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California's County and City Environmental Health Services Delivery System

Loma Linda University School of Public Health
Office of Public Health Practice & Workforce Development

Primary Authors
Paola Case, MPH
David Dyjack, DrPH, CIH

Co-Investigators
Susanne Montgomery, PhD, MPH
Hal Marlow, PhD(c)
Deanna Berger, RN, MPH(c)

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Darice Bailey, California Department of Health Services
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Executive Summary

The CDC publication *A National Strategy to Revitalize Environmental Health Services* presented a sober characterization of environmental health (EH) delivery systems in the United States. Significant concerns pivoted around seven major conditions including the state of the practitioner labor pool, service delivery capacity, information management, and stakeholder engagement.

Purpose

The purpose of our research was to assess the current status of county and city environmental health service delivery in California with the aim to:

- Provide a foundation for informed decision making around EH service delivery; and
- Identify opportunities for the Loma Linda University School of Public Health Regional Academic Center to partner with California service providers to enhance the capacity of environmental health service delivery.

Methods

Standardized interviews were conducted March 2005 to May 2005 with 55 of the 62 (88%) county and city directors of environmental health, representing 90% of the state's population and 94% of the landmass.

Relevant databases and other publicly available information germane to project goals were also evaluated.

Findings

Interviewed directors reported a total of 2477 professional EH staff employed in county and city agencies complemented by 520 support personnel. A review of California's Registered Environmental Health Specialist (REHS) database revealed that approximately 3181 active REHSs reside in California, with a vast majority employed in the public workforce at the federal, state or local level. Sixty-seven percent (67%) of directors reported difficulty in recruiting qualified applicants. Technical training needs were greatest in the Certified Unified Program Agency (CUPA) activities (60%), dairy programs (57%) and septic systems (55%), while non-technical training would be beneficial in conflict resolution (55%), written/oral communication (49%), and problem solving (49%). Fifty-six percent (56%) of respondents were familiar with the 10 essential services while only 11% collect health outcome measures to demonstrate agency efficiency and effectiveness. The agencies reported providing anywhere from eight to 19 separate technical services with retail food facility inspections being the most common.

Conclusions and Recommendations

The study team concluded that environmental health services are largely provided at the local level as a reflection of local need, however, this tendency towards customization leads to stakeholder confusion about EH service purpose and value when multiple service agencies are compared and contrasted. This lack of clarity may contribute to the erosion of political and financial support reported by some directors. The team tendered eight recommendations, many of which apply to the nation at large, to enhance EH service delivery in California. These include the sharing of best practices between counties,

implementation of a standardized learning management system accompanied by required continuing professional education for REHS, enhancing awareness and visibility of the EH profession, increased financial support to assist in service integration while supporting salaries commensurate with the cost of living, and the identification, routine collection and systematic dissemination of health and financial outcomes measures valued by key stakeholders.

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Abbreviations Used in the Report

ARB	Air Resources Board
Cal/EPA	California Environmental Protection Agency
Cal/OSHA	California Occupational and Health Administration
C/C	Counties and Cities
CCDEH	California Conference of Directors of Environmental Health
CDC	Centers for Disease Control and Prevention
CDHS	California Department of Health Services
CUPA	Certified Unified Program Agency
DDWEM	Division of Drinking Water and Environmental Management
DOSH	Division of Occupational Safety and Health
DPR	Department of Pesticide Regulation
DTSC	Department of Toxic Substances Control
DWR	Department of Water Resources
EH	Environmental Health
EPA	Environmental Protection Agency
IWMB	Integrated Waste Management Board
LEA	Local Enforcement Agency
LPA	Local Primary Agency
REHS	Registered Environmental Health Specialist
RWQCB	Regional Water Quality Control Board

1. INTRODUCTION

California is the third largest state in the United States, spanning more than 160,000 square miles, measuring 770 miles in length with elevations ranging from 14,495 (Mount Whitney) to 282 feet below sea level (Death Valley). The state possesses 58 counties that vary in surface area ranging from San Francisco's 91 square-miles to the 20,000 square-miles that constitute San Bernardino County. While some counties have sparse populations (such as the 1,200 residents of Alpine County) more than 9 million people call Los Angles County home. In addition to a unique geographic and demographic composition, each of California's 58 counties has its own political organizational structure and relationship with the state government.[1]

Reflecting this diversity, an intricate milieu of governmental agencies has emerged to develop, administer, regulate, and enforce California's environmental health (EH) services. This complex web of service providers has not been formally described, nor is it well understood by those outside the profession, which potentially contributes to a lack of clarity of the EH profession's overall purpose, and public health benefits

it provides to California citizens. This condition places the profession at risk of being undervalued by society.

To enhance our understanding of EH service provision, the Loma Linda University School of Public Health conducted an environmental health services delivery assessment of California's County and City health agencies. The investigation included a workforce enumeration, an evaluation of training needs, an assessment of knowledge and practice regarding the *Ten Essential Services of Environmental Health*[2], and trends in emergency response. The role of federal and state agencies, Native American and Tribal Territories were beyond the scope of this project.

A team from Loma Linda School of Public Health (LLU-SPH), Department of Environmental and Occupational Health gathered data from January to June 2005 with subsequent report writing. The undertaking of this project would not have been possible without two key partners: the California Conference of Directors of Environmental Health (CCDEH) and the Registered Environmental Health Specialist (REHS) program, administered under the California Department of Health Services (CDHS), Division of Drinking Water and Environmental Management.

1.1 Background

The need for an assessment of the structure, size, and capacities of state, local and tribal environmental health agencies was described by the Center for Disease Control and Prevention's (CDC) *A National Strategy to Revitalize Environmental Health Services*.[3] This document

established that a revitalization of environmental health services is urgently needed, and presented the following seven environmental health generalizations, in part, to support this argument:

1. There is an insufficient number of practitioners and properly trained environmental public health specialists.
2. In the public sector, environmental public health personnel are underpaid compared with their counterparts in the private sector, leading to many vacant positions and high turnover rates.
3. Service delivery techniques often are outdated. Many employees in the environmental public health workforce do not fully benefit from available technology and information management.
4. The "Essential Public Health Services" and a health outcomes analysis approach have had minimal effects on environmental public health practice and the delivery of environmental public health services.
5. Substandard residential housing, school building, and day-care facilities pose potential risks to health and have received little attention from environmental health programs.
6. The demand for expanded environmental public health services and new and emerging threats are diluting service delivery.
7. More stakeholders need to be engaged in the process of delivering environmental public health services at the community level.[3]

The authors of the *Revitalize* document suggested that addressing these generalizations through innovative programs will lead to enhanced environmental health services. The proposed plan embodied

six main goals: build capacity, support research, foster leadership, communicate and market, develop the workforce and create strategic partnerships.[3]

Our study builds on the foundation established by the *Revitalize* document. Our aim was to characterize environmental health conditions within California, and to use the findings as a tool to identify opportunities to enhance service delivery capacity.

1.2 Environmental Health Service Delivery in California

California operates under a centralized-decentralized control mechanism, where local environmental health (EH) services may be provided by state agencies, local health departments, and in some cases, a mixture of both.[4] Key state agencies that oversee the delivery of EH services are the California Environmental Protection Agency (Cal/EPA) and the California Department of Health Services (CDHS). There are a total of 62 local providers of EH services in California (See Appendix A for an alphabetical listing of the 62 jurisdictions). These providers include EH departments, divisions and service programs in 58 county and four city jurisdictions (Figure 1). Due to their small population size (<50,000 people), 10 rural counties contract with the CDHS to develop and support environmental health programs and services.[5] These counties are provided with State employed Environmental Health Specialists, but several also employ county Registered Environmental Health Specialists (REHS). Each of the 10 counties employs a Health Officer and support staff.[6] Contract and non-

Figure 1
California City and County
Environmental Health Departments

contract counties are responsible for providing the services that their respective Board of Supervisors and county administrators assign.

Table 1.1 California REHS Examination's Content Areas and Relative Emphasis[7]
Highest Emphasis
• General Math & Science
• Inspections and Investigation Processes
• Food and Consumer Protection
• Drinking Water
Medium Emphasis
• Hazardous Materials and Waste Management
• Solid Waste and Medical Waste Management
• Wastewater Management
• Recreational Waters and Public Pools
• Disaster Management
• Pest and Vector Control
Lowest Emphasis
• Air Quality
• Housing & Institutions
• Land Use

California has strict standards and protocols regarding the registration of environmental health specialists. The Division of Drinking Water and Environmental Management administers this mandated program. Gaining Registered Environmental Health Specialist (REHS) status signifies that education and training experience in required areas has been met, and that the individual has passed a state administered comprehensive examination.[7] Being an REHS is required for employment when providing services in specific EH health areas. Currently, there are approximately 3,180 REHS on record in the State

of California. Table 1.1 presents the California REHS examination's content areas and relative emphasis.

1.3 Legal Authority for Environmental Health Service Provision

The basis for California EH regulations is rooted in both federal and State statutes. Enforcement of federal law by State and local agencies and State law by localities is generally authorized directly through statute, by implementing regulations or Memoranda of Understanding (MOUs). Most local EH authority is derived from delegated federal and state authority whereas local regulatory authority in some areas, such as retail food safety, is vested directly with the local agencies through both federal and state laws.[8]

California law is comprised of 29 codes that include the Health and Safety Code, the Public Resources Code, and the Welfare and Institutions Code. Customarily these statutes are implemented through regulations adopted by administering agencies such as the California Department of Health Services or the Integrated Waste Management Board. The 28 titles of regulations are contained in the California Code of Regulations or CCR. Most local agencies will also adopt local ordinances to expand or clarify the implementation of these federal and state laws. Virtually all legal authority for the California EH programs is derived from the California Health and Safety Code, the Public Resources Code (CCR Title17 and 22 respectively), and the local ordinances and regulations.

2. METHODOLOGY

2.1 Assessment Instrument (Survey)

The survey was developed in two phases. Phase I included a literature search to identify existing surveys utilized for similar assessments. The Johns Hopkins Bloomberg School of Public Health Center for Excellence in Community Environmental Health Practice's *Environmental Health Discussion Guide, September 2003* was the primary instrument reviewed, and provided a foundation for our efforts.[9] After mark-up and modification, the resulting instrument contained 19 EH programmatic review areas. The draft instrument was subsequently submitted to CDC and key personnel at CCDEH for review and comment.

Phase II involved incorporating the suggested modifications and adjustments, including explicit insertion of the *Ten Essential Services of Environmental Health*. Additionally, six other areas of EH service delivery were added to the original 19, resulting in a total of 25 program areas. The final instrument assessed 25 pertinent media and specific program areas, through which a majority of local environmental health services are delivered: outdoor air, indoor air, drinking water, Local Primacy Agency (LPA), water wells, waste water, hazardous materials/emergency response, household hazardous waste, Certified Unified Program Agency (CUPA), superfund sites, solid waste, medical waste, liquid waste, biosolids, food, recreational health, animal control,

vector control, radiation health, noise pollution, housing, land use, occupational health, pesticide regulation and dairy (See Appendix B for the full questionnaire).

In addition to identifying areas where EH services were provided, the EH directors reported on the number of EH professionals working in the field, whether or not funding was adequate to effectively provide that service, whether or not services in that area had been reduced/eliminated or enhanced/added in the past five years, and if technical training was needed or desired.

The survey contained sections assessing the worker profile including number and type of EH workers, their race/ethnicity, age, minimum level of training required versus preferred, and the number of vacant and frozen openings. Training needs in technical areas, as well as in the core competencies, as delineated by the CDC publication *Environmental Health Competency Project: Recommendation for Core Competencies for Local Environmental Health Practitioners*,[10] were also assessed. Other areas evaluated include trends in staff longevity and retention and trends in emergency response.

Six open-ended questions were also included in the survey to allow for information to be presented without the imposition of predetermined responses. These six questions addressed barriers and enabling mechanisms in responding to emergencies, methodologies for measuring success, descriptions of departmental best practices, key needs and barriers that need to be addressed to enhance environmental health service delivery. Unsolicited comments made by the interviewees were transcribed and wherever appropriate, included in the results and discussion sections to provide context.

The final survey instrument was submitted to Loma Linda University's Institutional Review Board (LLU-IRB), which determined that the proposed data collection and analysis procedures did not involve the use of human subjects as defined in the federal regulations 45 CFR 46.102(f).[11]

2.2 Survey Sample

All 62 environmental health directors in the state were invited to participate in the survey. The CCDEH president distributed the assessment instrument via e-mail to all conference members with an attached letter articulating the scope and purpose of the project. The e-mail explained that the environmental health officers would be receiving a phone call to schedule an appointment to conduct the survey by phone. In sum, 55 counties/cities (88.7%) participated in the survey. A total of 48 phone interviews were conducted: 45 with EH directors and three with personnel appointed by the EH director. Two directors provided information for more than one county (this occurred with contract counties only). Four surveys were submitted via mail, fax or e-mail without the completion of a phone interview. Seven (6 county and 1 city) EH directors elected to not participate. The seven non-participant jurisdictions represent approximately 5.6% of the California's land mass area and roughly 10% of the population.

2.3 Survey Administration

All interviews were conducted between March 15 and May 17, 2005. The surveys were administered as phone interviews with the EH director or their designee (although 94% were conducted by directors), and ranged in duration from 30-60 minutes. The length of

the interviews varied due to the length of responses from the directors, and on their prior preparation for the survey. Phone interviews were conducted by one research associate to assure consistent survey administration. Questions were read exactly as they appear on the survey, and elaborations in any area were provided only if the interviewee asked for clarification.

To assure consistent survey administration, questions regarding the *Ten Essential Services of Environmental Health* were answered by referring to National Public Health Performance Standards Program's *Local Public Health System Performance Standard*.[12] Questions regarding training in the core competencies were addressed by referring to CDC's document *Environmental Health Competency Project: Recommendation for Core Competencies for Local Environmental Health Practitioners*.[10]

2.4 Survey Analysis

To assure confidentiality, participating counties were assigned a code number and survey data were analyzed using EXCEL and SPSS 12.0. All data, except for the six open-ended questions, were coded and entered into SPSS. Qualitative data were recorded as precisely as possible from statements made by interviewees and transcribed into an EXCEL text work file, coded, and general themes were identified for each set of responses. Data reported were aggregated to protect confidentiality of individual respondents.

Limited statistical analysis was conducted to explore whether size (determined by square miles, population, and population density) influenced self-report on certain issues. Statistical analyses were run with SPSS 12.0.

