

PUBLIC HEALTH EDUCATION AND THE UNIVERSITY OF CALIFORNIA

Final Report of the Health Sciences Committee -- April 2004

BACKGROUND

In recent years, the field of public health has been vaulted into the national spotlight. The tragedies of September 11, 2001, emergence of SARS and the West Nile Virus, and alarming new threats of bioterrorism are among the events fueling this focus. The nation's public health workforce – dedicated to prevention and control of communicable and chronic diseases, and to preparing neighborhoods, communities, and nations to respond to new and changing threats – has suddenly become more visible. This workforce ranges from front-line public health nurses and health educators to staff of non-profit community service agencies, directors of state health departments, university-based researchers and educators, and leaders and scientists employed by national entities such as the Centers for Disease Control and Prevention (CDC).

To assess the adequacy of the nation's public health system, the Institute of Medicine (IOM), CDC, and other national bodies have convened experts to examine existing public health resources and to assess future public health education and workforce needs. In many instances, these efforts have been hindered by a lack of consistent data at state and national levels because public health initiatives are undertaken in a wide variety of settings by individuals who are not always categorized as public health practitioners. Despite this complexity, national studies show that the demand for trained public health professionals will increase and, unless things change, will continue to outpace supply. Education is fundamental to building and maintaining the public health workforce. In California, four accredited schools and five smaller degree/certification programs provide public health education, with the largest research and education programs in the state offered by University of California (UC) Schools of Public Health (SPH) located at Berkeley (UCB) and Los Angeles (UCLA).

This report provides an overview of public health activities and occupations; a description of the current public health infrastructure and workforce, both nationally and within California; a summary of public health educational programs in California; and a set of overall findings and recommendations regarding UC's role in preparing future leaders and professionals for careers in public health service, research, and education.

WHAT IS PUBLIC HEALTH?

Public health has been defined as "the science and art of promoting health, preventing disease, prolonging life and improving quality of life through organized efforts of society."¹ Public health has long been seen as complementary to medical treatment: Asklepios, the Greek God of medicine, had two daughters: Hygiea - the Goddess of prevention, and Panacea - the Goddess of treatment. Research findings support this link. In one study, for example, 10% of premature deaths were considered avoidable through improved access to medical care. The remaining 90% were due to personal risk behaviors, environmental risks, and human biology.² These latter factors are central targets for public health efforts.

Historically, public health has focused not only on diseases, but also on conditions associated with health, such as poverty, sanitation, and nutrition. Public health successes are credited with helping to reduce the prevalence of many infectious diseases; improving the safety of workplaces; reducing and controlling injuries among the general population; enhancing prevention and treatment of chronic conditions; and contributing to improvements in sanitation and food safety. Through activities ranging from basic research, to frontline efforts such as vaccination programs, to leadership at national levels on health policy and disease control, public health issues and outcomes touch the lives of people throughout the world.

Renewed efforts to delineate the elements of an ideal system, including workforce competencies and overarching public health goals,³ highlight the need to focus on the multiple biological, environmental, and social and behavioral factors that affect health. Spiraling health care costs and the growing number of uninsured Americans continue to call into question the adequacy of the nation's health care delivery system. Documented disparities in health status among ethnic and racial groups underscore the need for new efforts and initiatives to reduce such disparities. Events ranging from threats of bioterrorism to the development of new technologies and advances in genomics, bioinformatics, and other areas present opportunities for collaboration between public health and other fields, such as medicine, law, and biotechnology. Notwithstanding these needs, many individuals question the adequacy of the public health system and its workforce for responding to current and future needs.

WHO IS THE PUBLIC HEALTH WORKFORCE AND WHAT DO THEY DO?

The public health workforce includes clinicians (physicians, nurses, dentists); occupational and environmental health specialists; epidemiologists and biostatisticians; health program administrators and health educators; and health economists, planners, and policy analysts. Public health professionals are more specifically defined as individuals holding advanced degrees in public health or a related field. Overall, however, the public health workforce is said to include individuals who work in:

- Governmental public health agencies (i.e., federal, state, county, and local health departments)
- Non-governmental public health organizations (e.g., community-based social service organizations and advocacy groups)
- Healthcare financing and delivery systems (e.g., hospitals, health plans and medical groups)
- Academic and research institutions
- Private organizations (e.g., disease management, information technology and biotechnology firms)

The public health workforce focuses on three broad and overarching areas: assurance, assessment, and policy development/advocacy. Within these areas, efforts range from health surveillance, protection, and promotion to policy development, planning, and regulation, as well as the organization, delivery, and evaluation of health services directed toward individuals and populations. Appendices A, B, and C, respectively, provide information regarding the 12 most common public health specialties; occupations

classified by the U.S. Bureau of Health Professions as public health related; and descriptions of each of the public health workforce sectors listed above. Appendix D provides a description of “essential public health services.”

In assessing workforce needs, it is important to note that many public health workers have no formal public health training.⁴ Others have training in specific public health skills, such as epidemiology, biostatistics, or health education. A smaller number has received formal public health education, with the most prevalent degree being a Masters of Public Health (MPH). Other public health degrees, such as the Doctor of Public Health (DrPH), the Doctor of Philosophy in Public Health (PhD), the Doctor of Science (ScD), and joint degrees such as the MD/MPH are granted by a relatively small number of schools.

