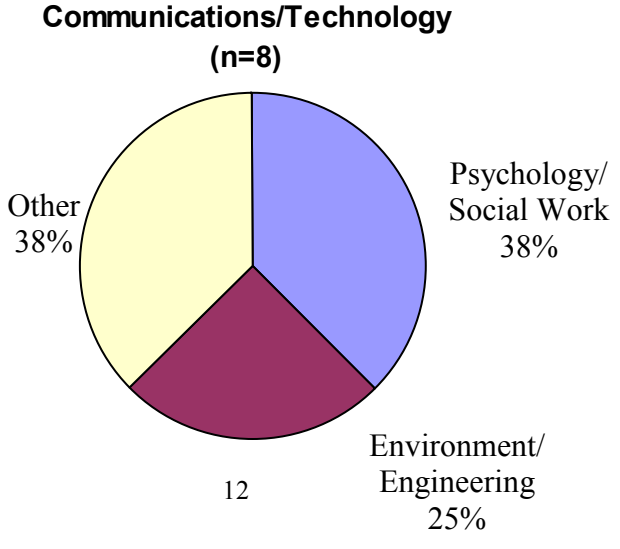
Figure 12. Educational Background of Public Health Employees by Occupational Classification











Beyond the educational attainment and professional experience of West Virginia's public health employees looms the important issue of training needs. The following data show that a substantial component of the workforce wants additional training. Categories pertaining to these training interests are not mutually exclusive (Figure 13). Almost a quarter of the public health workforce is interested in earning an MPH degree. A slightly smaller proportion wants a doctorate or another type of master's degree. Approximately 40% seek continuing education credits and/or certificates.

Figure 13. Training Programs Desired Among Public Health Employees (n=1103)