3. DATA

Data submitted by each respondent reflect the director's perspective of the local workforce. For example, some reported individual workers while others reported full-time equivalents (FTE). Some directors were able to provide detailed demographic information while others could provide only rough approximations. Variations in data are also inherent because the organizational structure in each EH department differs. As a result, reporting for individual services often entailed breaking down program areas. For example, many EH departments reported having a consumer protection section that encompasses retail food facility inspections as well as recreational health. Although some respondents were able to report the actual number of individuals working in each service area, many were unable to make this distinction because of service delivery overlap. Finally, additional variations in data reporting occurred as a function of the director's understanding and interpretation of each particular question. The LLU-SPH team ultimately excluded two questions due to inadequate clarity.

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4. RESULTS—WORKFORCE

4.1 Numbers Employed

The numbers reported in the enumeration sections of this study are estimates, an outcome attributable in part to the different methods of reporting and categorizing staff by the different health departments.

Professional staff numbers include REHS staff, paraprofessionals, and EH directors involved in any type of environmental health service delivery. Support staff includes clerical and administrative positions that involve structured work in support of office operations. A total of 2,477 EH professional and 520 support staff positions were reported. Table 4.1 provides the breakdown of these positions based on full-time, part-time, contract or temporary status.

Table 4.1—Professional and support staff totals for full-time, part-time, contract and temporary status

Appointment	EH Professional Staff	Support Staff
Full Time	2387	494
Part Time	42	18
Contract*	19	1
Temporary	30	8
Total	**2477**	**520**

*While this number was intended to represent the number of state contract employees (those working in the 10 contract counties), some directors indicated having contract staff if they contracted services to other counties or to other agencies. The number reported here may represent a slight overestimate.

4.2 Workforce Profile

Demographic information was collected for EH professional and paraprofessional staff only. While gender projections were comparatively accurate, many directors approximated the ethnic origin and age of the professionals. Not all respondents provided information for all three demographic categories. In some instances, directors were able to provide breakdowns for only one or two of the categories reported here. This explains the variation in sample size (*n*) for the three demographic categories. Therefore, data presented in Table 4.2 represent a good faith estimate about the general makeup of the workforce.

More than half of professionals and paraprofessionals (55%) were male. Regarding ethnic origin, a majority (61%) of those employed as professionals or paraprofessionals in EH departments were identified as Caucasian (white). The next two largest groups were Hispanic/Latino (16%) and Asian/Pacific Islander (11%). The majority of professional staff (97%) were in either the 25-44 (52%) or 45-64 (45%) age categories.

Table 4.2—Workforce demographic breakdown by gender, ethnic origin and age

Category	Total number	% of n
Gender	**n = 2231**	
Male	1229	55%
Female	1002	45%
Ethic Origin	**n = 2248**	
White	1361	61%
Black/African-American	212	9%
Hispanic/Latino	361	16%
Asian/Pacific Islander	241	11%
Other	73	3%
Age	**n = 1524**	
18-24	30	2%
25-44	787	52%
45-64	685	45%
65+	22	1%

4.3 Degree Required

Directors were asked to indicate the minimum certification or degree required for EH service delivery employment. Seventy-six percent of respondents indicated that both a B.S./B.A. degree and Registered Environmental Health Specialist (REHS) status were required for EH service delivery employment (Table 4.3). The remainder of respondents stated that a B.S./B.A. degree was sufficient. Directors indicated that an individual with a high school diploma or an Associate's (A.A.) degree could provide limited technical activities.

Table 4.3—Degree or certification expectations for EH employment

Degree/Certification	Frequency	Percent
BS/BA	13	24
REHS	42	76
Total	**55**	**100**

4.4 REHS Database

Methodology

To gain further insight and understanding of environmental health professional demographic information, our project team collaborated with the REHS program within CDHS. Through this partnership, we gained access to the REHS database, which stores information about current REHSs in the state. The database was provided to us without personal identifiers (i.e., names, Social Security numbers, home addresses, or telephone numbers) to protect the identity of those whose information appears in the database. The information contained in the database included (for each REHS): residential zip code, date of birth (DOB), date registered, sex, employment type and the date registration expires. The information was provided as an ACCESS database. Data were analyzed using EXCEL and SPSS 12.0. A total of 514 records were removed from the data set: 96 because registration had expired, 408 because they were marked as retired, and 10 because the date of birth was missing.

Table 4.4.1— Types of employment procured by REHS professionals in the State of California as provided by the REHS program

Employment Type	Frequency	Percent
Federal Agency EH	22	1
Federal Agency Other	26	1
Local Government EH	52	2
Local Government Other	51	2
Local Health Department EH	2162	68
Local Health Department Other	52	2
Non-California Agency	36	1
Private Industry EH	61	2
Private Industry Other	250	8
Self-Employed EH	9	0
Self-Employed Other	114	4
California Public Schools	43	1
State Agency EH	67	2
State Agency Other	44	1
State Health Department EH	77	2
State Health Department Other	6	0
Other	6	0
Unknown	103	3
Total	**3181**	**100**

Results

Sixty-eight percent of current REHSs in the state were employed in a local health department and were actively involved in EH (Table 4.4.1). The next largest cohort was private industry other (8%) and self-employed other (4%).

REHS Distribution

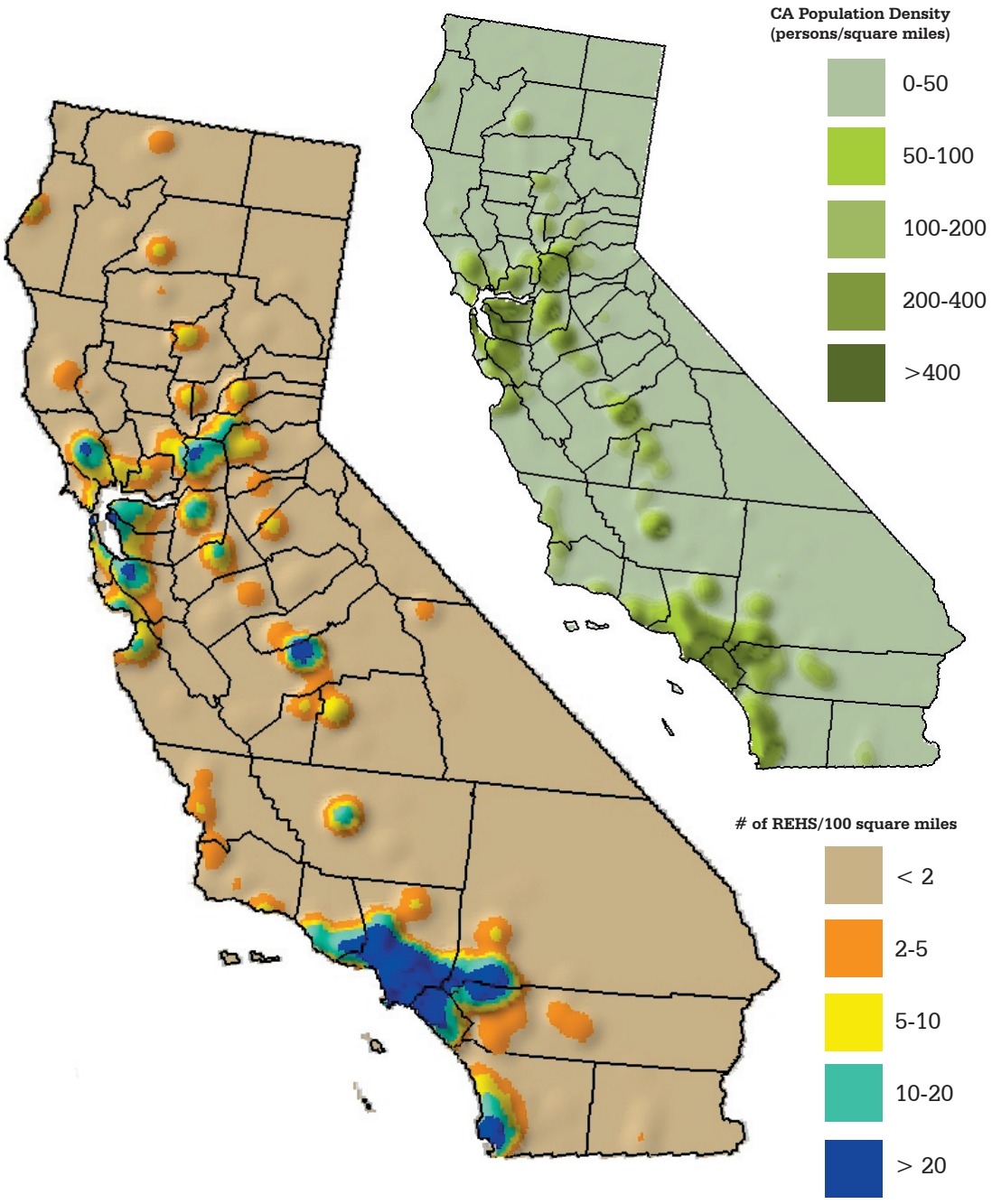
Figure 2 presents a three-dimensional geographic distribution of the density (per 100 square miles) of REHS professionals in California. Original residential ZIP code data, provided by the REHS database,[i] were converted into a continuous surface by employing a geographic information systems (GIS) density estimation technique. The map creates a virtual landscape, where elevated areas represent a greater density of REHS professionals and low-lying parts represent a lower density.

The figure provides an intuitive depiction of the geographic distribution pattern of REHS professionals. This pattern closely follows that of population distribution in California. The areas that have the greatest population density also have a higher density of REHS professionals. Conversely, remote and rural areas with lower population densities demonstrate a lower density of REHS. The urbanized portions of southern California, (including the metropolitan areas of Los Angeles, San Diego and the Inland Empire), Sacramento, Fresno and the San Francisco Bay area display the highest REHS densities (equal to or exceeding 20 REHS professionals per 100 square miles). Of these, the REHS density in the metropolitan area of Los Angeles County (>60) is the greatest. The eastern, desert regions of San Bernardino, Riverside, Inyo and Imperial Counties as well as Modoc and Lassen Counties in Northern California show the lowest densities of REHS professionals. Overall, the density map describes a true trend, but shows only the residential locations of REHS professionals and does not account for the underlying population.

Note:

[i] In order to protect the privacy of REHS professionals, the database provided by the REHS program did NOT include residential addresses. Only ZIP codes were provided for mapping purposes.

Figure 2
Three dimensional distribution of REHS density
(density calculated per 100 square miles)



To provide a different view, ZIP code data were also analyzed as a function of the population that can potentially be served. However, displaying raw workforce rates by ZIP code (total REHS for each ZIP code / ZIP code population) can be a misleading portrayal of the distribution of professionals. Therefore, an adaptive spatial filter was superimposed on 2000 Census-derived California population data in order to maintain a nearly constant denominator size of at least 10,000 people. To capture this population, the filter adjusted the area utilized for analysis, with radii ranging from five to 85 miles (covering a corresponding area of 79 to 22,700 square miles, respectively). The same technique was applied to the REHS residential data in order to obtain the numerator. This smoothing process alleviates the unstable workforce rates resulting from mapping small area data. A map representing the geographic distribution of the workforce in California as a rate of REHS professionals per 10,000 population is presented in Appendix C. In addition to stabilizing workforce rates, using an adaptive spatial filter models the distances from residential to employment locations as a range. [ii]

A benchmark state average of 0.9 REHS per 10,000 population was derived by dividing the total number of REHS professionals with active status in the state by the total population of California. Certain rural areas in close proximity to pockets of REHS residential locations exhibited rates well above the statewide average. For example, a group of counties on the northeastern sector to the state exceeded the statewide average by up to four. In contrast, some metropolitan areas along the Pacific coast had rates of REHS representation below the bench mark average.

Note:

[ii] The assumption underlying this analytical methodology is that the workforce in urban areas will need to travel less distance from

their residential locations to serve a population of equivalent size as compared to REHS professionals in rural areas that are more sparsely populated. For example, in most parts of Los Angeles County, to serve a population of at least 10,000 people, an REHS professional would need to cover an area with a radius of 5 miles or less. In contrast, to serve an equivalent population in some parts of Inyo County, an REHS professional would need to cover an area with a radius of 85 miles.

REHS Workforce Profile

Ages were calculated using the reported DOB and ranged between 24 and 84 with an average of 47. Of current REHSs, 45% were 50 years of age or older. Figure 3 illustrates the age distribution; a normal curve is superimposed on the graph. Using the date of registration, age at the time of registration was also calculated and ranged between 21 and 66, with the average age at time of registration being 31.5 years of age. Sixty-seven percent of registered specialists were male.

Figure 3
Histogram of Registered Environmental Health Specialists (REHSs) age distribution

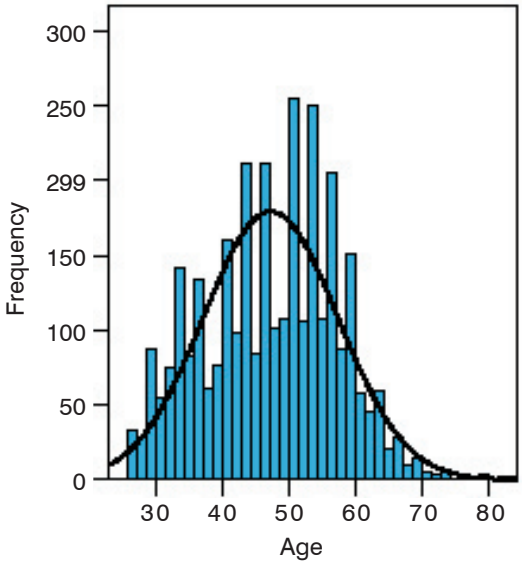


Table 4.4.2 compares data reported by the health officers (i.e., all professional staff) to the results provided from analyzing the REHS database (i.e., REHS only). In both cases males outnumber females, though the REHS database results show a more disproportionate gender distribution. The data vary when comparing age. In both cases, the number of individuals under 24 and over 65 is almost negligible. There is a difference, however, when analyzing the 25-44 and 45-64 age categories. While the survey results indicate that 52% of professionals are 25-44, the REHS database results show a smaller percentage, 39%. The opposite occurs when looking at the next age bracket, with 45% being 45-64 according to health officer data, and 58% according to the REHS database. It is important to note that the EH Delivery Systems Survey includes professionals and paraprofessionals (which are not required to have REHS). Although the numbers cannot be directly compared, they do provide a reasonable estimate of the workforce.