Current Workforce Estimates and Needs

For several years, experts have expressed concerns about the size and competencies of the public health workforce.⁵ National and state workforce estimates are frequently limited to surveys of government agencies. Estimating the impact of these numbers is further complicated by the lack of a verifiable number or formula that defines an adequate public health workforce. Despite these limitations, the most frequently cited estimate puts the national public health workforce at nearly 450,000 paid, full-time workers, with an estimated 45% employed in governmental settings.⁶ Numbers in non-governmental sectors are very difficult to estimate because these organizations neither routinely collect occupational data nor classify it according to federal standards.

Nationwide, the greatest demand among professional occupations is for public health nurses,⁷ followed by environmental scientists, health educators, epidemiologists, and administrators. In the private and non-profit sectors, vacancies exist in many of these same disciplines. Employers in these sectors, however, report particular need for health services administrators, health analysts, and program managers. Governmental public health agencies may face the steepest challenges of all employment sectors. These agencies cite a widening scope of mandated activities and greater client needs at a time of severe budget constraints, which have generally resulted in lower salaries and understaffing. One notable exception is in the area of bioterrorism preparedness, where an increase in targeted federal funding began in 2002.

In California, preliminary results of a UC San Francisco (UCSF) study of public health workforce in five counties shows that recruitment of trained professionals (i.e., those with advanced degrees and/or certification) is a challenge due to limited applicant pools and non-competitive pay. Rural communities appear to be hardest hit by this challenge.⁸ According to a UCSF Center for Health Professions study of six California Local Public Health Agencies, the greatest staffing need, with or without formal public health training, is for clinicians (including nurses/nurse practitioners, dentists, physicians), microbiologists, program administrators, and dietitians. Where public health degrees are required, significant shortages exist for epidemiologists, health educators, and environmental health scientists.⁹

Future Workforce Demands

Demographic trends within the U.S. and in California, in particular, will have an impact on the numbers and skill sets needed in the public health workforce. Among these trends are the aging of the population and the public health workforce itself, overall population growth and increasing ethnic diversity, existing

health workforce shortages, lack of training within the existing public health workforce, and challenges posed by existing and emerging diseases. A brief elaboration of each follows.

The aging of the population and the public health workforce. California has the largest elderly population in the nation, and this group is expected to grow at more than twice the rate of the total population between now and 2020.¹⁰ With aging comes increased prevalence of chronic illnesses and the emergence of other needs often served by the public health system. Aging trends will also impact the workforce itself, with projections estimating that 50% of the federal public health workforce in California are 50 years or older and 44% of CDC's and 54% of NIH's physicians and biologists are eligible to retire within the next 5 years.^{11,12}

Population expansion. Census information shows that gains in life expectancy, together with population growth resulting from immigration, will increase the U.S. population by 18% by 2020.¹³ Within California, overall population growth is expected to increase by more than 7.5 million (22%) between 2000 and 2015.

Increasing ethnic diversity. Between 1970 and 1998, the percentage of Californians who were white/ non-Hispanics decreased from nearly 80% to 52%. By 2002, this percentage dropped to 46%, with recent projections that Hispanic Americans will be the largest ethnic group in the state by 2025. Like most health professions, non-whites are dramatically underrepresented in the public health workforce and its leadership. As research continues to document the disparities in health status between racial and ethnic groups, the demand for a culturally competent, ethnically diverse public health workforce will undoubtedly increase. Figure 1 below shows projections for California's major ethnic groups.

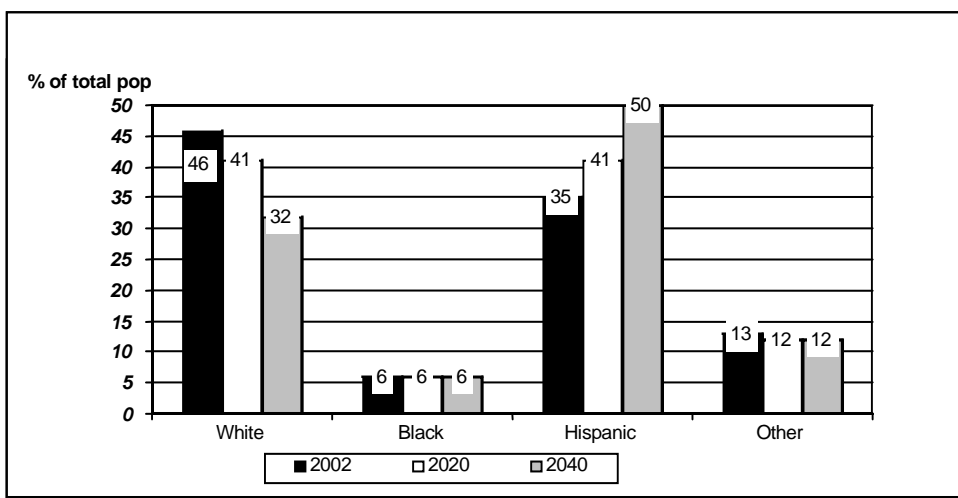


Figure 1. Ethnicity in California through 2040 (Source: CA Dept. of Finance)

Health workforce shortages. An estimated 4 million Californians live within the state's 165 Health Professions Workforce Shortage Areas. These areas suffer from shortages of nurses, physicians, and other health professionals who are critical members of the public health workforce in virtually all underserved communities.