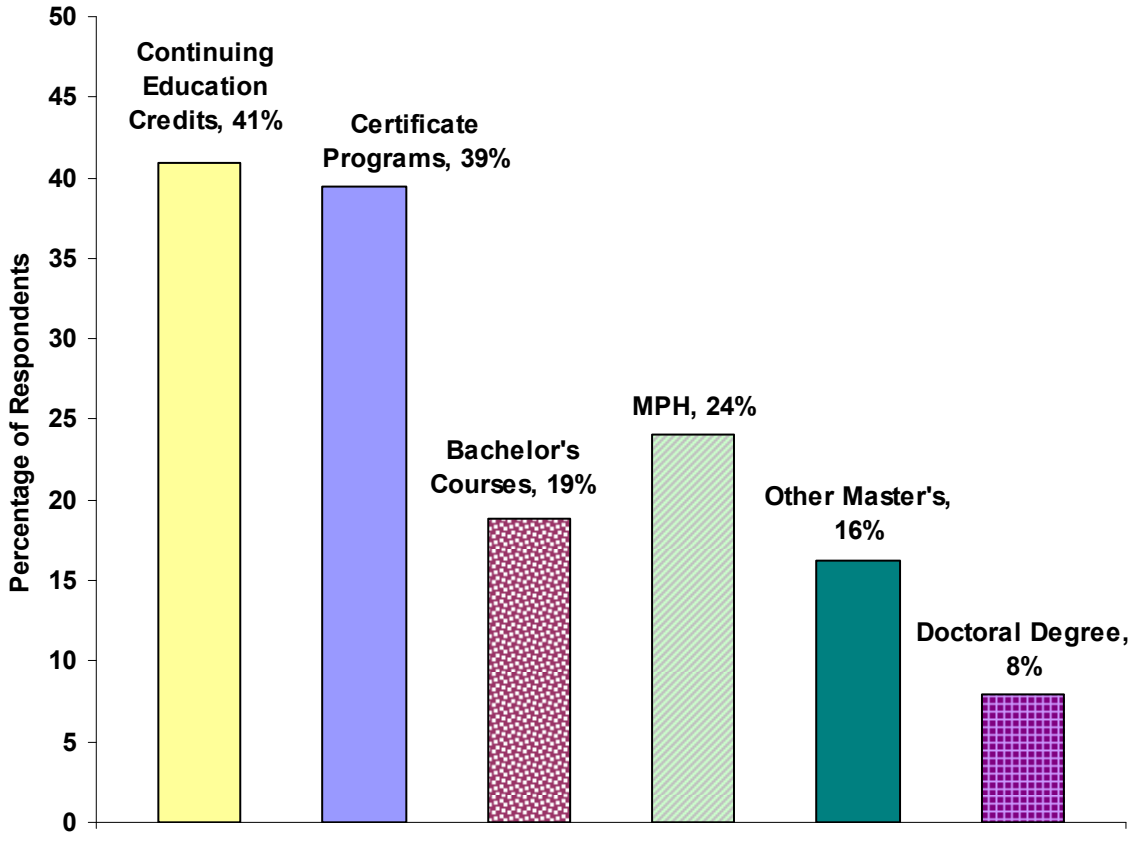
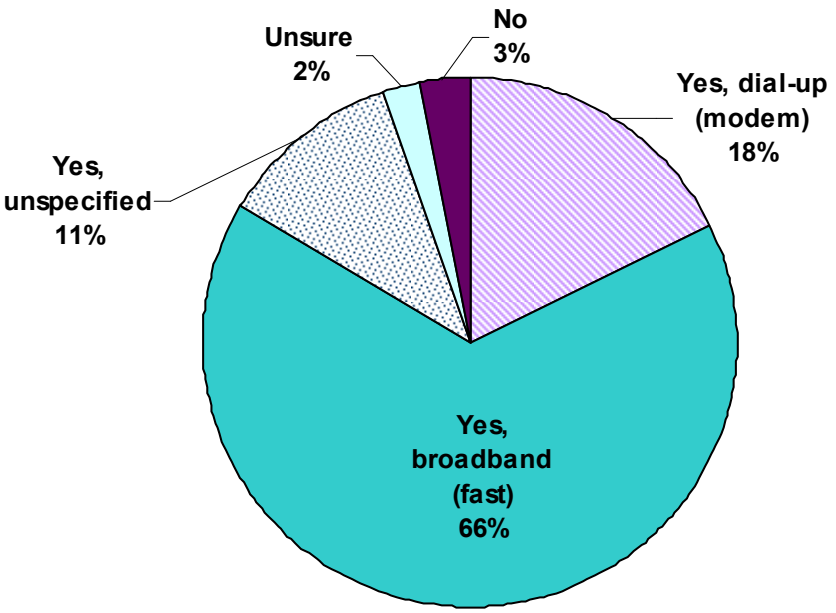


Figure 14. Internet Access at Work for Public Health Employees (n=670)



On-the-job Internet access is now almost universal for the public health workforce in West Virginia. Two-thirds of respondents report that their access is via a fast Internet service; that is, through a broadband connection (Figure 14). Another 29% also report Internet access, with a large majority of these specifying that their access is slow - comes via a telephone modem. The remainder did not indicate mode of access.

Augmenting their workplace capacity, three-quarters of public health employees in West Virginia can access the Internet from their homes (Figure 15). Twenty-eight percent use broadband technology.

Figure 15. Internet access at home for Public Health Employees (n=673)

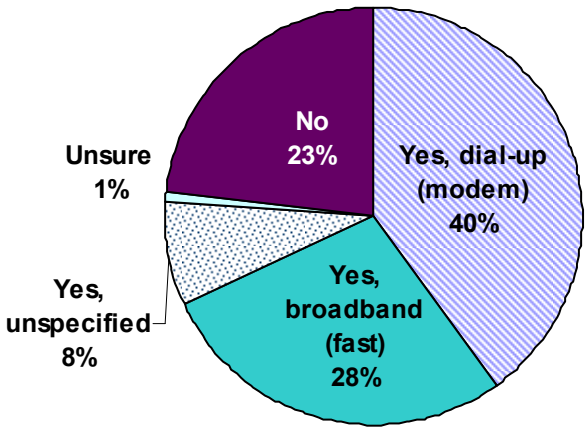
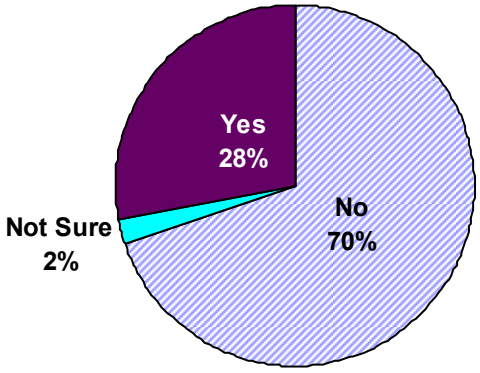