Table 4.4.2—REHS gender and age as reported by health officers compared to database records

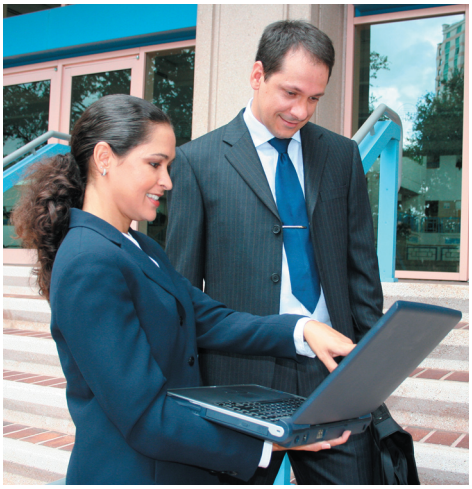
	Data reported by health officers	REHS Database
Gender	(n=2231)	(n=3181)
Male	55%	63%
Female	45%	37%
Age	(n=1524)	(n=3180)
18-24	2%	0
25-44	52%	39%
45-64	45%	58%
65+	1%	3%

Retired

Information for those that were marked "retired," but were still active on the REHS database was also analyzed. Active status is maintained if the routine registration fee is paid. In the database, 408 records were labeled retired and active. Four records were not included because of missing information (404 of the 408 were evaluated). The average age for this group was 66.7 years of age. Interestingly, the average age at time of registration for this group was 31.8, which is strikingly similar to the age at registration for non-retired REHS.

Trainee

Under most conditions a person must receive training before they are considered eligible to sit for the REHS registration exam administered by the State of California. EH Departments throughout the state routinely hire REHS trainees. In order to qualify as a trainee, applicant transcripts must be reviewed by the state REHS program to validate academic preparation. The REHS program verifies that a candidate has a Bachelor's degree and at least 30 units of relevant science courses. When this is confirmed, the candidate receives a letter from the state that authorizes him/her to apply for employment as a trainee. Within three years of being hired as a trainee, candidates must pass the REHS state administered examination to achieve REHS status.



The REHS program maintains a separate database to track trainees and those individuals who have received the letter of trainee qualification. This database contained 417 records at the time of the survey. According to the trainee database information provided, there are approximately 25

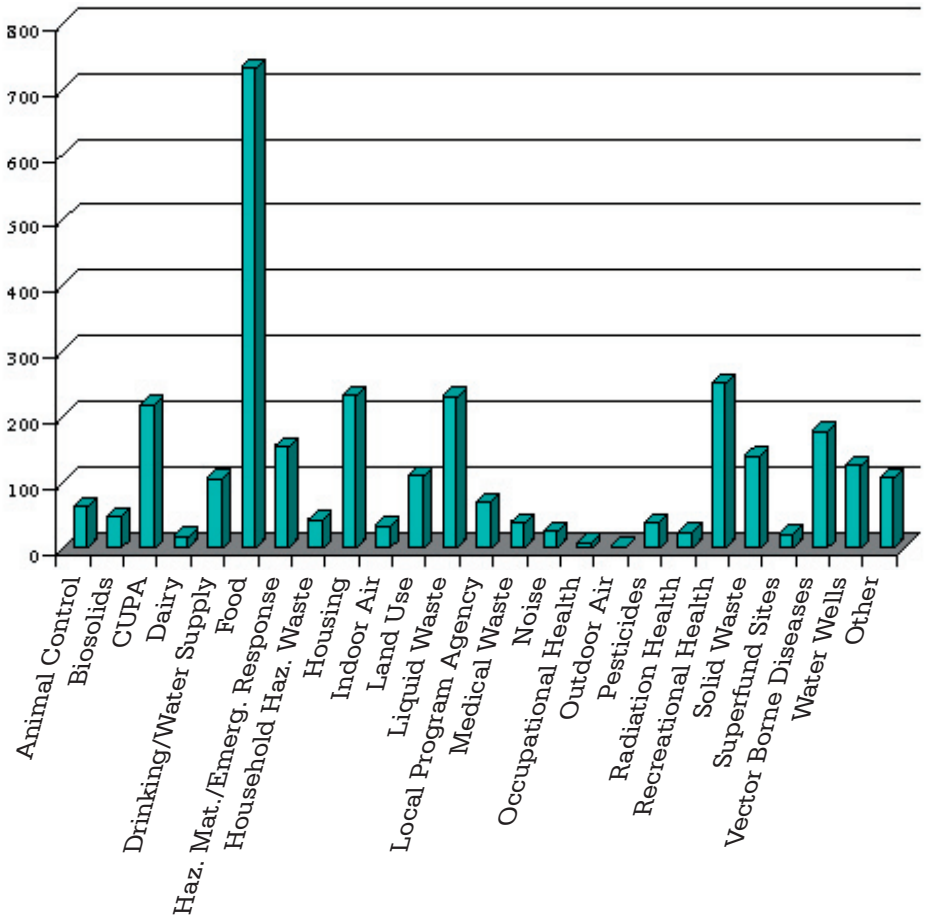
trainees in the state who will be eligible to sit for the REHS exam once their training period is complete. There are approximately 392 individuals who have received their letter authorizing them to seek employment in the EH field as trainees, indicating an ample number of individuals with base qualifications to enter the EH profession in trainee status. The average age for this group is 35.5 years, and 64% are under the age of thirty (these results were based on 218 records that provided DOB; DOB was not reported for 199 records).

4.5 Workforce Breakdown by Service Area

This section provides a breakdown of the total number of professionals and paraprofessionals that were reported per service area. The total number of employees for all service areas was 3,080, which is higher than the 2,477 that was reported as the total number of professionals and paraprofessionals working in the surveyed EH departments. This discrepancy arises from the fact that some directors did not have the breakdown to provide FTEs and instead provided the total number of people that worked in each service area. This resulted in an overestimate in certain service areas (i.e., if individual X worked in the food program and inspecting pools, food would be given a 1, as would recreational health, for a total of two positions reported).

The number of professionals and paraprofessionals (733) providing services in food quality towers over all other programs, and constitutes almost 25% of the total reported workforce. Recreational health follows as the service area with the second highest number of reported employees (252), followed by housing (232) and liquid waste (231). Programs that employ the most professionals appear to be substantially, or completely fee supported (Figure 4).

Figure 4
Total number of reported professionals/paraprofessionals by the assessed environmental health service areas



4.6 Optimal Number of EH Employees

To assess the realistic needs for additional staff, directors were asked to indicate the optimal number of employees needed to carry out regulatory obligations. Altogether, respondents indicated that there was a need for an additional 324 positions—this constitutes about 13% of the current number employed by the EH departments. By comparing the number of additional positions needed with the total number of allocated positions, a varying range in need was calculated between

1.8% to 150%. Departments with one FTE indicating that they need one additional person would require a 100% staff increase.

4.7 Vacancies and Challenges

A total of 217 vacancies were reported during the survey period. Directors identified 22 of these vacancies as frozen due to lack of funding, representing 10% of the total vacancies.

Directors were asked about major challenges faced by their department regarding the workforce and the filling of vacancies. Table 4.7 summarizes their responses. The most frequently reported challenge was a lack of adequately qualified applicants. A majority of directors explained that there were currently not enough qualified applicants to fill vacant posts and that recruiting REHS was a difficult process. Compensation and retention were also challenges reported by more than half of the respondents. Throughout the interview process compensation and retention were linked. Another challenge directly related to compensation that emerged as a prominent theme was high cost of living. Ten respondents (18%) noted this challenge as a comment or as "other." (For an Environmental Health Specialist salary comparison within California, see Appendix D). Thirty-five percent of respondents reported competition issues. The repeated theme associated with this challenge was that counties with lower compensation level recruit and train personnel only to lose them to larger, higher remunerating counties once employees acquire experience and certification qualifications. Responses to "other" varied, and included safety issues, budget constraints and inelastic staffing levels.

Table 4.7—Percent of respondents who indicated facing major challenges in their EH department

Major challenges faced by EH Department	Indicated challenge applied % (n)
Lack of adequately qualified applicants	67 (37)
Applicants lack relevant experience	35 (19)
Retention	52 (29)
Compensation	58 (32)
Competition	35 (19)
Other:	27 (15)

4.8 Workforce Trends

Table 4.8.1—Percent of respondents perceiving trend stability in staff longevity

Are trends in staff longevity getting more stable, less stable, or staying the same?	% (n)
More stable	18 (10)
Less stable	33 (18)
Staying the same	45 (25)
Were not sure/didn't know	4 (2)

Survey participants were asked if any trends had presented themselves in terms of staff longevity and retention (Table 4.8.1). The majority of respondents (45%) felt that longevity and retention were staying the same. About one-third of respondents indicated that trends in staff longevity were becoming less stable. This group of respondents attributed the faltering stability of their workforce to several reasons, most notably low salaries and high housing costs. Other reasons included the large number of retirees and the continuous demand for services associated with local population increases.

Table 4.8.2—Reported trends in occupation after leaving EH department

If staff has left your C/C, where did they go?	% (n)
Work for other counties	65 (36)
Work for the state	29 (16)
Work for private industry	35 (19)
Work for academia/to pursue an education	15 (8)
Retired	73 (40)
Other Reasons	24 (13)

Directors were asked to identify the professional destination of departing employees with respondents reporting all applicable categories. Seventy-three percent indicated that they had lost at least one employee to retirement in the past five years. A substantial number of respondents (65%) also indicated that they had lost staff to other counties. The most reported "other" was maternal/paternal leave. Please refer to Table 4.8.2.

5. RESULTS—SERVICES

The results presented in Section 5 cover the function, or service provision aspect as reflected by the questionnaire. In order to facilitate reporting results, related service areas are aggregated. The funding levels, training needs, and service reduction or enhancement are addressed in Sections 6.1, 6.2 and 6.3 respectively. In tables describing each service, C/C refers to counties and cities, and EH directors refer to the county EH director or the designee for that county. Respondents reported providing anywhere between eight and 19 of the specified services.

5.1 Air Quality

Outdoor air and indoor air are both services evaluated by the survey that pertain to the provision of air quality services.

5.1.1 Outdoor Air

Program Description: Oversight and/or regulation of mobile and stationary sources of outdoor air pollution.

In California, the Air Resources Board (ARB), which is a part of California Environmental Protection Agency (Cal/EPA), is the lead agency responsible for air quality management. Outdoor air pollutants

can be emitted by mobile (includes both on and off-road sources) or stationary sources (fixed equipment and industrial sites). The state is divided into 35 local Air Pollution Control Districts (APCD) and Air Quality Management Districts (AQMD) (See Appendix E) that develop and implement local air quality management plans and specifically regulate emissions produced by local stationary sources.[13] Although ARB also has direct authority over mobile sources, it is the Mobile Source Enforcement Section that is responsible for enforcing laws and regulations regarding mobile sources.[14]

Only four of the survey respondents indicated that they provide any type of service in outdoor air (Table 5.1.1). All other C/Cs indicated that outdoor air quality issues were handled by their respective Air Quality Management District. One county manages the local air district within the EH department. All EH directors indicated that services in this area had not been reduced in the past five years (Table 5.1.1).

Table 5.1.1—Number of counties/cities that provide outdoor air service and respondent perception of experiences with outdoor air service provision

Service provision in outdoor air:	# of C/C	Experiences with service provision in outdoor air (n=4)	Yes % (n)	No % (n)
No	51	Is funding adequate?	50 (2)	50 (2)
Yes	3	Have services been reduced in past 5 years?	0	100 (4)
Complaint basis only	1	Have services been enhanced in past 5 years?	50 (2)	50 (2)
		Is there a need for technical training in this area?	50 (2)	50 (2)
Professionals reported in this service area	2			

5.1.2 Indoor Air

Program Description: *Involvement in the regulation of or any issue pertaining to indoor air quality, including but not limited to mold, asbestos, carbon monoxide and smoking complaints.*

Despite the universal presence and knowledge of air pollutants in the indoor air environment, government standards are largely absent in this area. The California Occupational Safety and Health Program (Cal/OSHA), in the Department of Industrial Relations (DIR), has the regulatory and enforcement authority regarding exposure limits and other standards for the workplace that have a direct impact on indoor air quality. Aside from this exception, there are few governmental regulations for common indoor pollutants, and an absence of specification standards for residences, schools or public buildings.[15]

State agencies have developed general standards and guidelines to aid in assessing the hazards from indoor air pollutants. For example, CDHS has an Indoor Air Quality Program, which conducts research and experiments relating to the causes, effects, extent, prevention and control of indoor pollution in California.[16] ARB carries out a non-regulatory Indoor Air Quality (IAQ) and Personal Exposure Assessment Program (Indoor Program).[17] Like the DHS-IAQ Program, the ARB Indoor Air program includes research and development of indoor air quality guidelines, as well as public education and outreach.

Eighteen counties indicated that they provide some type of indoor air service, more than half of these being on a complaint basis only (Table 5.1.2). Mold and asbestos were the most noted complaints, although several directors indicated that they also address odor, carbon monoxide and smoking complaints. Several directors (n=3) worked with other agencies on indoor air quality issues: the air quality management district, housing program or county building department. Though most programs provided monitoring and other non-regulatory programs, one C/C managed mold issues related to code compliance violations, and another issued smoking citations. One county contracted with a lab for sampling (non-regulatory basis) and another stated that funds were insufficient to conduct adequate testing for indoor air complaints. One C/C identified a training need even though indoor air services were not provided by that C/C (Table 5.1.2). All respondents indicated that services had not been reduced in the past five years.

Table 5.1.2—Number of counties/cities that provide indoor air service and respondent perception of experiences with indoor air service provision

Service provision in indoor air:	# of C/C
No	37
Yes	7
Complaint basis only	11
Professionals reported in this service area	34

Experiences with service provision in indoor air (n=18)	Yes % (n)	No % (n)
Is funding adequate?*	39 (7)	56 (10)
Have services been reduced in past 5 years?	0	100 (18)
Have services been enhanced in past 5 years?	17 (3)	83 (15)
Is there a need for technical training in this area?	44 (8)	61 (11)
* Percentages do not add up because of unreported values		

5.2 Water Quality

Several program areas inquired about in the survey specifically address water quality. These include drinking water/supply, local primacy agency (LPA), water wells and wastewater.

5.2.1 Drinking Water/Supply

Program Description: Assures that domestic water supplies are safe, potable and available at an adequate quantity and at sufficient pressure.

In California, Federal EPA has delegated primacy to CDHS to enforce the Safe Drinking Water Act. Within CDHS, it is the Drinking Water Program (DWP), in the Division of Drinking Water and Environmental

Management (DDWEM), which regulates public water systems. Two Drinking Water Field Operations Branches (DWFOBs), one for Northern California and the other for Southern California, regulate public water systems.[18] The DWFOBs work with Federal EPA, the State Water Resources Control Board (SWRCB), and the nine Regional Water Quality Control Boards (RWQCBs) and other entities whose primary concerns include protecting drinking water supplies.[18] (For map of nine RWQCBs, see Appendix F)

In addition to acting as the primary enforcement body, the DWFOBs perform field inspections of more than 7,500 water systems (including all large water systems and some small water systems), issue operating permits and review plans for new facilities.[18] The DWFOBs oversee five regions and are composed of 21 drinking water program district offices that provide services at the local level (See Appendix G). At this level, the DWFOBs collaborate with county health departments, planning departments and local government, including the boards of supervisors.[18] Unlike large water systems, either CDHS or individual counties can oversee regulation of small water systems. CDHS has delegated primacy to 35 local primacy agencies (LPAs) for the regulation of public water systems containing less than 200 service connections (Please see LPA section 5.2.2 below).[19] This includes community, transient and non-transient water systems. The DWFOBs have direct regulatory oversight for 23 counties that do not have LPA status.