Lack of public health training within the existing public health workforce. Recent studies highlight the lack of formal public health training within the existing public health workforce. As a result, many have called for expanded federal efforts and increased outreach by schools of public health to provide

continuing education and distance learning for these workers. Many of these public health workers have expressed a desire to broaden their knowledge base, but barriers (e.g., inability to leave one's job to attend school, a relatively small number of available training programs) make access to such training difficult.

New diseases and ongoing challenges. Public health efforts are perpetually challenged by the emergence of new viruses and the persistent challenges of others, and simultaneously confronted with epidemics of non-viral health threats such as chronic illnesses and obesity. Programs involving education, disease prevention, and effective treatment and control are routinely employed against these viruses and illnesses. To effectively respond to new threats, such as the SARS or West Nile viruses, and to effectively manage threats posed by known causes, such as tuberculosis, HIV, or obesity, the workforce must have access to current information and research findings as well as state-of-the-art diagnostic and treatment techniques.

PUBLIC HEALTH EDUCATION

Nationwide, there are 33 accredited schools of public health in the U.S. These are located at 10 private and 23 public universities. Their degree programs, combined with certification, distance learning, and continuing education programs, make these schools the primary means to strengthen and secure the public health infrastructure, nationally and within California. The primary functions of these schools, as outlined by The IOM Committee on Educating Public Health Professionals for the 21st Century,¹⁴ are to:

- Educate the educators, practitioners, and researchers and prepare public health leaders and managers
- Serve as a focal point for multischool transdisciplinary research, as well as traditional public health research to improve the health of the public
- Contribute to policy that advances the health of the public
- Work collaboratively with other professional schools to assure quality public health content in their programs
- Assure access to life-long learning for the public health workforce
- Engage actively with various communities to improve the public's health

Schools of public health offer multiple masters and doctoral degrees. The Masters in Public Health is the most common professional degree, with just over half of public health students pursuing MPH degrees. Several schools offer joint degree programs, combining the MPH with master's degrees in business, public policy, social welfare, or law. Doctoral level professional degrees include the Doctor of Public Health, the Doctor of Philosophy in Public Health, and the Doctor of Science degrees. These degrees are typically awarded in biostatistics, epidemiology, environmental health sciences, health services and policy analysis, and infectious disease/public health biology.

Required coursework for all public health students includes courses in biostatistics and epidemiology, and one or more courses in health administration, environmental health, and/or behavioral sciences. These five core discipline areas are essential for the MPH degree and are recommended for all degree candidates. Although most students focus on these core areas, a variety of specialties are offered (see Appendix A). It is worth noting that the Institute of Medicine has also called for other health professions schools (e.g., nursing, medicine) to create or expand training of their students in these core public health disciplines. The Institute of Medicine has also recently called for expansion of public health training into eight new areas: informatics, genomics, communication, cultural competence, community-based participatory research, global health, policy and law, and public health ethics. Expansion of the public health curriculum into these areas will most likely necessitate recruiting new faculty.

Application and Enrollment Trends

The number of applications to accredited schools of public health has risen steadily over the last decade, with the Association of Schools of Public Health (ASPH) citing a 48% increase since 1992. In 2002, prospective students submitted a record 23,365 applications to accredited schools. In the same year, 6,329 new students began their training. Of these, more than 55% of enrollees began MPH programs. The remaining 45% sought other masters (22%) or doctoral degrees (23%). Enrollment growth has occurred in epidemiology, health services administration, health education/behavioral science, international health, and biostatistics – all areas with a documented need. According to the ASPH, enrollment in all schools of public health grew 9% in 2002 over the prior year.¹⁵

By contrast, as shown in Figure 2, the two UC Schools of Public Health show virtually no growth in combined enrollment over the last 10 years. The UC SPHs are among the most selective schools in the country and are limited by both their number of faculty FTEs and space constraints. In 2002, with a total combined pool of 1,838 applicants, UCLA and UCB enrolled 254 and 208 students, respectively. In both schools, the majority of applicants and enrollees were women. Although non-white students represented 43% of all students who enrolled at UCB, and 54% of those who enrolled at UCLA, the percentage of students from underrepresented minority groups (i.e., Black/African-Americans, Native Americans, and Hispanics,) is 9.5% at UCB and 18.5% at UCLA.