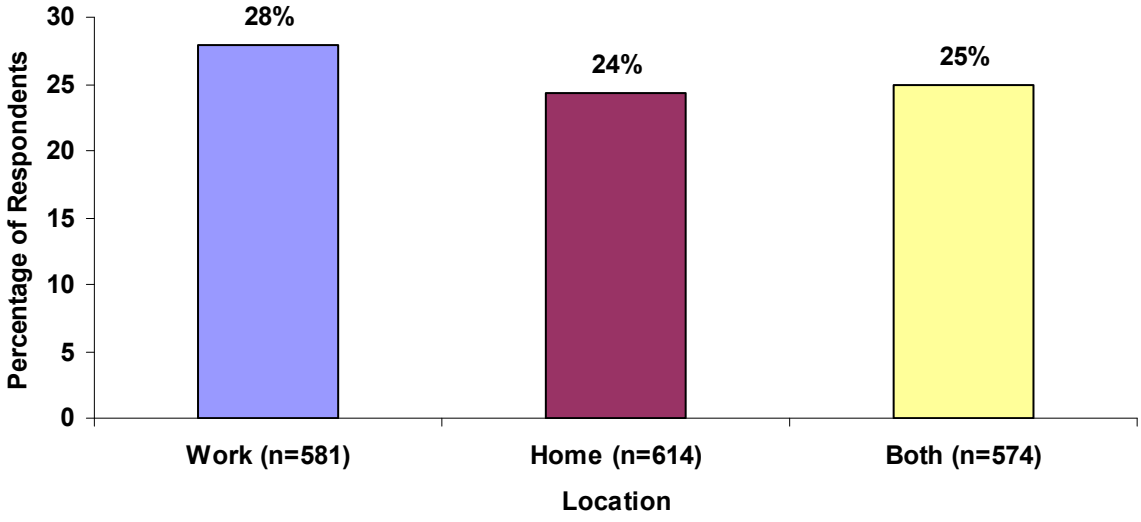
Figure 16. Course Taken via the Internet by Public Health Employees (n= 676)



Twenty-eight percent of the West Virginia public health workforce has taken a course over the Internet (Figure 16).

Focusing on employees with Internet access, Figure 17 shows the prevalence of employees who have taken a course through that medium by location – at work or at home. Twenty-five percent have taken a web-based course both at work and at home.

Figure 17. Percentage of Public Health Employees with Internet Access Who Have Taken a Course via the Internet by Access Location



Interpreting Top Priority Training Needs

Determination of the top priority training needs employed the procedure used in the workforce document constructed by the University of North Carolina for their state[5].

This procedure is reproduced verbatim:

"A color code was used to identify the percent of the workforce who indicated each competency as a training need.
Purple = identified as training need by more than 66% of the workforce
Red = identified as training need by 50% to 66% of the workforce
Orange = identified as training need by 33% to 49% of the workforce
Gray = identified as training need by less than 33% of the workforce

For emergency preparedness and response competencies, individuals were asked to respond to the following questions using the scale shown.

My personal confidence to do this activity: 1=Low, 2, 3, 4=High
My level of need for training: 1=Low, 2, 3, 4=High

The level of need for training in emergency preparedness and response competencies was identified by ranking the percent of participants who indicated a low confidence to perform the activity (1 or 2) and a high need for training (3 or 4).

Emergency preparedness competencies were ranked according to the number of employees who indicated each competency as a training need. The 5 competencies with the highest percentages were identified as top emergency preparedness training needs.

For public health core competencies, individuals were asked to respond to the following questions using the scale shown.