Of survey respondents, 96% indicated that their jurisdiction provides services in drinking water/supply. The two counties that had no direct involvement with drinking water service delivery were both contract

counties and identified CDHS as the regulatory authority that provided these services. While the three city departments surveyed cannot have LPA status, they all confirmed the provision of some type of services in the area of drinking water. Sixty-four percent of respondents indicated that funding was adequate to effectively provide services, and 98% reported that services had not been reduced in the past five years. (Table 5.2.1).

Table 5.2.1—Number of counties/cities that provide drinking water/supply service and respondent perception of experiences with drinking water/supply service provision

Service provision in drinking water/ supply?	# of C/C
No	2
Yes	53
Professionals reported in this service area	106

Experiences with service provision in drinking water/ supply (n=53)	Yes % (n)	No % (n)
Is funding adequate?*	64 (34)	32 (17)
Have services been reduced in past 5 years?	2 (1)	98 (52)
Have services been enhanced in past 5 years?	13 (7)	87 (46)
Is there a need for technical training in this area?	34 (18)	66 (35)
* Percentages do not add up because of unreported values		

5.2.2 Local Primacy Agency (LPA)

Program Description: LPAs regulate small public water systems that serve less than 200 service connections and assure their operation in compliance with relevant federal and state regulations. The purpose of the program is to ensure that small public water systems deliver safe and adequate potable water.

As described above, CDHS has granted LPA status to 35 EH departments. The LPA program falls under Small Water Systems Unit, which is a part of the Technical Programs Branch within the DWP. Delegated LPA counties have regulatory responsibility for community water systems with less than 200 service connections and non-community water systems. The DWFOBs provide oversight, technical assistance and training for LPAs.[19]

Of the surveyed counties, 32 identified themselves as LPAs (Table 5.2.2) and one county was currently pending LPA appointment. Several of the non-LPA counties managed state small water systems, which service between 4-15 service connections. While 59% reported that funding was adequate and 97% reported that services had not been reduced in the past five years, nearly half (47%) of respondents indicated that there was a training need in providing LPA services (Table 5.2.2).

Table 5.2.2—Number of counties/cities that are appointed as the Local Primacy Agency (LPA) and respondent perception of experiences with service provision as the LPA

Local Primacy Agency status:	# of C/C	Experiences with service provision as the LPA (n=32)	Yes % (n)	No % (n)
No	23	Is funding adequate?*	59 (19)	38 (12)
Yes	32	Have services been reduced in past 5 years?	3 (1)	97 (31)
		Have services been enhanced in past 5 years?	13 (4)	88 (28)
Professionals reported in this service area	70	Is there a need for technical training in this area?	47 (15)	53 (17)
		* Percentages do not add up because of unreported value		

5.2.3 Water Wells

Program Description: Regulation of the construction, reconstruction or repair, modification (deepening), abandonment and/or destruction of all types of wells to ensure that ground water is not contaminated.

In California, the Department of Water Resources (DWR) is one of the leading agencies in assisting local water districts in water management and conservation efforts. Section 231 of the Water Code requires DWR to develop well standards to protect the quality of groundwater.[20] The minimum requirements for constructing, modifying, maintaining and destroying wells are found in DWR Bulletin 74-90 (supplement to Bulletin 74-81), *California Well Standards, Water wells, Monitoring wells, Cathodic protection wells, June 1991*.[20] Drillers must

adhere to the construction criteria established by these standards. Regulation and enforcement of DWRs standards is predominantly carried out at the local level by local government, counties, cities and some water districts. Environmental health departments are the primary authority for issuing permits in California. Out of 75 well permitting agencies, 54 found are in county EH departments, 10 in other county departments such as health, planning or land use, nine in individual cities and two in water districts.[21] Permitting agencies are required to complete several inspections, including initial site inspections, verification of proper placement of annular seal around the well casing and/or final inspections. Some departments are also required to complete Environmental Impact Reports with the original plan check. In order to qualify for a permit, contractors must usually submit an application, a plot plan and pay a fee to the EH department.

CDHS has specific requirements for public water supply wells servicing more than 15 service connections. The California Department of Toxic Substances Control (DTSC) establishes recommended standards for the construction of monitoring wells in hazardous waste sites. The State Water Resources Control Board (SWRCB) has requirements for monitoring wells constructed at landfills and other regulated facilities.[20] Ninety percent of survey respondents provided water well service (Table 5.2.3). The main involvement reported was issuing of permits to drill wells, and monitoring well drilling and pouring of the annular seal. Several C/Cs indicated that water well management and permitting was coupled to the land use program. C/Cs differed in permitting authority; some counties permit drilling only in the unincorporated areas (drilling in incorporated cities must be permitted by city) while others indicated that drilling in any part of the county was under their

jurisdiction. At least 90% reported that services had neither been enhanced nor reduced in the past five years (Table 5.2.3).

Table 5.2.3—Number of counties/cities that provide water well service and respondent perception of experiences with water well service provision

Service provision in water wells?	# of C/C
No	5
Yes	50
Professionals reported in this service area	126

Experiences with service provision in water wells (n=50)	Yes % (n)	No % (n)
Is funding adequate?*	72 (36)	24 (12)
Have services been reduced in past 5 years?	2 (1)	98 (49)
Have services been enhanced in past 5 years?	10 (5)	90 (45)
Is there a need for technical training in this area?	38 (19)	62 (31)
* Percentages do not add up because of unreported values		

5.3 Hazardous Materials

5.3.1 Household Hazardous Waste (HHW)

Program Description: Program to ensure proper storage and disposal of household hazardous materials and waste.

Since regulating individual residences for HHW is unrealistic, Federal EPA exempts wastes generated by normal household activities from the definition of hazardous waste.[22] Although HHW is not regulated as hazardous waste, in California it is still regulated as a solid waste. The California Integrated Waste Management Board (CIWMB) is the

lead agency in developing and promoting alternatives to the illegal or environmentally unsound disposal of HHW.[23] The CIWMB provides HHW grants to assist local government and agencies in establishing or maintaining permanent HHW programs with the aim to reduce the amount of HHW disposed of in landfills.[23]

Of C/Cs surveyed, 22 administered some type of HHW program (Table 5.3.1). Involvement included reviewing permits for facilities that manage collection events and working with the Local Enforcement Agency (LEA) or solid waste management authority to provide support with collections. Most C/Cs provided educational information about identifying and proper disposal of these hazardous materials. All reported services had not been reduced in the past five years (Table 5.3.1).

Table 5.3.1—Number of counties/cities that provide household hazardous waste service and respondent perception of experiences with household hazardous waste provision

Service provision in household haz. waste:	# of C/C
No	33
Yes	22
Professionals reported in this service area	43

Experiences with service provision in HHW (n=22)	Yes % (n)	No % (n)
Is funding adequate?*	73 (16)	23 (5)
Have services been reduced in past 5 years?	0	100 (22)
Have services been enhanced in past 5 years?	23 (5)	77 (17)
Is there a need for technical training in this area?	41(9)	59 (13)
* Percentages do not add up because of unreported values		

5.3.2 Certified Unified Program Agency (CUPA)

Program Description: *County EH department serves as the CUPA for the county.*

The Unified Program was created in 1993 to "consolidate, coordinate, and make consistent the administrative requirements, permits, inspections, and enforcement activities" [24] for six environmental management programs. The six programs as described by Cal/EPA are:

- Hazardous Materials Release Response Plans and Inventories (Business Plans)
- California Accidental Release Prevention (CalARP) Program
- Underground Storage Tank Program
- Aboveground Petroleum Storage Act Requirements for Spill Prevention, Control and Countermeasure (SPCC) Plans
- Hazardous Waste Generator and Onsite Hazardous Waste Treatment (tiered permitting) Programs
- California Uniform Fire Code: Hazardous Material Management Plans and Hazardous Material Inventory Statements[24]

Cal/EPA is the agency responsible for coordination of the CUPA program. Numerous other state agencies are involved in the administration, regulation and enforcement of CUPA program requirements, including DTSC, the Governor's Office of Emergency Services (OES), Office of the State Fire Marshall (OSFM), and the State Water Resource Control Board (SWRCB).[24] Currently, there are 82 CUPAs in California: 48 are in EH departments, six are in other county departments (health, county fire, etc.), 21 are in city fire departments, six are in other city departments (public safety, toxics management

division), and the description for one was unavailable.[25] CUPAs can have contractual agreements with participating agencies (PA) that can coordinate with the CUPA to implement one or more programs. There are currently 17 PAs in California.[25]

Of respondents, nearly 82% identified their EH department as a CUPA (Table 5.3.2). Of the three city jurisdictions only one housed the CUPA program in the city EH department. The CUPA program was eliminated from one C/C in the past five years. Sixty percent reported a need for technical training in CUPA activities, making it the service area with the highest training need (Refer to Appendix H).

Table 5.3.2—Number of counties/cities indicating Certified Unified Program Agency (CUPA) status and respondent perception of experiences with service provision in CUPA

Service provision in CUPA?	# of C/C
No	10
Yes	45
Professionals reported in this service area	219

Experiences with service provision in CUPA (n=45)	Yes % (n)	No % (n)
Is funding adequate?*	71(32)	27 (12)
Have services been reduced in past 5 years?	7(3)	93 (42)
Have services been enhanced in past 5 years?	47(21)	53 (24)
Is there a need for technical training in this area?	60 (27)	40 (18)
* Percentages do not add up because of unreported values		

5.3.3 Hazardous Materials/Emergency Response (Haz. Mat./ER) Program Description: Respond to emergencies related to hazardous materials/waste spills, injuries or other unexpected events and oversight of cleanup.

Eighty-four percent of respondents provided services in hazardous materials/emergency response. Services were intertwined with the CUPA activities in most C/Cs. Six of the 10 jurisdictions not housing the CUPA program also indicated they do not provide services in hazmat/ER. Likewise, many respondents shared staff between hazmat/ER service provision and the CUPA program. Several counties lacking the CUPA program did provide services in hazmat/ER. Two counties were involved at a technical support capacity only. Fifty percent reported a need for training in hazmat/ER (Table 5.3.3), which correlates with the high training need in CUPA activities.

Table 5.3.3—Number of counties/cities that provide Haz.Mat/ER service and respondent perception of experiences with Haz.Mat/ER service provision

Service provision in Haz. Mat/ER?	# of C/C
No	9
Yes	46
Professionals reported in this service area	155

Experiences with service provision in Haz. Mat/ER (n=46)	Yes % (n)	No % (n)
Is funding adequate?*	70 (32)	28 (13)
Have services been reduced in past 5 years?	4 (2)	96 (44)
Have services been enhanced in past 5 years?	13 (6)	87 (40)
Is there a need for technical training in this area?	50 (23)	50 (23)
* Percentages do not add up because of unreported values		

5.3.4 Superfund Sites

Program Description: Involvement in site clean-up and remediation efforts of sites designated as Superfund sites.

The Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), commonly known as Superfund, mandates the U.S. EPA to identify, investigate and work with the remediation of abandoned or inactive hazardous waste sites.[26] California's regulatory authority regarding Superfund site remediation is somewhat convoluted. DTSC and the RWQCB are lead agencies that oversee the regulatory process by preparing, reviewing and approving Remedial Action Plans or Removal Action Workplans for all sites, including military sites.[27] Regulatory and enforcement authority at the local level is limited. Twenty-four counties in California have one or more sites designated as Superfund sites.[28]

Of the 13 C/Cs that reported providing services in this area, several indicated that their role was one of support to DTSC (Table 5.3.4). All respondents indicated that there has been little change in this service area, neither having been reduced nor enhanced in the past five years (Table 5.3.4).

Table 5.3.4—Number of counties/cities that provide Superfund service and respondents perception of experiences with Superfund service provision

Service provision in superfund sites:	# of C/C
No	42
Yes	13
Professionals reported in this service area	21

Experiences with service provision in superfund sites (n=13)	Yes % (n)	No % (n)
Is funding adequate?	62 (8)	38 (5)
Have services been reduced in past 5 years?	0	100 (13)
Have services been enhanced in past 5 years?	0	100 (13)
Is there a need for technical training in this area?	38 (5)	62 (8)
* Percentage does add up because of unreported value		

5.4 Liquid Waste and Biosolids

5.4.1 Liquid Waste (Septic Systems)

Program Description: Regulation of on-site sewage disposal systems and of septic pumpers/haulers; can include regulation of chemical toilets.

Until recently, California did not have statewide minimum standards for on-site sewage treatment systems. The pending statewide regulations for Assembly Bill (AB 885) will require the adoption of standardized regulations for on-site wastewater treatment sites by the State Water Resources Control Board.[29] Regulations for (AB 885) are currently out for public comment. Traditionally, local EH Departments have been responsible for reviewing septic system design proposals, permitting

the installation or replacement/repair of septic tanks, and licensing and inspecting septage haulers/pumper trucks. The Regional Water Quality Boards have delegated septic tank approval primacy to local government through several Memorandums of Understanding (MOU).

Fifty-three C/Cs (96%) provided liquid waste services (Table 5.4.1). The range of services varied widely, ranging from response to septic tank leakage only, to comprehensive liquid waste programs responsible for inspecting all septic tank plans and septic haulers. Many respondents reported that the liquid waste program was carried out in combination with the land use program and consisted predominantly of permitting the installation of on-site septic systems. Fifty-five percent reported a training need in liquid waste (Table 5.4.1). This was the third highest reported need in training.

Table 5.4.1—Number of counties/cities that provide liquid waste service and respondent perception of experiences with liquid waste service provision

Service provision in liquid waste:	# of C/C
No	2
Yes	53
Professionals reported in this service area	231

Experiences with service provision in liquid waste (n=53)	Yes % (n)	No % (n)
Is funding adequate?*	62 (33)	34 (18)
Have services been reduced in past 5 years?	6 (3)	94 (50)
Have services been enhanced in past 5 years?	15 (8)	85 (45)
Is there a need for technical training in this area?	55 (29)	45 (24)
* Percentages do not add up because of unreported values		

5.4.2 Biosolids

Program Description: Oversee or regulate land application of biosolids.