Top 10 Schools Change in Enrollment 2002 vs. 1992

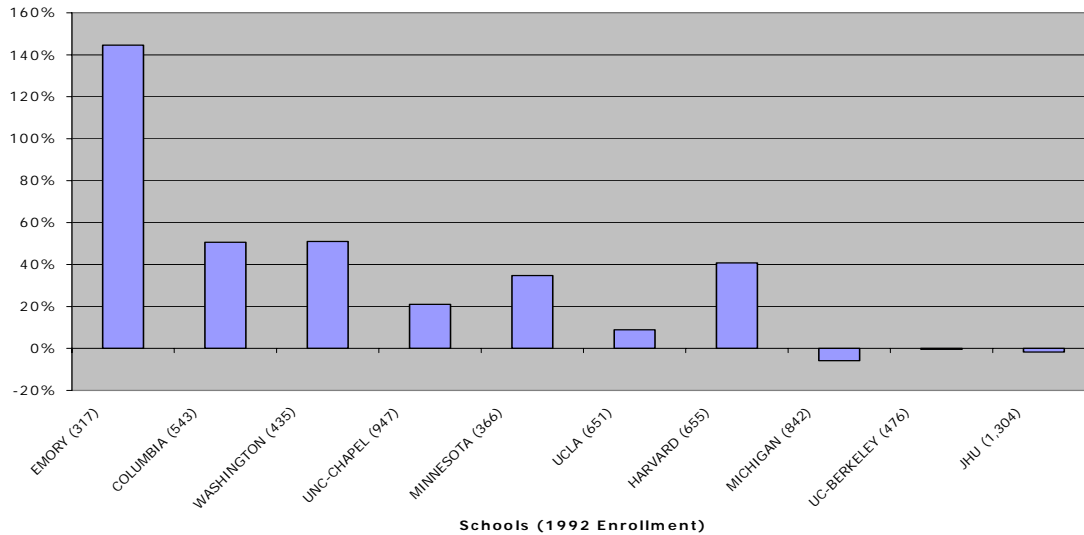


Figure 2. Enrollment Changes for Top U.S. Schools of Public Health

Public Health Education in California

In California, four schools and six accredited programs offer public health education. Figure 3 (below) provides information concerning the degrees and other offerings at all accredited schools and programs in public health in California.

Schools	DEGREES OFFERED								Joint MPH Degrees	RESIDENCIES		Other Offerings
	BS	MS	MA	MPH	MHA	MSPH	DrPH	PHD		Prev. Med.	Occ. Med.	
Loma Linda	X			X	X	X	X		none	X	X	distance learning, certif. programs
SDSU	X	X		X				X	MD, MSW	X		distance learning
UCB	X	X	X	X			X	X	MD, MBA, MSW, MPP, MCRP(1)	X	X	
UCLA		X		X			X	X	JD, MBA, MD, MA(2), D.Env.(3), PhD(4), + joint pgms. in Educ., Social Welfare, Public Policy, Info.Mgmt.	X		distance learning, exec. MPH
Programs												
CSU Fresno		X		X					none	X		none
CSU Long Beach		X		X					MS Nursing			none
CSU Northridge				X					none			none
SFSU	X			X					none			none
San Jose State	X			X					none			none
USC				X					BS(5), MD, PharmD(6), PhD, or PPDPT(7)			none

1 - MCRP = Masters in City & Regional Planning
 2 - African, Asian, Islamic, or Latin Amer. Studies
 3 - Environmental Science and Engineering

5 - Health Promotion
 6 - Doctor of Pharmacy
 7 - Post Prof. Dr. of Physical Therapy

Figure 3. Accredited California Schools of, and Programs in, Public Health

Schools of Public Health. Of the four accredited schools, located at UCB, UCLA, Loma Linda University, and San Diego State University, the UC schools are widely recognized for their excellence in teaching, research, and service. UC's origins as a land grant institution lead it to include public service in its mission and its commitment to educate a workforce that helps keep California's economy competitive. According to the US News and World Report peer ranking of "America's Best Graduate Schools," UCB and UCLA are tied for 7th within the Top 10 Schools of Public Health in the U.S.¹⁶ Among public health research institutions, UCB and UCLA ranked 10th and 14th, respectively, in total funding by the National Institutes of Health (NIH) in 2002.¹⁷ This ranking is striking given that both UC schools have fewer faculty than most of the nation's top schools.

When ranked by total student enrollment, UCLA is 9th and UCB is 18th among all accredited U.S. schools, with 709 and 474 students, respectively. In California, however, the UC Schools of Public Health are the largest in terms of enrollment. More than 65% of masters and over 80% of doctoral candidates in the state's public health schools attend UC (see Figure 4, below). These schools offer a variety of disciplines and degrees and allow many opportunities for research and collaboration across institutions and disciplines.

	UC Berkeley	UCLA	Loma Linda University	San Diego State University
Total Students	474	709*	306	336
Masters Students	319	460	246	304
Doctoral Students	155	249	60	32

Figure 4. Student Enrollment in California Schools of Public Health, 2002 (ASPH, 2003)

* This number includes approximately 100 enrollees participating in the executive degree program.

Although the UC schools are the largest in California, they are smaller than those at most comparison institutions. Among the top ten schools of public health, UCB is the smallest and UCLA is the third smallest in total enrollment, demonstrating UC's inability to keep pace with significantly increasing enrollments nationally. The magnitude of this gap is even greater given that California is the most populated state in the nation. For example, when compared to the University of Washington, the University of Michigan, and the University of North Carolina, Chapel Hill (the nation's other large state-supported Schools of Public Health,) the UC Schools of Public Health have both the lowest number of faculty and the lowest number of students per capita.