This skill is important to my job: 1=Low, 2, 3, 4=High
My level of need for training: 1=Low, 2, 3, 4=High

The level of need for training in core public health competencies was identified by ranking the percent of participants who indicated high importance to their job (3 or 4) and a high need for training (3 or 4).

Public health core competencies were also ranked according to percent, and the 8 competencies with the highest percentages were identified as top core competency training needs."

Statewide Training Needs Data

This section documents the self-reported emergency preparedness and public health training needs of the West Virginia public health workforce as a whole. Of the 1,752 public health employees in West Virginia, 1,103 (63%) submitted assessment data by September, 2004.

Emergency Preparedness and Response Competencies
Percent of public health employees who indicated low personal confidence to do this activity (1 or 2) and high need for training (3 or 4):

33%	Describe the signs and symptoms of exposure to chemical agents
30%	Describe the signs and symptoms of biological agents
27%	Describe the incident command system in your community
26%	Use emergency communication equipment
25%	Describe your health department's emergency response plan

Public Health Core Competencies
Percent of public health employees who indicated high importance to job (3 or 4) and high need for training (3 or 4):

43%	Stay informed of public health laws and regulations
43%	Communicate effectively both in writing and speaking
37%	Maintain the security and confidentiality of personal and public health information
33%	Explain your technical/computer needs to the appropriate people
30%	Be aware of amount of each important health problems in your community
30%	Interact effectively with people from diverse cultural, socioeconomic, and educational backgrounds
29%	Advocate for public health programs and resources
28%	Plan and implement effective emergency response services

Occupational Training Needs Data:

Registered Nurse

This section documents the self-reported emergency preparedness and public health training needs of the West Virginia public health workforce, disggregated by occupational classification, and starting with registered nurses. Registered nurses comprised 12% (n=133) of the 1,103 public health workforce employees who responded to the survey.

Emergency Preparedness and Response Competencies
Percent of public health employees who indicated low personal confidence to do this activity (1 or 2) and high need for training (3 or 4):

39%	Describe the signs and symptoms of exposure to chemical agents
36%	Use emergency communication equipment
30%	Describe the incident command system in your community
28%	Perform your communication role in an emergency
26%	Describe the signs and symptoms of biological agents

Public Health Core Competencies
Percent of public health employees who indicated high importance to job (3 or 4) and high need for training (3 or 4):

59%	Stay informed of public health laws and regulations
53%	Use public health software like EPI-INFO
50%	Plan and implement effective emergency response services
49%	Advocate for public health programs and resources
48%	Explain your technical/computer needs to the appropriate people
45%	Monitor enforcement of public health laws and regulations
45%	Conduct community assessments including identifying needs, assets and priorities
45%	Communicate effectively both in writing and speaking

Occupational Training Needs Data

Nurse's Aide, LPN and APN Masters (n=25)

Emergency Preparedness and Response Competencies
Percent of public health employees who indicated low personal confidence to do this activity (1 or 2) and high need for training (3 or 4):

37%	Describe your health department's emergency response plan
37%	Describe the incident command system in your community
37%	Perform your communication role in an emergency
37%	Describe the signs and symptoms of exposure to chemical agents
33%	Find resources that will help you carry out your responsibilities during an emergency

Public Health Core Competencies
Percent of public health employees who indicated high importance to job (3 or 4) and high need for training (3 or 4):

60%	Refer clients to other agencies where appropriate to receive personal health services
56%	Recognize a disease outbreak in your community or nearby communities
52%	Use public health software like EPI-INFO
52%	Maintain the security and confidentiality of personal and public health information
48%	Explain public health regulations to community
48%	Solicit input from individuals and organizations about important health issues in the community
44%	Communicate with other agencies to identify new disease cases in your community
44%	Present information or data on health issues to other health professionals or to the general public

Occupational Training Needs Data:

Physician and Dentist (n=13)

Emergency Preparedness and Response Competencies
Percent of public health employees who indicated low personal confidence to do this activity (1 or 2) and high need for training (3 or 4):