Treatment of municipal wastewater generates liquid and semi-solid components. The liquid component can be discharged to percolating ponds or be used to irrigate some types of land. The sludge, or semisolid component, can be treated to produce biosolids. No single state agency has regulatory authority of biosolids management in California. Lead agencies include the nine regional water quality control boards, the IWMB, the ARB, and the California Department of Food and Agriculture.[30] Three counties in California have completely banned biosolids, and nine have effective bans (making regulations so stringent that land application is discouraged). Others have adopted local ordinances that directly or indirectly regulate biosolids. Seventeen counties currently have ordinances that directly regulate land application of biosolids. The 41 counties that lack these ordinances rely on the RWQCBs to regulate land application of biosolids.

Of respondents, 35% indicated some involvement with biosolids regulation (Table 5.4.2). Several C/Cs collaborated with the Agriculture Department and with the RWQCB. One county indicated that individual cities had authority concerning biosolids application and that county oversight was limited to unincorporated areas. Several identified their department as the entity that would theoretically permit application but that these requests were seldom or non-existent. One C/C reported that regulation of biosolids had been eliminated from the department, accounting for the discrepancy in Table 5.4.2 (services reduced in past 5 years having an *n* of 20).

Table 5.4.2—Number of counties/cities that provide service in biosolids and respondent perception of experiences with service provision in biosolids

Service provision in biosolids:	# of C/C
No	36
Yes	19
Professionals reported in this service area	48

Experiences with service provision in biosolids (n=19)	Yes % (n)	No % (n)
Is funding adequate?	79 (15)	21 (4)
Have services been reduced in past 5 years?	5 (1)	95 (19)
Have services been enhanced in past 5 years?	11 (2)	89 (17)
Is there a need for technical training in this area?	37 (7)	63 (12)
* Percentages do add up because of unreported values		

5.5 Solid Waste

5.5.1 Solid Waste

Program Description: Oversee storage, collection, transportation and disposal of solid waste. Program may include inspections, permitting, and response to complaints.

The lead agency for solid waste management in California is the Integrated Waste Management Board (IWMB), within Cal/EPA. The IWMB grants Local Enforcement Agency (LEA) status to local departments. LEAs permit and inspect active, inactive and closed transfer stations and disposal sites, and have the responsibility for enforcing minimum standards regarding storage and transportation of

solid wastes.[31] There are currently 66 local entities that have been designated LEAs. These are found in local and city EH and health departments and waste management agencies.[32]

Results showed that 52 C/Cs provided services in solid waste management (Table 5.5.1). Of these, 43 were the LEAs. Six counties did not directly provide solid waste management services, but contracted with other counties for these services and provided support to their acting LEA. Five C/Cs were not the LEA; these C/Cs housed the LEA in a separate agency or department. A majority reported that funding was adequate and that services in solid waste had not been reduced (Table 5.5.1).

Table 5.5.1—Number of counties/cities that provide solid waste service and respondent perception of experiences with solid waste service provision

Service provision in solid waste:	# of C/C
No	3
Yes	50
Complaint basis only	2
Professionals reported in this service area	140

Experiences with service provision in solid waste (n=52)	Yes % (n)	No % (n)
Is funding adequate?*	81 (42)	15 (8)
Have services been reduced in past 5 years?*	6 (6)	92 (48)
Have services been enhanced in past 5 years?*	21 (11)	77 (40)
Is there a need for technical training in this area?*	44 (23)	52 (27)
* Percentages do not add up because of unreported values		

5.5.2 Medical Waste

Program Description: Includes the inspection of registered medical waste generating facilities and on-site medical treatment units.

The Resource Conservation and Recovery Act (RCRA), subtitle 'J' regulates medical waste.[33] As defined by the EPA, medical waste is "any solid waste that is generated in the diagnosis, treatment, or immunization of human beings or animals, in research pertaining thereto, or in the production or testing of biologicals." [34] Medical waste disposal is regulated at the state level. In California, this is accomplished by CDHS through the Medical Waste Management Program (MWMP). The state functions as the local enforcement agency in 27 jurisdictions that have opted to have the state manage medical waste. The MWMP provides support and oversight for 35 local agencies that are medical waste local enforcement agencies for their jurisdictions.[35]

Thirty C/Cs (55%) provided services in medical waste management (Table 5.5.2). For numerous C/Cs, the responsibility for registering tattoo and body art facilities fell within the confines of the medical waste program. Eighty-seven percent reported that funding was adequate, making this the most adequately funded program (Refer to Appendix I).

Table 5.5.2—Number of counties/cities that provide medical waste service and respondent perception of experiences with medical waste service provision

Service provision in medical waste:	# of C/C
No	25
Yes	30
Professionals reported in this service area	38

Experiences with service provision in medical waste (n=30)	Yes % (n)	No % (n)
Is funding adequate?*	87 (26)	10 (3)
Have services been reduced in past 5 years?	0	100 (30)
Have services been enhanced in past 5 years?	7 (2)	93 (28)
Is there a need for technical training in this area?	40 (12)	60 (18)
* Percentages do not add up because of unreported values		

5.6 Consumer Protection

5.6.1 Food

Program Description: Inspection of retail food facilities to ensure that food is safe and facilities are hygienic.

Food facilities can be retail (restaurants, markets, bakeries, bars, catering trucks) or wholesale (suppliers of food to retail facilities). Wholesale facilities are regulated directly by the Food and Drug Branch in CDHS. Retail food facilities are usually regulated by local entities that implement the California Uniform Retail Food Facilities Law (CURFFL), which establishes the minimum standards that must be adhered to by retail food facilities. CDHS has regulatory authority

over these localities.[36] Responsibilities for local jurisdictions include inspecting food facilities and reviewing construction or modification plans for food establishments. Food programs are fee-based.

All C/Cs (100%) provided food services (Table 5.6.1). Services predominantly included retail food facility inspections, enforcement action and follow-up for non-compliant facilities (citations), and food-borne illness investigations. This service area reported the highest of number of professionals, which exceeded all areas by more than 400 employees (Refer to Figure 4).

Table 5.6.1—Number of counties/cities that provide food service and respondent perception of experiences with food service provision

Service provision in food:	# of C/C
Yes	55
Professionals reported in this service area	733

Experiences with service provision in food (n=55)	Yes % (n)	No % (n)
Is funding adequate?*	67 (37)	29 (16)
Have services been reduced in past 5 years?	4 (2)	96 (53)
Have services been enhanced in past 5 years?	16 (9)	84 (46)
Is there a need for technical training in this area?	40 (22)	60 (33)
* Percentages do not add up because of unreported values		

5.6.2 Recreational Health

Program Description: Monitor and inspect public pools and spas, beaches and freshwater (lakes and streams) recreational areas to assure that they are free of safety or disease hazards.

The Recreational Health and Beach Safety Program, part of the Division of Drinking Water and Environmental Management in DHS is charged with the task of developing and implementing initiatives to address the underlying causes of preventable disease and hazardous conditions associated with our coastal waters, swimming pools and other recreational waters.[37] Pool laws and regulations are prescribed and delineated by two separate entities. The Building Code oversees construction requirements for pools, whereas DHS is responsible for health-related operational standards that directly relate to water quality. The Recreational Health and Beach Safety Program is responsible for promulgating coastal water regulations, but is not responsible for lakes and streams. Local governments responsible for inspecting pools and beaches are required to notify the Recreational Health and Beach Safety Program when citations occur.[38]

This program was almost ubiquitous in local EH departments, with all but one jurisdiction providing services in this area (Table 5.6.2).

Departments regulated public pools and spas (those in apartments, condominiums, townhouses, hotels/motels, schools and campgrounds/resorts). Most also required a plan check for public pool construction to assure the minimum safety requirements were being met. A majority of departments also responded to complaints of hazardous or unsanitary conditions in public pools. Thirty-seven percent reported a need for training in recreational health (Table 5.6.2).

Table 5.6.2—Number of counties/cities that provide recreational health service and respondent perception of experiences with recreational health service provision

Service provision in recreational health:	# of C/C
No	1
Yes	54
Professionals reported in this service area	252

Experiences with service provision in recreational health (n=54)	Yes % (n)	No % (n)
Is funding adequate?*	74 (40)	22 (12)
Have services been reduced in past 5 years?	4 (2)	96 (52)
Have services been enhanced in past 5 years?	6 (3)	94 (51)
Is there a need for technical training in this area?	37 (20)	63 (34)
* Percentages do not add up because of unreported values		

5.7 Vector and Animal Control

5.7.1 Vector Control

Program Description: Respond to the problems and health hazards created by vectors, such as mammals, insects, arthropods or any others that carry disease or are nuisances.

The Infectious Disease Branch within CDHS is the lead state program in the surveillance, investigation, prevention and control of communicable diseases.[39] The Vector-Borne Disease Section (VBDS) has seven regional offices that provide technical assistance to local vector control agencies to prevent and control vector-borne diseases.[39] Though this section provides oversight, monitoring of vectors occurs predominantly at the local level. Mosquito Abatement Districts (MAD), Mosquito and Vector Control Districts (MVCD) and Vector Control Districts (VCD) may or may not be found in local EH Departments. MADs, MVCDs, and VCDs are required to provide annual reports to the VBDS. The VBDS has cooperative agreements with local agencies and local agencies must be certified by the state to be able to apply pesticides for vector control.[40]

Services in vector control were provided by 78% of the surveyed C/Cs (Table 5.7.1). While plague surveillance and Lyme disease were sporadically mentioned, when asked about vector control the majority of respondents discussed departmental effort and activities regarding West Nile Virus and mosquito abatement. Ninety-eight percent reported that services had not been reduced in the past five years (Table 5.7.1).

Table 5.7.1—Number of counties/cities that provide vector control service and respondent perception of experiences with vector control service provision

Service provision in vector control?	# of C/C
No	12
Yes	38
Complaint basis only	5
Professionals reported in this service area	178

Experiences with service provision in vector control (n=43)	Yes % (n)	No % (n)
Is funding adequate?*	60 (26)	37 (16)
Have services been reduced in past 5 years?	2 (1)	98 (42)
Have services been enhanced in past 5 years?	26 (11)	74 (32)
Is there a need for technical training in this area?	44 (19)	56 (24)
* Percentages do not add up because of unreported values		

5.7.2 Animal Control

Program Description: Provides animal-related services including rabies control and bite investigation.

The Veterinary Public Health Section is another section within the Infectious Disease Branch in CDHS. This Section assists local counties in the investigations and control/prevention of zoonotic diseases, such as rabies.[39] Animal control services are provided at the local level by different departments depending on the city or county, and can be found in police departments, community services divisions, and as separate animal control departments.

Most C/Cs did not have an animal control component within the EH department. Only 30% provided any type of services in this area (Table 5.7.2). Services ranged from working with the county's animal control division as support, to running full animal control programs that included biting animals, humane work, rabies surveillance, response to dead animals and animal waste. Thirty-one percent reported a training need, which was one of the lowest training needs reported in any service area (Refer to Appendix H).

Table 5.7.2—Number of counties/cities that provide animal control service and respondent perception of experiences with animal control service provision

Service provision in animal control?	# of C/C
No	39
Yes	16
Professionals reported in this service area	63

Experiences with service provision in animal control (n=16)	Yes % (n)	No % (n)
Is funding adequate?*	63 (10)	31 (5)
Have services been reduced in past 5 years?	0	100 (16)
Have services been enhanced in past 5 years?	6 (1)	94 (15)
Is there a need for technical training in this area?	31 (5)	69 (11)
* Percentages do not add up because of unreported values		

5.8 Housing

Program Description: Ensures compliance with the requirements for sanitation, ventilation, maintenance, use and occupancy for residential facilities (apartment buildings and condominiums) and temporary lodging facilities (motels/hotels, organized camps, labor camps).

Regulation of housing facilities in the state of California involves a complex interaction between state and local agencies.

Over 80% of surveyed C/Cs provided services in housing (Table 5.8). In general, EH directors affirmed service delivery in housing if they were involved in any type of inspection of facilities where people can live or lodge to ensure safe and sanitary conditions. Numerous types of facilities were reported, including but not limited to: apartment buildings and condominiums, detention facilities, employee housing, labor camps, residential care homes, organized camps and substandard housing. Forty-three percent of respondents indicated that funding was not adequate to provide services. When considering services provided by a majority of C/Cs, housing had the greatest funding need (Refer to Appendix I).

Table 5.8—Number of counties/cities that provide housing service and respondent perception of experiences with housing service provision

Service provision in housing:	# of C/C
No	9
Yes	37
Complaint basis only	9
Professionals reported in this service area	232

Experiences with service provision in housing (n=46)	Yes % (n)	No % (n)
Is funding adequate?*	54 (25)	43 (20)
Have services been reduced in past 5 years?	2 (1)	98 (45)
Have services been enhanced in past 5 years?	7 (3)	93 (43)
Is there a need for technical training in this area?	37 (17)	63 (29)
* Percentages do not add up because of unreported values		

5.9 Pesticide Use

Program Description: Involved with monitoring of pesticide application, storage of pesticides and investigations related to pesticide use.

In California, the Department of Pesticide Regulation (DPR), part of Cal/EPA, has the authority to regulate pesticide use. At the local level, DPR works in concert with California's County Agricultural Commissioners (CACs), who serve as the principal enforcement entity for state pesticide laws and regulations. The state has a total of 55 CACs that oversee proper and safe use of pesticide in California's 58 counties. El Dorado/Alpine, Inyo/Mono and Plumas/Sierra each share one CAC.[41]

A total of 13 respondents provided services in pesticide regulation (Table 5.9). A majority of respondents not providing services specified that the CACs were responsible for providing local services in pesticide regulation. For those that reported providing services, the range of services described included injury reports, pesticide illness reports, storage and clean up. Two counties regulated pesticide issues in conjunction with their hazardous materials program. All C/Cs reported that services had not been reduced in the past five years (Table 5.9).

Table 5.9—Number of counties/cities that provide pesticide service and respondent perception of experiences with pesticide service provision

Service provision in pesticides:	# of C/C
No	42
Yes	9
Complaint basis only	4
Professionals reported in this service area	39

Experiences with service provision in pesticide regulation (n=13)	Yes % (n)	No % (n)
Is funding adequate?*	54 (7)	31 (4)
Have services been reduced in past 5 years?	0	100 (13)
Have services been enhanced in past 5 years?	8 (1)	92 (12)
Is there a need for technical training in this area?	46 (6)	54 (7)
* Percentages do not add up because of unreported values		

5.10 Radiation Health

Program Description: Includes licensing radioactive materials and inspection of facilities using radiation.