State	Population	# of Faculty (State-funded FTE)	# of these Faculty/10 ⁶ Population	# of PH Students	# of PH Students/10 ⁶ Population
Washington	5,900,000	37	6.3	550	93
Michigan	9,000,000	120	12.1	800	81
North Carolina	8,000,000	112	11.5	1242	155
California (UCB, UCLA, SDSU*)	33,900,000	131	3.9	1494	44

Figure 5. Training Capacity of California's vs. Other States' Public Schools of Public Health (2002)

Source: Association of Schools of Public Health, and State population data

* When Loma Linda University (California's other accredited school of public health) is added to these totals, it does not make an appreciable change. Also, the other three states do not have any private Schools of Public Health.]

Public Health Programs. California's six accredited public health programs, located at the University of Southern California and the California State University campuses in Fresno, Long Beach, Northridge, San Francisco, and San Jose, are smaller in size and scope than the four schools of public health. These programs offer Masters of Public Health (MPH) degrees, with most focusing on preparing students for careers in environmental and occupational health, health administration, and/or community health education/promotion. The programs at California State University, Fresno and the University of Southern California also offer special MPH programs for medical residents; CSU Fresno's residents come via the UCSF Fresno Medical Education Program, and USC's come from the Keck School of Medicine at USC.

Public health education in California also includes new advanced degree programs at the UC Davis (UCD) and UC Irvine (UCI) campuses. In 2002, the UCD Schools of Medicine and Veterinary Medicine began offering an MPH degree for MD, DVM, and other health professions students with an interest in disease prevention and community health. Students can enroll in the one-year program between their second and third, or third and fourth, years of training, selecting such unique areas of study emphasis as human and zoonotic infectious diseases and veterinary public health as well the traditional public health disciplines of epidemiology, informatics, nutrition, environmental health, and general public health. UCD applied for accreditation of their master of public health program in June 2003, a process that typically takes from 12 to 18 months to complete.

At UCI, the School of Social Ecology offers a doctoral degree in Environmental Health Science and Policy (EHSP) with special emphasis in Epidemiology and Public Health. The central focus of the EHSP program is cross-disciplinary research related to environmental quality, e.g., toxic metals in the environment, international conflict and cooperation in resource management, habitat restoration and conservation biology, epidemiology of environmental cancers, as well as of violence and injury-prevention. Students are prepared to become active researchers, able to assume positions in higher education, government, commerce, or the non-profit sector.

Strengths of the UC Schools of Public Health

Excellence in research and teaching and opportunities for interdisciplinary collaboration. The research and teaching excellence of faculty at UCB and UCLA is well recognized within the field. Opportunities for collaborative research and learning across disciplines are among UC's greatest strengths. Joint degrees are offered with many other professions, including business, public policy, law, medicine, social welfare, and cultural studies. These and other opportunities for transdisciplinary study yield a pool of graduates who are well equipped to enter the workforce at management and leadership levels within a variety of settings.

Excellence in preparing and training leaders. Graduates of UC programs are consistently tapped for leadership positions in governmental agencies, as well as non-governmental organizations. UC public health graduates presently serve, for example, as the Director of the California Office of Statewide Health Planning and Development and the Director of the Centers for Disease Control and Prevention. Another is the immediate past Director of the California Department of Health Services. UC graduates are actively recruited by agencies, health care delivery systems, and organizations across the nation, and often fill leadership positions within them.

Innovation in education. Recognizing the need for expanded education and training opportunities for the current public health workforce and new outreach efforts, UCLA developed an executive MPH program and is exploring the potential for distance learning and certificate programs. Both UCB and UCLA have implemented “pipeline” programs for encouraging undergraduate interest in public health. UCLA has created a new minor in public health and UCB is offering a new upper division major in the field. Each is likely to attract more students to health professions careers. Early assessments indicate that the UCB major is drawing about 100 students per year. UCLA’s new minor is also popular.

Fostering interaction between academia and public health practice. UC Schools are working to strengthen their support of and association with public health practice. UCB has a growing Center for Public Health Practice that places students in local, state, and national agencies, where they gain valuable work experience. Both UCLA and UCB involve students in community health assessments and other activities to increase awareness of public health issues and community needs. Both campuses offer lecture series and other opportunities to bridge the gaps between the academic and agency communities, and both are part of the Pacific Public Health Training Center (PPHTC), a collaborative, federally funded effort to improve public health practice by providing web-based training for existing workers.

Continuing Challenges

Accommodating growing demand for training and research. UC Schools of Public Health are located in densely populated urban areas and face major constraints with regard to classroom, office, and laboratory space. Although assessments conclude that each is maximizing their use of on- and off-campus space, any increase in enrollment would require a reassessment of space needs.

Diversifying the public health workforce. At UCB, only 5% of the students are African American and 4% are Hispanic. At UCLA, the figures are 7.9% and 9.8%, respectively. Nationally, these figures are also low. Across all U.S. public health schools, 11.1% of all students are African American and 9.4% are Hispanic. The growing health needs of these populations underscore the need to increase diversity, improve recruitment of students committed to work in underserved communities, and increase the cultural competency of all students. Among prospective employers that hire UC graduates, increasing diversity and improving cultural competency are repeatedly identified as priority objectives.