55%	Use emergency communication equipment
36%	Describe the signs and symptoms of exposure to chemical agents
35%	Describe the signs and symptoms of biological agents
27%	Define responsibilities of a health department during an emergency situation
27%	Describe your health department's emergency response plan

Public Health Core Competencies
Percent of public health employees who indicated high importance to job (3 or 4) and high need for training (3 or 4):

77%	Stay informed of public health laws and regulations
50%	Create partnerships between public and private organizations to deliver public health services
46%	Write proposals to obtain funding
46%	Meet with professionals and community members to gather opinions about how to promote the health of the population to address a priority health problem
46%	Use health promotion models to design or evaluate a health intervention program
46%	Develop long-range plans for health programs
46%	Use regulations to promote health in your community
46%	Explain public health regulations to community

Occupational Training Needs Data

Medical Technician (n=23)

Emergency Preparedness and Response Competencies
Percent of public health employees who indicated low personal confidence to do this activity (1 or 2) and high need for training (3 or 4):

48%	Describe the signs and symptoms of exposure to chemical agents
43%	Describe the signs and symptoms of biological agents
39%	Describe the incident command system in your community
30%	Define responsibilities of a health department during an emergency situation
30%	Use emergency communication equipment

Public Health Core Competencies
Percent of public health employees who indicated high importance to job (3 or 4) and high need for training (3 or 4):

74%	Stay informed of public health laws and regulations
61%	Explain your technical/computer needs to the appropriate people
56%	Communicate effectively both in writing and speaking
52%	Create appropriate staff development and training plans for employees
52%	Maintain the security and confidentiality of personal and public health information
48%	Read scientific literature to keep up-to-date with knowledge of new disease and disease risk factors
48%	Apply principles of group dynamics to develop effective partnerships
48%	Collect, summarize, and interpret information relevant to a health issue

Occupational Training Needs Data:

Certified Health Education Specialist (n=18).

Emergency Preparedness and Response Competencies
Percent of public health employees who indicated low personal confidence to do this activity (1 or 2) and high need for training (3 or 4):

47%	Use emergency communication equipment
47%	Describe the signs and symptoms of biological agents
43%	Describe the signs and symptoms of exposure to chemical agents
41%	Describe your health department's emergency response plan
35%	Describe the incident command system in your community

Public Health Core Competencies
Percent of public health employees who indicated high importance to job (3 or 4) and high need for training (3 or 4):

61%	Maintain the security and confidentiality of personal and public health information
61%	Be aware of amount of each important health problems in your community
50%	Read scientific literature to keep up-to-date with knowledge of new disease and disease risk factors
50%	Use statistics to analyze health data and make relevant inferences from the data
44%	Stay informed of public health laws and regulations
44%	Present information or data on health issues to other health professionals or to the general public
44%	Identify cultural, social, and behavioral factors that affect health problems in your community
44%	Solicit input from individuals and organizations about important health issues in the community

Occupational Training Needs Data

Registered Sanitarian (n=63).

Emergency Preparedness and Response Competencies
Percent of public health employees who indicated low personal confidence to do this activity (1 or 2) and high need for training (3 or 4):

49%	Describe the signs and symptoms of exposure to chemical agents
40%	Describe the incident command system in your community
38%	Describe the signs and symptoms of biological agents
35%	Describe your health department's emergency response plan
30%	Use emergency communication equipment

Public Health Core Competencies
Percent of public health employees who indicated high importance to job (3 or 4) and high need for training (3 or 4):

78%	Plan and implement effective emergency response services
64%	Recognize a disease outbreak in your community or nearby communities
60%	Stay informed of public health laws and regulations
59%	Communicate effectively both in writing and speaking
58%	Collect biological or environmental samples to better understand a health problem
56%	Perform environmental health risk assessments
56%	Maintain the security and confidentiality of personal and public health information
56%	Collect, summarize, and interpret information relevant to a health issue

Occupational Training Needs Data:

Licensed Social Worker (n=22)

Emergency Preparedness and Response Competencies
Percent of public health employees who indicated low personal confidence to do this activity (1 or 2) and high need for training (3 or 4):