The Radiologic Health Branch is within the Food, Drug, and Radiation Safety Division of CDHS. The Branch enforces the Radiation Control Laws and Regulations, which includes licensing of radioactive materials, registration of X-ray-producing machines, certification of X-ray and radioactive material users, inspection of facilities using radiation, investigation of radiation incidents, and surveillance of radioactive contamination in the environment.[42] Nine C/Cs provided services in radiation health (Table 5.10) and only two of those had comprehensive radiation health programs. These counties represented two of the few local agencies designated by the CDHS to conduct inspections of facilities utilizing radiation. The remaining C/Cs that offered services respond to either complaints or emergencies. All respondents indicated that services had not been reduced or enhanced in the past five years (Table 5.10).

Table 5.10—Number of counties/cities that provide radiation health service and respondent perception of experiences with radiation health service provision

Service provision in radiation health:	# of C/C
No	46
Yes	7
Complaint basis only	2
Professionals reported in this service area	24

Experiences with service provision in radiation health (n=9)	Yes % (n)	No % (n)
Is funding adequate?	44 (4)	44 (4)
Have services been reduced in past 5 years?	0	100 (9)
Have services been enhanced in past 5 years?	0	100 (9)
Is there a need for technical training in this area?	44 (4)	56 (5)
* Percentage does add up because of unreported value		

5.11 Occupational Health and Safety

Program Description: Evaluate and control hazards in the workplace to prevent occupational injuries.

The lead state agencies regulating occupational health and safety are the CDHS and the Department of Industrial Relations. The Division of Occupational Safety and Health (DOSH) houses the Cal/OSHA Program. This program is responsible for enforcing California workplace safety and health laws and regulations and for providing assistance to employers and workers.[43] There are 23 Cal/OSHA Enforcement Unit district offices that enforce state guidelines for occupational health

and safety at the local level.[43] The regulation of radiation/radioactive materials in the workplace is provided by the Radiological Health Branch (part of Prevention Services, CDHS) instead of Cal/OSHA. Cal/EPA's Department of Pesticide Regulation has a Worker Health & Safety Unit that oversees enforcement (by local Agricultural Commissioners) of certain EPA pesticide requirements related to occupational health.

These two are the only areas where Cal/OSHA has agreed to delegate workplace enforcement authority. The Occupational Health Branch in CDHS is responsible for surveillance, hazard evaluation, worksite investigations and public education about occupational disease and injury among California workers—this branch is non-regulatory.[44]

Table 5.11 summarizes results for occupational health and safety delivery by participant C/Cs. More than 87% of respondents reported that their C/C was not involved in the delivery of services in this area. As with all other programs not traditionally found in EH departments, the services offered in this area greatly vary, from response to complaints to comprehensive programs that provide indoor air quality evaluations, mold sampling and identification and radiation safety training. All respondents indicated that services had not been reduced in the past five years (Table 5.11).

Table 5.11—Number of counties/cities that provide occupational health service and respondent perception of experiences with occupational health service provision

Service provision in occupational health:	# of C/C
No	48
Yes	6
Complaint basis only	1
Professionals reported in this service area	8

Experiences with service provision in occupational health (n=7)	Yes % (n)	No % (n)
Is funding adequate?	71 (5)	29 (2)
Have services been reduced in past 5 years?	0	100 (7)
Have services been enhanced in past 5 years?	29 (2)	71 (5)
Is there a need for technical training in this area?	29 (2)	71 (5)

5.12 Noise

Program Description: Regulate noise pollution and investigate noise complaints.

Noise ordinances adopted by local cities and counties in California serve as the primary enforcement mechanism for noise pollution control in the state.[45] A small percentage of counties and city EH departments monitor or regulate noise, however, most enforcement activities in this area are carried out by city and county planning, police or building departments. The entity charged with regulating noise depends on the

source of the noise (e.g., noise pollution due to construction is generally regulated by the building department).

The majority of C/Cs did not offer services in noise control. Sixteen C/Cs indicated providing noise services, three of these on a complaint basis only (Table 5.12). Two sources of noise identified as being regulated by EH departments were leaf blowers and fixed noises (such as those from air conditioning or hood ventilation systems). Only one C/C indicated that services had been eliminated (accounts for $n=17$ in services reduced, see Table 5.12).

Table 5.12—Number of counties/cities that provide noise service and respondent perception of experiences with noise service provision

Service provision in noise:	# of C/C
No	39
Yes	13
Complaint basis only	3
Professionals reported in this service area	26

Experiences with service provision in noise (n=16)	Yes % (n)	No % (n)
Is funding adequate?	56 (9)	44 (7)
Have services been reduced in past 5 years?	6 (1)	94 (16)
Have services been enhanced in past 5 years?	0	100 (16)
Is there a need for technical training in this area?	44 (7)	56 (9)
* Percentages do not add up because of unreported values		

5.13 Land Use

Program Description: Programs that aim at mitigating public degradation that can result from poorly planned land development; includes revision and evaluation of land use proposals.

Any project that involves land development must be reviewed for consistency and compliance with state laws and regulations pertaining to domestic water supplies and disposal of sewage and solid waste. Major and minor subdivisions, use permits, parcel maps, adjustments to property lines between two or more parcels, all fall under the jurisdiction of local land use programs. Fees usually support the cost of reviewing these projects.

Ninety percent of C/Cs provided services in land use (Table 5.13). The most noted service was reviewing environmental health impact reports to ensure that development activities or septic tank installations did not have a detrimental environmental impact. Several C/Cs noted that they collaborate with the county planning department in providing land use services. Forty-four percent reported that there was a training need (Table 5.13).

Table 5.13—Number of counties/cities that provide land use service and respondent perception of experiences with land use service provision

Service provision in land use:	# of C/C
No	5
Yes	50
Professionals reported in this service area	111

Experiences with service provision in land use (n=50)	Yes % (n)	No % (n)
Is funding adequate?*	58 (29)	38 (19)
Have services been reduced in past 5 years?	4 (2)	96 (48)
Have services been enhanced in past 5 years?	18 (9)	82 (41)
Is there a need for technical training in this area?	44 (22)	56 (28)
* Percentage does add up because of unreported value		

5.14 Dairy

Program Description: Perform dairy inspections or are responsible for "soft serve" sampling.

Diary programs are overseen by the Milk and Dairy Foods Control Branch in the California Department of Food and Agriculture (DFA).[46] While DFA inspects the milk plants and processed milk, registered dairy inspectors employed at the local level are responsible for inspecting dairies and facilities that store the raw milk prior to processing. Registered dairy inspectors also have the authority to

permit and inspect soft serve ice cream equipment. Soft serve sampling is carried out to guarantee acceptable bacteriological quality.

Thirteen percent of counties provided some type of dairy services (Table 5.14). Of the seven counties that provided dairy services, two reported performing soft serve inspections, two conducted inspections of dairies and three inspected both soft serve and dairies. As reported by EH directors, the state performs inspections in localities where EH departments do not provide dairy services. All seven reported that services had not been reduced in the past five years (Table 5.14).

Table 5.14—Number of counties/cities that provide dairy service and respondent perception of experiences with dairy service provision

Service provision in dairy:	# of C/C
No	48
Yes	7
Professionals reported in this service area	17

Experiences with service provision in dairy (n=7)	Yes % (n)	No % (n)
Is funding adequate?*	57 (4)	29 (2)
Have services been reduced in past 5 years?	0	100 (7)
Have services been enhanced in past 5 years?	14 (1)	86 (6)
Is there a need for technical training in this area?	57 (4)	43 (3)
* Percentages do not add up because of unreported values		

5.15 Other Services

Table 5.15—"Other" service programs reported by EH directors

Other Programs Reported	
Abandoned Vehicles	Local Oversight Program (LOP) (n=6)*
Beach Monitoring	Needle Exchange Program
Childhood Lead Poisoning (n=3)	Ocean Water Sampling
Cross Connection	Office of Emergency Services (OES)
Detention/Jails	Pharmaceutical Recovery Program
Disaster Preparedness/BT (n=2)	Plan Check Program
Employee Housing	Smoking Enforcement
Erosion and Sedimentation Control Program*	Storm Water Pollution Prevention (n=2)
Fats, Oils, Grease (FOG)	Tattoo Program (n=3)
Food Assessment Program (Social Justice)	Tobacco Enforcement Program
Garment Program	Underground Injection Control
Green Business Program*	Waste Tire Program (n=2)
Healthy Homes for Children*	Water Pollution Control
Kennels (Inspect Kennel Sanitation)	Water Resources Management and Planning

In addition to the listed service areas, directors were asked about additional programs provided by their departments. Twenty-two EH directors reported offering other programs, with 107 professionals working in these service areas.

Directors reported 28 different programs under "other" (Table 5.15). Six programs were reported more than once. Several of the programs reported as "other" were also reported as best practices, and are labeled with an asterisk on Table 5.15.

6. RESULTS—SERVICES (CONTINUED)

6.1 Training

There are two sections of the survey that assessed the need for training. The section included in the functions portion of the survey assessed the need for technical training in each service area. The other section inquired about training needs in core competency areas.

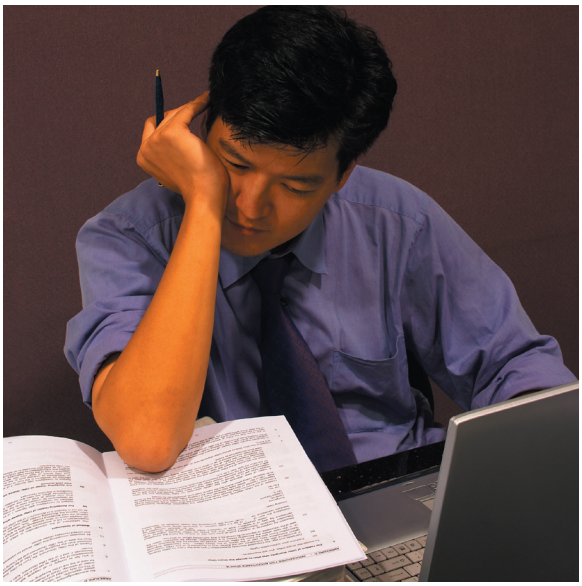
Technical Training

In all program areas more than 25% of respondents indicated that there was a need for training (See Appendix H). The area where the need for training was the highest was the CUPA program, with 60% of C/Cs reporting a need for training, followed by the dairy program (57%) and liquid waste program (55%). Respondents citing the need for training in the CUPA program linked this need to new responsibilities periodically added to the CUPA program by the state. Additionally, smaller counties (based on population) noted a hardship in appropriating sufficient time to train staff because training sessions consumed their workforce (many have staff of <10 personnel) for periods of time necessary to complete other mandated departmental duties. For liquid waste, the need for training was often associated with AB 885.

Additional Training

This section of the survey assessed the need for training in core competency areas as delineated by *Environmental Health Competency Project.*[10]

Similar to technical training, there was a significant need for training in the core competencies. In the communication and management sections, reported training needs exceeded 30% in all surveyed areas except for organizational knowledge and behavior (Table 6.1). In the technical training portion, training needs were 38% for statues and regulations and 24% for institutions and licensed establishments. While these two areas were not identified as core competencies, both are included under the highly emphasized Inspections/ Investigations section of the REHS exam. Thus, it is interesting that almost a quarter of respondents indicated that there was a need for training in this area. There was a general interest in statutes and regulations training. Most comments on this matter revolved around the idea that statutes and regulations were constantly changing, therefore training in this area would be beneficial.



Responses for "other" training needs varied. Areas identified as having training needs were communicable diseases, bio-terrorism, risk communication and health education, working with the community and collaboration, and the reasons why statutes and regulations are important.

When participants were asked to identify the form of training that they preferred for their department, some respondents marked more than one method. The majority (69%) identified face-to-face training as the preferred mode, followed by web-based (31%) and satellite (13%) communication. Several directors explained that while face-to-face training was preferred, it was difficult to access from their remote location and often required expensive and time consuming trips to major metropolitan areas. In these cases, web-based training may offer a practical alternative.

Limited statistical analyses were conducted to determine whether EH directors from different-sized jurisdictions (based on square miles, population, and population density) responded to questions differently. Areas explored were additional training needs (written/oral communication, problem solving and project management, the three areas where training needs were most reported), trends in staff longevity and frequency in response to unexpected events. The size of the county had no bearing on EH director's perceptions of trends in staff longevity or emergency response. However, this analysis showed that differences exist in training needs as a function of county size. Counties with larger populations and higher population densities were more likely to indicate that there was a training need in written/oral communication and problem solving (Table 6.1).

Table 6.1—Additional training needs reported by respondents in communication, management and technical training

Please indicate the need for additional training in the following areas:		Indicated there is a training need % (n)
Communication		
1	Health Education	31 (17)
2	Written/Oral	49 (27)
3	Conflict Resolution	55 (30)
Management		
4	Problem Solving	49 (27)
5	Org. Knowledge & Behavior	27 (15)
6	Project Management	47 (26)
7	Computers & IT	38 (21)
8	Reporting/Record Keeping	40 (22)
9	Collaboration	36 (20)
Technical Training		
10	Statutes/Regulations	38 (21)
11	Institutions/Licensed Establishment	24 (13)
12	Other:	15 (8)
Preferred Delivery System		
13	Face-to-Face	69 (38)
14	Web-Based	31 (17)
15	Satellite	13 (7)

6.2 Funding Needs

At least 25% of respondents indicated that funding was inadequate in 20 out of the 25 service areas assessed (See Appendix I). Indoor and outdoor air displayed the highest need for funding, although this data needs to be carefully considered because only a few counties provide services in this area.

Data in this section may not reflect the true funding need of EH departments. Participants were asked if funding is adequate to effectively provide each service. Because most EH departments are largely fee supported many respondents indicated that funding was adequate, but most commented that funding from fees greatly limits the elasticity of funds to accommodate innovative programs and respond to emerging situations.

6.3 Enhancement/Addition and Reduction/Elimination of Services

Directors were asked if services have been enhanced/added or reduced/eliminated in the past five years. This was included to assess the trends in service delivery by local EH departments.

Results show that few programs had been reduced or eliminated in the past five years (See Appendix J). In contrast, numerous programs were reported as having been enhanced or added to the department in the past five years.

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7. RESULTS—ENHANCING EH SERVICE DELIVERY

7.1 Essential Services of Environmental Health

When asked if they were familiar with the *Ten Essential Services of Environmental Health*, 56% (n=31) of respondents agreed and 42% (n=23) disagreed. Table 7.1.1 presents results for each of the 10 Essential Services. It is interesting that while 42% of directors were not familiar with the Services nomenclature, a majority indicated that most were provided "routinely" or "sometimes" by their department. Table 7.1.2 summarizes results for Essential Service Eight. Only 64% of respondents reported that their staff received continuing education. However, 96% percent of EH directors reported assuring a competent workforce through training.