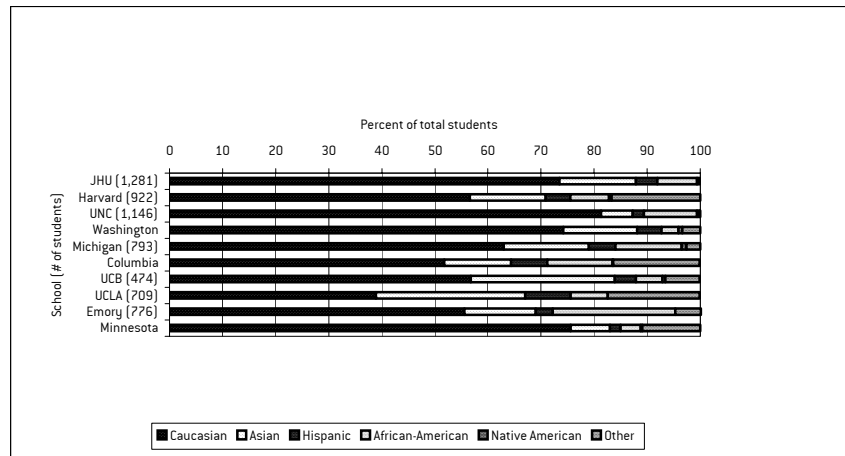


Figure 6. Student Ethnicity in Top 10 Schools of Public Health

Assessing the response of UC Schools of Public Health to the public health workforce needs of California. The distance learning and “pipeline” programs described previously represent a response by UC schools to the needs of California’s public health system. However, current alumni data gathering methods within both UC schools are inadequate for determining where graduates work. These data would be useful to each school and could be valuable in assessing responsiveness to state needs as well. Both schools appreciate the likely value of these data and are increasing efforts to collect it.

SUMMARY OF FINDINGS

- (1) California’s public health workforce is insufficient and needs are growing.** In the face of increasing demand from new public health threats and changing demographics, the public health workforce in California is considered by many to be deficient in size, scope, and quality. It is estimated that only 20% of the state’s public health workforce is actually trained in public health. Recent national studies have highlighted the threat that this fact poses – and the gravity of the situation is heightened as the CDC works to increase the nation’s bioterrorism preparedness. Public health agencies cite particular staff shortages of epidemiologists, environmental health scientists, and health educators. The private sector needs professionals trained in health services administration and management. Public health expertise has broadened to include cultural competency, genomics, informatics and other skills, and many workers lack formal training/advanced degrees in these and other areas. Well-trained, capable leaders and “frontline” public health workers are needed to address both current and future challenges.

- (2) Public health education is a primary means to strengthen the public health workforce.** UC public health schools, widely recognized for excellence in teaching and research, are an essential resource for strengthening the public health infrastructure. Enrollment in UC programs, however, has not kept pace with increasing workforce demands. The number of UC graduates has remained nearly constant over the last decade. Applications to UC schools continue to climb each year, with strong interest in programs of study in epidemiology, biostatistics, health education/behavioral science, and health services administration – areas in which the public health system has a demonstrated need.

- (3) California's population is increasingly diverse and its needs are not being met.** Underrepresented minority groups are disproportionately affected by widening disparities in health status. Cultural and linguistic barriers continue to plague millions of Californians. To develop effective interventions, public health professionals must study and understand the biologic, social, behavioral, and cultural causes of these widening health disparities. With this understanding, targeted solutions will more likely emerge.
- (4) UC and public health agencies are in a position to provide mutual assistance.** UC Schools of Public Health, in themselves, are public health organizations that serve their surrounding communities. Local public health agencies and organizations near these schools sometimes lack awareness of the functions or resources of the UC schools. Continuing to strengthen the ties between the UC SPHs and local and regional health organizations would better equip UC to assess and meet workforce needs. UC SPH students and local agency staff could each gain practical, state-of-the-art public health skills – a potentially significant benefit given that many current public health workers have had little formal education in public health.
- (5) Alumni databases for UC Schools of Public Health are inadequate.** The underdevelopment of the alumni databases for both schools hinders the ability to determine how graduates are employed and contribute to the workforce. More information is needed to categorize the jobs and the sectors in which alumni work and to track the additional degrees they receive.

RECOMMENDATIONS

- (1) Increase masters' level enrollment in UC Schools of Public Health, especially in fields with the greatest workforce and community health need.** To address the immediate shortfall of trained public health professionals entering California's workforce, increase UC's SPH enrollment growth above the rates of the past 12 years. At least a 25% increase in masters' level enrollment in public health degree programs, with concomitant increases in both faculty and support staff, is needed over the period 2005-2010. An additional 25% increase is needed over the period 2010-2015. Current priorities for growth are in fields with a strong statement of need, including epidemiology, health education/behavioral science, environmental health science, and health services administration. In addition to ensuring sufficient faculty in these specialties, however, the schools need to increase faculty in several other areas, among them public health nutrition; environmental health sciences; immunology; and social and behavioral epidemiology. Existing UC Schools of Public Health should be given high priority in these enrollment efforts, but parallel investments in the UCD and UCI public health programs should be made, with the goal of future growth commensurate with campus plans.
- (2) Broaden the variety of combined degree offerings.** Increase enrollment of students in concurrent joint or dual degree programs, including those combined with health and non-health related fields, and/or increase enrollment of students with previous advanced degrees to increase the pool of broadly trained public health professionals. Offer transdisciplinary training to promote increased collaboration and sharing of resources among graduate schools at all levels (e.g., postdoctoral work, teaching opportunities, and research investigations).