59%	Describe the signs and symptoms of biological agents
55%	Describe the signs and symptoms of exposure to chemical agents
55%	Describe your health department's emergency response plan
55%	Describe the incident command system in your community
41%	Use emergency communication equipment

Public Health Core Competencies
Percent of public health employees who indicated high importance to job (3 or 4) and high need for training (3 or 4):

45%	Stay informed of public health laws and regulations
41%	Be aware of amount of each important health problems in your community
41%	Maintain the security and confidentiality of personal and public health information
41%	Coordinate with other groups and agencies to ensure appropriate health care services are provided to your community
36%	Conduct community assessments including identifying needs, assets and priorities
36%	Develop long-range plans for health programs
36%	Refer clients to other agencies where appropriate to receive personal health services
36%	Understand the feasibility and expected outcome of each policy option

Conclusion

A call for upgrading skills or acquiring new ones is implied by any gap between the training of public health employees and their capacity to respond to population health needs. This issue is addressed in a seminal Institute of Medicine report entitled *Who Will Keep the Public Healthy: Educating Public Health Professionals for the 21st Century*.[6] The authors of that report argue for close connections between state and local health departments on the one hand, and university-based public health training programs on the other. However, they also recognize that state and local health departments can themselves play a key public health training function. With distance learning an essential component, fulfillment of this function has been markedly facilitated by the reach and richness of the Internet as a vital training and communications tool. For that reason, data on web accessibility for the West Virginia public health workforce was made an integral part of the assessment.

The survey achieved a 63% response rate, which is below optimum. This issue is elaborated upon in the Appendix. On balance, we conclude that this workforce assessment provides a fairly robust, but likely conservative platform for planning and implementing educational and training strategies and programs by the public health agencies of West Virginia.

Appendix

Methods and Research Limitations

This workforce survey was based on the Core Competencies for Public Health developed by the Council on Linkages Between Academia and Practice which is supported by the Public Health Foundation.[3] The specific language of the questionnaire was adapted from an assessment constructed by Tulane University in 2001.[7] It has subsequently been used in workforce assessments in North Carolina[8] and Virginia.[9] Additional demographic questions were added by an advisory to the West Virginia Bureau for Public Health in order to identify occupations consistent with West Virginia employment categories. In addition, information was obtained about whether employees obtained their professional degrees from West Virginian schools, or from schools located elsewhere in the United States or in another country.

The survey data were collected between May and September 2004 from employees of the West Virginia Bureau for Public Health and all 48 Local Health Departments in West Virginia. Respondents used an online assessment tool developed by the University of North Carolina Center for Public Health Preparedness. The online system was pretested by members of the advisory in May 2004. To maximize the availability of support staff, it was made available to different organizational units at different times in July, August, and September of 2004. Difficulties with how the online system stored data required hand validation of entries. Additional demographic data were obtained for some records months after the original data collection.

The data were set up in an Excel spreadsheet. Data were cleaned, and cases deleted prior to importation into SPSS version 13 for Windows. Following data importation, variables were recoded for analysis. Counts for each question and the responses were obtained using SPSS, and then graphed using Excel. Some variables had to be recoded for purposes of analysis. They were recoded in SPSS using the "Recode into New Variable" function in order to maintain the original responses. A few select variables were recoded in Excel owing to the complexity of the responses. Cross tabulations were compiled for each set of questions pertaining to training needs and wants, with responses being ranked from high to low within a Word document (also see the section entitled **Interpreting Top Priority Training Needs**).

Of 1,752 West Virginia public health employees 1,103 completed the survey, yielding a response rate of 63%. The West Virginia response rate is comparable to rates that have been obtained through mail surveys.[10] A recent study suggests that response rates to web-based surveys may be lower than that for mail surveys.[11] Although a response rate of 70% or higher would have been scientifically desirable, the West Virginia rate is not atypical in a climate where the public has become saturated with requests to complete surveys, especially from the marketing sector.