Table 7.1.1—Reported frequency of providing the Ten Essential Services of Environmental Health

Essential Service		Response (%)		
		Routinely	Sometimes	Never
1	Monitor environmental and health status to identify community EH problems?	20	69	11
2	Diagnose and investigate EH problems and health hazards in the community?	67	31	2
3	Inform, educate and empower people about EH issues?	76	24	0
4	Mobilize community partnerships to identify and solve EH problems?	26	64	11
5	Develop policies and plans that support individual and community EH efforts?	36	60	4
6	Enforce laws and regulations that protect health and ensure safety?	100	0	0
7	Link people to needed EH services and assure the provision of EH services when otherwise unavailable?	58	42	0
9	Evaluate effectiveness, accessibility, and quality of personal and population-based EH services?	36	51	13
10	Conduct research for new insights and innovative solution to EH problems and issues?	11	67	22

Table 7.1.2—Percentage of respondents reporting the assurance of a competent EH workforce for Essential Service #8

Essential Service 8		
Assure a competent EH workforce?		% Yes
a	Establishing workforce standards	75
b	Continuing education	64
c	Training	96
d	Other	13

7.2 Trends in Emergency Response

To assess participant views on trends in emergency response, EH directors were asked if they had experienced a change in the frequency of unexpected events over the past two years. Fifty-three percent felt that response frequency had not changed. Of those who felt that the frequency had changed, 35% felt that it had increased, and 13% that it had decreased (Table 7.2.1).

Table 7.2.1—Reported trends in frequency of response to unexpected events

Has the frequency of response to unexpected events changed over the past two years?	% (n)
Yes, it has decreased	13 (7)
Yes, it has increased	35 (19)
No, it has remained the same	53 (29)

When asked to rank the department's potential to respond to unexpected events on a scale of 1-10, with 10 being excellent, the average ranking was 7.5/10. Responses ranged from five to 10, and

the most reported score was 8/10. Nine respondents self-scored their department 5/10 and five self-scored 10/10. Approximately 42% of respondents self-scored their department's potential to respond to unexpected events average or below average (7/10 or lower).

Two open-ended questions were asked to assess barriers and enabling mechanisms in responding to unexpected events. Respondents were able to identify and list as many factors as necessary. Included are example responses for the three most reported themes for each question.

Question 1: Describe barriers that have prevented an optimal response to unexpected events.

A majority of responses to this question fell into three main categories: resources, training, and inter-agency collaboration (Table 7.2.2).

Table 7.2.2—Reported main barriers that prevent optimal emergency response

Main Barrier	% (n)
Lack of resources	45 (25)
Lack of training	36 (20)
Lack of interagency collaboration	15 (8)
Geographic size of county	7 (4)
No perceived barriers	7 (4)
Telecommunication problems	5 (3)

Issues related to geography created a barrier for four respondents (7%). These included having staff reside out of the county and overall size and varied terrain of the county. Four respondents indicated that there are no perceived barriers, or explained that barriers had been identified

and addressed. Three respondents indicated that telecommunication problems (i.e., problems with cell phone reception) created barriers to a proper response.

Lack of adequate resources was the most cited response. Respondents also presented the interrelated topics of lacking funding, staff and time. The most cited resource barrier was not having adequate staffing (n=16); several respondents (n=4) specifically indicated that one barrier was not having funds to support on-call personnel (Table 7.2.3).

Table 7.2.3—Lack of resources: example responses

Theme—Resources	Example Responses Paraphrased
• Lack of funding (general) • Inadequate staffing to respond appropriately to emergencies • Lack of time: consequence of lack of funds and staff	• Inadequate staffing makes it difficult to provide good emergency response • Funding for 24-hour staff; it is an out-of-pocket expense to keep people on a beeper • Can't take time off to practice

The next most cited barrier was lack of training. Four respondents specified that retention issues were directly correlated to inadequate training resulting from high turnover, and three others reported the inability to adequately train for all possible unexpected events (Table 7.2.4).

Table 7.2.4—Lack of training: example responses

Theme—Training	Example Responses Paraphrased
• Lacking adequate training and preparation (general) • Inability to properly train for emergency response because of high turnover • Feeling that it is impossible to train for all possibilities	• Vacancies due to turn over and recruitment; these vacancies cause a training burden on current staff • Significant training is required; with turnover, staff is not able to fully respond because they are not adequately trained • Accessibility to training in order to become more proactive rather than reactive

Fifteen percent reported communication barriers. The emergent theme was inter-agency communication problems (Table 7.2.5). Eight respondents indicated that lack of inter-agency communication posed as a barrier to responding to unexpected events. The most cited agencies with which there was a lack of coordination were law (sheriff, police) and fire.

Table 7.2.5—Lack of interagency collaboration: example responses

Theme – Inter-agency collaboration	Example Responses Paraphrased
• Inter-agency communication problems resulting from lack of collaboration • Lack of collaboration between responsible emergency response agencies	• Lack of internal communication with other departments such as hazardous materials, fire, law; there is a disjointed response • Agencies don't ask for help in response. There is a lack of collaboration with fire, law, public health, etc. • Communication with other departments; fire, police • Communication because different emergency response departments interpret emergency response differently • Poor communication between responsible agencies such as sheriff and fire

Question 2: Describe enabling mechanisms that enhance your department's potential to prepare for/ respond to unexpected events.

The purpose of this question was to identify enabling mechanisms that enhance each department's potential to respond to unexpected events. Enabling mechanism in this section refers to any activity or process employed by the department that is perceived to enhance the potential or quality of response to unexpected events. Training and inter-agency collaboration were the most cited responses, followed by having proper

equipment and a small jurisdiction. Three respondents indicated that having support from the administration was an enabling mechanism. Two respondents (not shown in Table 7.2.6) identified partnerships with academic institutions as being an enabling mechanism.

Table 7.2.6—Main enabling mechanism themes reported

Enabling Mechanism	% (n)
Adequate Training	51 (28)
Inter-agency Collaboration	47 (26)
Equipment	15 (8)
Small Size of County	15 (8)
Support from Administration	5 (3)

Having accessibility to training was the most cited enabling mechanism to unexpected events. Fifty-one percent of respondents indicated that training staff enhanced the department's potential to cope with emergencies. Table 7.2.7 provides example responses.

Table 7.2.7—Adequate training: example responses

Theme—Training	Example Responses Paraphrased
• Accessibility to training • Cross training of staff	• Inter-departmental training • Training with other divisions and counties • All cross-trained into all the different programs; all know basics in all programs and this allows for a quicker response

Forty-seven percent of EH directors reported collaboration with various first responders during unexpected events as an enabling mechanism. Directors described that preparing and collaborating with first responders enhanced the department's potential to respond to emergencies because relationships with these agencies were already established. Table 7.2.8 provides example responses for this theme.

Table 7.2.8—Helpful inter-agency collaboration: example responses

Theme – Interagency Collaboration	Example Responses Paraphrased
• Collaboration with various first response players • Staff knowledgeable of emergency response agencies and contacts (allows for collaboration) • Collaboration based on relationships	• On-going preparedness with partnerships: emergency department, law, fire, medical • Good working relationship with community organizations and related city departments: public works; public utility commission, building department

Having good equipment was reported as an enabling mechanism by 15% of EH directors (Table 7.2.9.). Telecommunications equipment including cells phones and wireless hand-held computers were the most mentioned, but responses also included GPS systems and walkie-talkies. One county director indicated that rapid retrieval of information made possible by having access to a database facilitated emergency response.

Table 7.2.9—Good equipment: example responses

Theme—Equipment	Example Responses Paraphrased
• Telecommunications equipment • Other equipment • Database utilization for retrieving information	• Good communication, pagers and cell phones • Infusion of BT money has allowed for training, preparing, response, capabilities; new equipment, cell phones, computers, GPS system. Hand-held computers allow them to take inventory of what is in the community through wireless capabilities • Good equipment: reference materials, protective equipment, cell phones • Equipment: Nextel cell phones, walkie-talkies • Staff is linked by cell phone/ radio communication allowing individuals to consult with their peers and supervisors and to enlist help if needed • Enhanced communication: radio phones, GPS systems • Development of database Envision enables them to retrieve information much more quickly

Being a small jurisdiction was identified as an enabling mechanism (Table 7.2.10). Fifteen percent of EH directors stated that being in a small jurisdiction allowed for more interaction and relationship building between first response agencies.

Table 7.2.10—Small county size: example responses

Theme—Small Size of County	Example Responses Paraphrased
• Smaller county allows for quicker response • Staff in smaller counties build relationships	• Small size of county enables response • Small county, you can't hide! • Small size enables them to know individuals they will be dealing with; they know each individual's strengths and weaknesses - helps tailor response • We are a small organization so internal communication is good. We have very good relations with the community • Staff that collaborates (knows each other well; easier done in smaller counties)

Unsolicited Response

Seven C/Cs (13%) reported that Bioterrorism (BT) money had helped the department become more prepared for unexpected events. Most respondents indicated that BT money facilitated the purchase of new equipment, contributing to better response capability.

7.3 Measuring Success and Best Practices

Two open-ended questions were included in the interview to assess how C/Cs measure and monitor success and to gather information about the perceived best practices for each department. Example responses are provided for the three most reported themes for each

question. (Example responses were not provided for the theme "surveys" since these were utilized to measure quality of customer service.)

Question 1: Describe how success is measured and monitored by your department.

There was a genuine interest in the development of a systematic and accurate methodology to measure and track success in EH. Respondents expressed the difficulties in assessing success in a field that focuses on prevention. The quotes below describe the general sentiment regarding the current approach for measuring and monitoring success.

- Measuring success is hard to do since our thing is prevention
- We don't have a good way to measure success and would like to see a model
- There is a need for objective tools but this requires someone to brainstorm through it

As utilized in this section, process measures refer to measures of success centered on actual activities, such as monitoring the frequency of inspections or turn around time for investigating or responding to a complaint. Outcome measures are those that assess service effectiveness; for example, reducing food or water-borne illness. A summary of the most noted measures of success is provided in Table 7.3.1. Sixty-two percent of EH directors communicated the use of process measures. Customer service was a measure of success for 27% of respondents. Seven of these respondents evaluated customer service through surveys. Thirteen percent of EH directors identified continued political support or a lack of conflicts with the local board of supervisors as a measure of success. Reports generated by the Envision database,

the rate of compliance based on the number of customers who corrected violations, and unspecified "outcome measurements" were each reported as success measures by 11% of respondents. Five percent indicated that the departmental measure of success was the absence of problems and two respondents (4%) stated that no formal methods to measure or monitor success were currently in place.

Table 7.3.1—Reported measures of success by EH directors

Measure	% (n)
Process	62 (34)
Customer Service (lack of complaints)	27 (15)
Surveys	13 (7)
Political support and conflicts	13 (7)
Reports by Envision database	11 (6)
Rate of compliance	11 (6)
Outcomes	11 (6)
Absence of problems	5 (3)
Currently do not have a way to measure success	4 (2)

Process measures were by far the most utilized way to measure success. This theme included all numeric indications of work completed and performance measure evaluations. Table 7.3.2 provides example responses for this theme.

Table 7.3.2—Utilizing process measures: example responses

Theme—Process Measures	Example Responses Paraphrased
• General statements about completing all required work • Varies by program but entails measuring activities; i.e., meeting mandated inspection frequency • Performance measures	• Very difficult to do; since our thing is prevention, measuring success is hard to do • Number of inspections conducted • Keeping up with the workload! • Complete projects and tasks. We measure success by completion • Completed all mandated, routine work

Twenty-seven percent of respondents reported customer service as a departmental measure of success. Table 7.3.3 demonstrates that responses generally revolved around assessing the quality of service provided by the department. Of those reporting the use of customer service as a measure of success, 13% specified administering surveys to evaluate the quality of service.

Table 7.3.3—Measuring success through customer service: example responses

Theme – Customer Service	Example Responses Paraphrased
• Measured by number of complaints • Utilization of surveys to assess quality of service	• Feedback, usually verbal, from the served community is the main avenue • Customer satisfaction - minimal number of complaints • Customer satisfaction - surveys with food and other programs • Number of complaints received and percent of complaints responded to within 48 hours. • Based on # of complaints

While no respondent indicated that obtaining political support was the sole measure of success, 13% of respondents did include political interactions, state or local, as one way to measure success (Table 7.3.4). Responses included continued political support and few political conflicts with the board of supervisors.

Table 7.3.4—Measuring success through political support: example responses

Theme—Political Support	Example Responses Paraphrased
• Continued political support • Number of complaints presented to the board of supervisors	• Based on board of supervisor meeting; if EH has to defend itself • Few conflicts politically (board of supervisors) • Measured success by continued support from administration in city council • How few complaints go to board of supervisors

Question 2: Describe an area in which your department particularly excels; i.e., your departmental best practice.

Respondents reported best practices either as departmental attributes or as specific programs. Some directors reported more than one area in which they felt their department excelled. Eighteen different programs were identified by EH directors as departmental best practices (See Table 7.3.5 for those most frequently reported). Generally, directors identified programs as best practices if the program functioned with particular efficacy, received consumer compliments, employed innovative methodologies or technologies or made unique contributions to EH. For non-services related best practices, directors reported departmental strengths relating to fostering relationships with the public and with other agencies: good relations with the public, amiable staff, providing public education and collaboration constituted a majority of the responses (Table 7.3.5). Three respondents (5%)

indicated that an area in which they excel was training staff. Three (5%) reported that collaboration with partners or emergency response departments was an area in which they perform particularly well.

Table 7.3.5—Self-reported departmental attributes and best practice programs

Best Practice	% (n)	Best Practice	% (n)
Good Customer Service/Relations with public	35 (19)	Food Program	13 (7)
Good Staff	16 (9)	Liquid Waste/Septics	11 (6)
Public education	11 (6)	Water Quality Program	7 (4)
Training	5 (3)	CUPA	5 (3)
Collaboration	5 (3)		

Thirty-five percent of respondents expressed that having good relations with the public was a departmental best practice. Providing good customer service was the most noted response for this theme. Many EH directors pride themselves in having departments with approachable, consumer-friendly staff. Responses that involved facilitating the public's access to information, such as imaging material or providing access to restaurant inspections on the web were also grouped with this theme, since these were seen as contributing to good customer service (Table 7.3.6).