- (3) Expand undergraduate programs in public health.** Access to undergraduate public health courses increases student exposure to the field. UCB's reestablishment – after a hiatus of 34 years – of an upper division major in public health is a good step in this direction. Similarly, UCLA recently introduced an undergraduate public health minor. Expanding undergraduate classes will help to train more students in public health, regardless of their major area of study, and will contribute to a better-educated workforce. These programs also serve to increase the pool of candidates for graduate study in public health and other health professions.
- (4) Examine options for expanding distance learning, executive education, and continuing education programs for health professionals.** Options might include providing more graduate level training, advanced degrees, and continuing education in public health. These options collectively offer useful mechanisms for increasing the number and qualifications of individuals contributing to public health efforts.
- (5) Diversify the student and faculty bodies and recruit students from those communities most affected by health disparities.** Although both schools have initiatives aimed at increasing the diversity of their faculty and student bodies (e.g., UCLA's Center for Diversity Enrichment, and UCB's offering of a Multicultural Health Specialty, and various initiatives focused on addressing health disparities), these efforts should be expanded. To better reflect the increasing diversity of the state, UC schools must diversify their student and faculty bodies. To address the needs of underserved communities, UC should, in addition to ongoing initiatives, increase efforts to recruit students from underserved communities and encourage and support their interests in returning to serve those communities.
- (6) Incorporate cultural competency training into the public health curriculum.** Cultural competency will assure that public health interventions are better tailored to the needs of each community. Educating public health students to be culturally competent can occur through collaboration with culture-focused programs (e.g., sociology, ethnic studies) and through partnerships with community organizations that address cultural issues.
- (7) Increase emphasis on public health practice.** Continue efforts to ensure that UC graduates have documented public health practice competence and have hands-on training and experience. Both students and communities can benefit from gaining skills in practice-based research techniques (e.g., community-based participatory research) that are effective means for addressing priority health needs.
- (8) Expand relationships between UC schools and local and regional public health organizations.** UC should continue to strengthen ties between public health academia and practice. Strengthening alliances with local organizations will enhance the ability of UC Schools of Public Health to meet the needs of the community and broaden the financial base used to meet those needs. Pursuing development of "academic health departments" (i.e., joint appointments for people working simultaneously in a public health agency and at a UC SPH) is of growing interest among California's public health leaders.
- (9) Improve alumni tracking and information to assist in planning and to assess the contributions of UC graduates.** UC Schools should work to improve alumni tracking and expand the type and quality

of information collected about their graduates. The ASPH has developed a standard alumni questionnaire, which UCLA is now using. Improved alumni information would be useful in campus planning and in gauging the success of UC programs in meeting the needs of the public.

Appendix A. Essential Public Health Services

- **Monitor health status** to identify community health problems
- **Diagnose and investigate health problems** and health hazards in the community
- **Inform, educate, and empower people** about health issues
- **Mobilize community partnerships** to identify and solve health problems
- **Develop policies and plans** that support individual and community health efforts
- **Enforce laws and regulations** that protect health and ensure safety
- **Link people to needed personal health services** and assure the provision of health care when otherwise unavailable
- **Assure a competent public health and personal health care workforce**
- **Evaluate effectiveness, accessibility, and quality** of personal and population-based health services
- **Research** for new insights and innovative solutions to health problems
- **Prepare and respond to disasters**

Source: Essential Public Health Services Work Group of the Core Public Health Functions Steering Committee, DHHS, 1994

Appendix A. Public Health Specialties

- Health Services Management: Administration or resource management in the public or private sectors of health service delivery can specialize in health planning, organization, finance, economics, or marketing.
- Health Policy Analysis: Analysis and formulation of policies affecting the health of populations and the delivery of health care services
- Biostatistics: These professionals apply statistical procedures, techniques, and methodology to characterize or investigate health problems and programs.
- Epidemiology: Due to a nationwide shortage, opportunities abound for specialists trained in the systematic study of the distribution and determinants of disease or disability in population groups.
- Behavioral Sciences/Health Education: These specialists use specific methods, skills, and program strategies to help people choose healthier lifestyles, to make more efficient use of health services, to adopt self-care practices, and to participate actively in the design and implementation of programs that affect health.
- Environmental Health Sciences: This arena includes diverse disciplines such as chemistry, toxicology, and engineering, and is concerned with the identification and control of factors in the natural and man-made environment (air, water, land, housing) that affect health.
- International/Global Health: This discipline encompasses virtually all specializations in public health and focuses on improving health standards in developing countries.
- Biomedical and Laboratory Practice: This arena encompasses a diverse array of specialists such as bacteriologists, microbiologists, and biochemists who use laboratory techniques for the diagnosis and treatment of disease and for the investigation of conditions affecting health status.
- Nutrition: In short supply in the public and private sectors, these specialists are concerned with the study of the interaction between nutrients, nutrition, and health and the application of sound nutritional principles to maintain good health.
- Public Health Practice and Program Management: Specialization in this area encompasses many identifiable public health programs and activities such as maternal and child health, aging, mental health, environmental health and professional disciplines such as medicine, dentistry, nursing, social work, and other clinical sciences.
- Maternal and Child Health: These professionals focus on the complex public health problems affecting women, children, and their families, including discovering and testing solutions through applied research at the local, state, national, and international levels and participating in community activities to improve the health of the MCH population.
- Occupational Safety and Health: Specialists employed in this field are concerned with the identification of health and safety hazards related to work and the work environment, as well as their prevention and control.