The primary issue of non-response for analysts is whether non-respondents vary substantially from respondents in ways that bias results.[11] Owing to confidentiality, we were unable to compare non-respondents with respondents, even on basic demographics. However, we speculate that respondents are likely to over-represent the more highly qualified sector of the workforce. Reflected by their occupational and career attainment, such employees are probably more willing and able than less qualified counterparts to access and complete a computer-based survey. The likely net effect of non-response is that the perceived training needs identified in this report overestimate the experience of the public health workforce. They may also underestimate actual training needs. Standards characterizing an optimally trained workforce have risen sharply in the face of the myriad challenges wrought by bioterrorism, emerging and re-emerging communicable diseases, and an aging infrastructure.[6] Variable Internet access for public health workers in West Virginia, whether due to economics, a training deficit, or both, does constrain the generalizability of the survey results.

Another research limitation is that the data presented here are self-reported rather than record-based. Thus, these data are subjective. A mitigating factor is the seriousness with which public health employees tend to view their responsibilities and duties. The participation of survey respondents indexes a high degree of commitment among that group to protecting and improving population health. By the same token, non-participation reflects a lower degree of commitment among the employee minority not tapped by the survey.

Acknowledgements

Assessment of the State's public health workforce was conducted under an award made to the West Virginia University (WVU) Research Corporation by the Bureau for Public Health (Agreement Number G031141). Responsibility for preparation of this report on that assessment lay with a team affiliated with the Department of Community Medicine (CMED) in the WVU School of Medicine. Consequently, report contents do not necessarily reflect the views of the Bureau for Public Health. The survey that generated the data was conducted by the University of North Carolina, Chapel Hill (UNC), under a subcontract with WVU. Items closely match those in the survey instrument that UNC administered in a 2004 assessment of the North Carolina public health workforce. Their report provided the model for this report, and their method for interpreting top priority training needs was fully adopted.

One person is singled out for a special thanks: Catherine Taylor of the Bureau for Public Health for coordinating data collection with the UNC survey team and serving as liaison between the Bureau and CMED. A debt is also owed Elsa Nadler, Grants Administrator in CMED, for her assistance with the budget, and Alan Ducatman, MD, MSc, Chair of CMED, for his support and encouragement for the project as a whole.

References

1. Brownson, RC, Baker, EA, Leet, TL, Gillespie KN. *Evidence-Based Public Health.* New York, NY: Oxford University Press, 2003.

2. Dawes, M, Davies, P, Gray, A, Mant, J, Seers, K, Snowball, R. *Evidence-Based Practice: A Primer for Health Care Professionals*. London, UK: Churchill Livingstone, 1999.

3. *Core Competencies for Public Health Professionals*. Council on Linkages Between Academia and Public Health Practice website. Available at: http://www.phf.org/competencies.htm. Accessed April 11, 2006.

4. United States Census Bureau, 2006). *West Virginia QuickFacts from the US Census Bureau*. Available from: http://quickfacts.census.gov/qfd/states/54000.html. Accessed February 25, 2006.

5. North Carolina Center for Public Health Preparedness. *North Carolina Public Health. Everywhere. EveryDay. EveryBody*. October, 2004.

6. Gebbie, K, Rosenstock, L, Hernandez, LM (eds). *Who Will Keep the Public Healthy? Educating Public Health Professionals for the 21st Century*. Washington, DC: National Academies Press, 2003.

7. Chauvin, S., Anderson, A., Bowdish, B. Assessing the professional development needs of public health professionals. *Journal of Public Health Management and Practice* 7; 2001: 23-27.

8. Harrison, L.M., Davis, M.V., MacDonald, P.D., Alexander, L.K., Cline, J.S., Alexander, J.G., et al. *Public Health Reports* 120 (supplement 1); 2005: 28-34.

9. Marcus, AC, Crane, LA. Telephone surveys in public health research. *Medical Care* 24; 1986: 97-112.

10. Raziano, DB, Jayadevappa, R, Valenzula, D. E-mail versus conventional postal mail survey of geriatric chiefs. *The Gerontologist* 41; 2001: 799-804.

11. Aday, LA. *Designing and Conducting Health Surveys*, second ed. San Francisco, CA: Jossey-Bass, 1996.