Appendix C. Public Health Occupations from the Bureau of Health Professions Classification Scheme

Administrative

Health Administrator

Professional

Administrative/Business Professional

Attorney/Hearing Officer

Biostatistician

Clinical, Counseling, and School

Psychologist

Environmental Engineer

Environmental Scientist and Specialist

Epidemiologist

Health Economist

Health Planner/Researcher/Analyst

Infection Control/Disease Investigator

Licensure/Inspection Regulatory

Specialist

Marriage and Family Therapist

Medical & Public Health Social Worker

Mental Health/Substance Abuse Social

Worker

Mental health Counselor

Occupation Safety and Health Specialist

PH Dental Worker

PH Educator

PH Laboratory Professional

PH Nurse

PH Nutrition

PH Optometrist

PH Pharmacist

PH Physical Therapist

PH Physician

PH Program Specialist

PH Student

PH Veterinarian/Animal Control

Specialist

Psychiatric Nurse

Psychiatrist

Psychologist

Public Relations/Media Specialist

Substance Abuse and Behavioral

Disorders Counselor

Other Public Health Professionals

Technical

Computer Specialist

Environmental Engineering

Technician

Environmental Science and

Protection Technician

Health Information Systems/Data

Analyst

Occupational Health and Safety

Technician

PH Laboratory Specialist

Other Public Health Technician

Protective Service

Investigations Specialist

Other Protective Service Worker

Paraprofessional

Community Outreach/Field Worker

Other Paraprofessional

Clerical/Support

Administrative Business Staff

Administrative Support Staff

Skilled Craft

Skilled Craft Worker

Service Maintenance

Food Services/Housekeeping

Patient Services

Other Service/Maintenance

Volunteers (Not included in figures)

Volunteer Health Administrator

Volunteer PH Educator

Volunteer Other Paraprofessional

Programs Unidentifiable

Appendix D. Further Description of Public Health Employment Sectors

Governmental public health agencies: Governmental public health agencies begin at the local level and extend all the way to the national Centers for Disease Control and Prevention. The Local Public Health Agencies (LPHAs) in California, historically resource poor yet mandated to provide a wide variety of services, employ physicians, nurses/nurse practitioners, dentists, program administrators and managers, program workers, and clerical staff.⁹ Typically, public health degrees are held by the agency director (often a physician) and by various other professional staff (e.g., epidemiologists, health educators, and environmental health scientists.) Many other positions within an LPHA, however, require no formal public health education. In other governmental public health agencies, senior level managers, administrators, and clinicians often hold advanced degrees (e.g., MBA, RN, DDS, MD, PhD) but their knowledge of public health is as likely to be based on day-to-day experience as it is to result from formal education and training.

Non-governmental public health agencies and organizations: Funded through public and private sources, these organizations vary widely in the functions they serve and the types of professionals they employ – but all play important roles and undertake key public health functions.

- **Non-governmental public health agencies and organizations:** Organizations in this category range from national education and advocacy groups, like the March of Dimes, to localized groups such as community asthma prevention coalitions. These organizations assist the indigent through education and/or provision of public health services, research public health issues, and advocate for specific changes in public health policy.
- **Healthcare financing and delivery systems:** Health services delivery organizations (hospitals, health plans, and medical groups) meet the community's preventive, acute, and chronic health needs, including provision of care to indigent populations. Some organizations are responsible for the total health and treatment needs of their population and also contribute to the health of the communities they serve. Kaiser Permanente, for example, provides such services for an estimated 8 million Californians. Public health services these organizations provide range from disease reporting to health education, to flu shots and indigent care.
- **Academic and research institutions:** Academic institutions train educators, practitioners, managers, policy makers, and researchers to be public health leaders and workers, and also often provide important healthcare services. Workers in these settings often mirror the professional staffing in LPHAs (i.e., professionals holding advanced degrees and having interest and experience, but a variable amount of formal public health education.)
- **Other private for-profit organizations:** This sector includes companies in the following areas: pharmaceuticals, biotechnology, hospitals, information technology, medical devices and equipment, and disease management, as well as consulting and health insurance. The managers, administrators, analysts, and consultants employed in these businesses generally hold advanced degrees (sometimes in public health) and often have significant experience and/or formal training in management and business administration. Individuals with experience and masters-level training in either business or public health enter the workforce as mid-level managers. Research-oriented companies employ professionals with clinical and public health backgrounds (e.g., physicians, nurses, health educators). In all organizations in this sector, however, formal training in public health is valued and recognized but is most often not a requirement for employment.

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