Table 7.3.6—Good relations with public: example responses

Theme—Good Relations with Public	Example Responses Paraphrased
• Provide good customer service • Maintain good relations with the public • Facilitate public's access to information	• Personal service, ability to talk to a live person rather than a recorded message, and the practice of finding a contact for a caller with issues that are outside our scope • Exceptional customer services • Approachable staff, good customer service • Being responsive and accessible; providing human contact • Our website identifies conditions in restaurants (includes violations, descriptions, date of evaluation); complete and comprehensive inspection report; respond in timely manner within 24 hours to all complaints

Sixteen percent of EH directors stated that a departmental best practice was having a competent, team-oriented staff. Responses included staff commitment to EH, being team players, having a wide knowledge base and being able to accommodate to changing circumstances (Table 7.3.7).

Table 7.3.7—Good staff: example responses

Theme—Good Staff	Example Responses Paraphrased
• Team players • Receptive individuals • Experienced and knowledgeable • Accommodating	• Many staff committed to EH (provide education and communication which ultimately leads to voluntary compliance) • Staff are good team players and cover for each other (there is reciprocity; great attitude! Desire to learn; staff is young and inexperienced but make up for it w/attitude) • We've done an excellent job in infrastructure development —staff know what is expected of them; evaluations correlate to performance measures

Providing public education was a best practice reported by 11% of respondents. As Table 7.3.8 shows, responses included outreach activities in numerous venues including schools, residential communities and special events.

Table 7.3.8—Public education: example responses

Theme —Public Education	Example Responses Paraphrased
• Develop programs aimed at educating the public • Respond to public requests for education in EH matters • Engage community through education	• Outreach - excellent public education program; i.e., kids at school program which includes participation from private industry (free stuff, book covers for the kids) • We have a group, Special Projects, that is very active in community outreach • Have started more community outreach (public education activities). Despite limited resources, try to do more than state agencies

7.4 Enhancing EH Service Delivery, Key Needs and Challenges

Two questions were asked to assess the EH director's thoughts on the key needs that should be met and challenges that should be addressed to enhance the provision of EH services. Respondents were asked to enumerate the needs and challenges pertinent to enhancing EH services. Data in this section were grouped according to common themes and in a few cases responses suitable for more than one category were grouped accordingly. For question One, example responses are provided for the first two and fourth most commonly reported themes. Example responses are not provided for the theme, "training, funding for training," because responses were similar to those found in Table 7.2.4. For question Two, example responses are not provided for the most reported theme, as the range of comments was

akin to those presented in Tables 7.2.3 and 7.4.2. Responses for "lack of political support for EH profession" were usually linked with "poor marketing of EH profession," and thus example responses for both categories are grouped in Table 7.4.3.

Question 1: Identify key needs to enhance or better provide environmental public health services.

Responses to this question are summarized in Table 7.4.1. Twenty-two (40%) EH directors stated that a key need to enhance or better provide EH services was increasing resources (Table 7.4.2). The next most noted responses were increased advocacy for the EH profession (Table 7.4.3) and training (Table 7.2.3). Eighteen percent of respondents identified training or funding for training as key needs. Having an alternative source of funding that was not fee-related was a need presented by 13% of EH directors (Table 7.4.4). Seven percent of respondents expressed the need for public outreach and education. Respondents sensed that increasing public education would result in higher compliance and a better understanding of the EH field, which would translate into increased funding. Increased involvement from state agencies was expressed by seven percent of respondents. Responses included increased involvement from state agencies in promoting the EH agenda at a political level, delegating programs (LEA, LPA, CUPA), coordinating training, and standards development. Seven percent of respondents identified the need to become more proactive. Respondents linked this need to lack of resources, stating that proactive endeavors such as a statewide data management system, developing a disease surveillance system, and providing comprehensive services including outreach education required additional resources. Increased political support, continued education and addressing the pipeline shortage were responses provided by five percent of EH directors. Five percent did not respond.

Table 7.4.1—Key needs identified by EH directors to enhance EH services

Key Needs	% (n)
Resources - Funding and Staffing	40 (22)
Increased advocacy/understanding of EH profession	31 (17)
Training, funding for training	18 (10)
Funding not generated by fees	13 (7)
Educating the public/ Public outreach	7 (4)
More involvement from state agencies	7 (4)
Become more proactive	7 (4)
Increased political support	5 (3)
Continuing Education	5 (3)
Pipeline: educational system not producing qualified professionals	5 (3)
No response	5 (3)

Forty percent of directors identified a need for increased resources, including funding and staffing. Respondents articulated that retention suffered from inadequate funding and consequently contributed to less effective service delivery. Table 7.4.2 provides examples of responses pertaining to this theme.

Table 7.4.2—Increased resources: example responses

Theme—Resources	Example Responses Paraphrased
• Funding to support staffing levels that allow for the proper provision of services • Inadequate funding results in low retention	• Budget to support positions…we lost 3 positions last year • We need to retain and attract qualified staff to maintain the proper level of enforcement. Our vacancy rate is high, currently running around 20%

Thirty-one percent of EH directors reported a need for increased advocacy for the EH profession. Respondents connected a general lack of public knowledge regarding the EH profession to reduced appreciation for the field. A key need identified to address this deficiency was education and outreach about the scope and importance of EH activities, both for the general public and political figures shaping the EH agenda. Additionally, respondents expressed the need for enhanced marketing of the profession, and explained that a history of poor marketing has also contributed to a lack of understanding and appreciation for the field.

Table 7.4.3— Increased advocacy for profession: example responses

Theme—Increased Advocacy for Profession	Example Responses Paraphrased
• Need for promoting EH profession • Lack of appreciation stems from lack of knowledge about EH field • The public and politicians need to be educated about what EH is • Need for marketing and publicizing the profession	• The importance of what we do is not reflected in our salaries • Broader understanding by community of what EH services are (Not tree-huggers!) • Profession is under publicized… Difficult to publicize though because even sending staff to career days at universities can be a problem because of workload. • EH is an unknown profession • Enhancing the REHS profession; profession is invisible

An increase in non-fee generated funding was a key need expressed by 13% of respondents (Table 7.4.4). EH directors noted that increases in non-categorical, general fund and grant money were needed to provide more flexibility in the programs and services that could be offered by the department. Several directors indicated that funds for research and to support mandated programs were necessary because fee generated funds cannot be used for these purposes.

Table 7.4.4—Non-fee generated funding: example responses

Theme—Additional funding not generated by fees	Example Responses Paraphrased
• Funding	• Funding made available not driven by fee-for-service; non-categorical funding; right now tied to services. We need money for research • Having general fund money; general purpose EH funding to provide a comprehensive approach without worrying about spending fee-generated time and money • Must become more proactive instead of reactive but right now we have to target services to meet the needs of fee providers

Question 2: What are the most significant barriers to improving environmental public health services?

Table 7.4.5 summarizes responses to this question. Fifty-six percent of respondents identified lack of resources as being a main barrier to improving EH services. Poor marketing of EH profession was identified as a main barrier by 33% of respondents. Sixteen percent of respondents reported pipeline issues (i.e., lack of qualified applicants) or lack of political support for EH profession as main barriers to improving EH services. Seven percent of respondents reported that difficulty in securing funds from non fee-generated sources was a barrier. Three respondents (5%) identified each of the following as significant barriers: competition with other departments/counties, lack of state guidance, or inadequate training. Two respondents reported

that lack of participation by the community created a barrier to improving EH services.

Poor marketing of the EH profession was reported as a significant barrier to improving EH services by 33% of respondents. This barrier revealed a circular theme. Poor marketing of the profession results in a lack of public and political understanding of EH. Consequently, this lack of understanding translates into a lack of appreciation and support for EH programs and activities. Examples of responses are provided in Table 7.4.6.

Table 7.4.5—Most significant barriers to improving EH services identified by EH directors

Barrier	% (n)
Resources - Funding and Staffing	56 (31)
Poor marketing of EH profession	33 (18)
Pipeline: Lack of qualified personnel	16 (9)
Lack of political support for EH profession	16 (9)
Non-fee generated funds	7 (4)
Competition with other departments and counties	5 (3)
Lack of state guidance	5 (3)
Inadequate training	5 (3)

Table 7.4.6—Need to market profession: example responses

Theme – Need to Market Profession	Example Responses Paraphrased
• Disseminating information about EH field to general public • Generating support for EH services by raising awareness in publicly elected officials	• Profession taken for granted by public (need political support, including at the local level, for what we do) • Biggest challenge: hard to get people excited about stuff that has been prevented • Getting the message to legislators. People don't know what EH people do. The profession is poorly marketed • Educating politician about EH issues • Narrow scope of EH practice from perspective of public. It is an invisible profession (need to get out there and advertise for the profession)

Sixteen percent of directors reported pipeline issues relating to the next generation of EH professionals and a perceived lack of qualified work staff. Table 7.4.7 presents example responses for this theme.

Table 7.4.7—Pipeline issues: example responses

Theme—Pipeline	Example Responses Paraphrased
• Insufficient labor pool	• Lack of qualified staff (finding and retaining qualified staff) • Lack of registered professionals • Lack of adequately qualified work force • Ability to attract and retain highly qualified, energetic people willing to think beyond the scope of their job • The # of REHS—having enough registered, trained individuals to continue the profession

Seven percent of respondents noted that an alternative to fees was necessary to fund important EH activities. Respondents expressed concern over the lack of flexibility resulting from predominantly fee-based budgets (Table 7.4.8).

Table 7.4.8—Securing non-fee generated funds: example responses

Theme— Non-fee generated funds	Example Responses
• Service limited to fee supported activities	• Need for development of programs that are not fee supported; must be supported by rate payers • Lack of funding sources other than fees charged to regulated businesses

8. LIMITATIONS

Limitations

This study was subject to several limitations. As noted in Section 3 of this report, reported data differed from county to county based on the information available to each director at the time of the interview, differences in reporting staff numbers, demographics and services, and on individual director's perceptions about the current trends, barriers and needs in their department. As in all survey research, the understanding and interpretation of each question influenced the response and may account for variations in data provided. Phone interviews were conducted to collect data, which may be a limitation if the participant was not accustomed to interviewing in this manner.

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9. DISCUSSION and RECOMMENDATIONS

Diversified EH System

At the local level, California possesses a diversified EH services delivery system that reflects public and political demand for effective and visible EH services. At the same time, some view the system as fragmented, illustrated by vertically aligned service delivery with limited integration between agencies. Proponents of the latter point to California's 62 EH departments, 35 air quality management districts, 21 water quality management districts, 55 county agricultural commissioners, and 23 Cal/OSHA enforcement districts as evidence for their contention. These entities oversee separate and sometimes overlapping EH areas, and with few exceptions, work independently from each other creating uncertainty among EH professionals and their customers about which agency is providing which service.

This trend is continued in local EH departments, where a standard framework for service delivery is absent. C/Cs reported delivering anywhere from eight to 19 services with retail food facility inspections being the one common service provided by every EH office. Furthermore, the interpretation of the terminology in the field lacks consistency and does not account for differences in the level of service provision between entities. Thus, directors often affirm provision of services regardless of whether basic or comprehensive services are provided.

While it is understandable that different jurisdictions provide services differently, this lack of cohesiveness can result in confusion within the profession as well as for those not familiar with the EH field. As a result, consumers and politicians can become cautious in supporting EH departments when they do not understand the range of services, or what these services actually entail. This places EH in a continuous cycle, where lack of understanding for the profession results in lack of support, translating into reduced or limited resources. However, to break the cycle, marketing the field must begin with a clear and consistent definition of what EH is, what its role in public health is, and the value it represents.

RECOMMENDATION

We recommend standardization of EH terms and definitions to enhance communication among and between EH entities and with those outside the profession.

Best Practices

Because the EH field is highly technical, professionals in this field have generally suffered from a reputation of not being "people friendly." However, contrary to this perception, this study found that many respondents pride themselves in their department's relationship with the public. In fact, the three most reported non-services best practices involve internal and external relationships around customer service or education. Directors also, however, reported specific services as best practices. Unfortunately, a system that encourages sharing of best practices does not currently exist.

RECOMMENDATION

We recommend California develop an inter-county system for sharing of best EH practices.

Measures of Success

The majority (62%) of interviewed EH directors conveyed the use of process measures (e.g. number of inspections scheduled vs. number completed) as the cornerstone of their success reporting system. The absence of measures that demonstrate public health value (e.g., reduction in foodborne illnesses over time translated into health care cost savings) is problematic, as accountability and return on investment principles appear to be gaining momentum at the federal level.

A step toward addressing this matter is reporting successes in EH in a manner that communicates the field's significance. The CDC's Futures Initiative presents "Health Impact" as one of its six strategic directions, which emphasizes "programs to achieve measurable health impact for the public."[47] A key word in this strategy is *measurable*. By adopting outcome measures, EH departments may convey the value of EH in a much more effective fashion. Our study shows that most EH departments utilized process measures to assess success, and only 11% measured any type of outcomes. Integrating measurable, health impact components to current programs could allow for better reporting of successes.

RECOMMENDATION

We recommend that the EH profession, perhaps spearheaded by the National Environmental Health Association (NEHA), should develop, collect, and catalog customer-focused outcomes and performance measures, which demonstrate health and financial benefits of EH services.

Dealing with unanticipated EH threats

Though a majority of EH directors (53%) reported that the frequency of response to unexpected events has not changed over the past two years, 35% perceived that the frequency of events has increased. With over one-third of EH departments sensing that the need to respond to unexpected events is on the rise, it is imperative that these departments be adequately prepared. Unfortunately, nearly 42% of respondents self-scored their department's potential to respond to unexpected events average or below average (7/10 or lower). Of these, 16% self-scored their department's potential as a five out of 10.

There are steps that directors can take to enhance their department's potential to respond to these emergencies. Findings from this study show that three issues reported by EH directors as barriers for proper response are also reported as enabling mechanisms by directors who carry them out more efficiently. Specifically, these are training, inter-agency collaboration and proper communication.

RECOMMENDATION

We recommend that EH personnel systematically participate in local, regional, and national emergency preparedness, response, and recovery plans.

Integration of Services

Key stakeholders throughout the nation are calling for a shift in EH service delivery from traditional services that focus on the relationship between agents and disease, to more comprehensive programs that take into account local environments and communities and how these affect the public's health.[3, 48] To accomplish this, stakeholders have suggested integrating the ten *Essential Services* of environmental health into routine practice.

Our study evaluated each EH director's familiarity with the ten *Essential Services*. Forty-two percent of respondents indicated that they are not familiar with the *Essential Services*. We also found, however, that although a large percentage of EH directors lack familiarity with the terminology *Essential Services*, most reported providing many of the services. While it appears that departments are attempting to transition to more integrated service delivery, our data support that in California, the emphasis of EH remains principally focused on providing fee generating, traditional, stovepipe services (Refer to Table 7.1.7). All respondents (100%) indicated providing Essential Service Six (enforce laws and regulation that protect health and ensure safety) "routinely." On the other hand, 22% reported "never" for Essential Service Ten (conduct research for new insights and innovative solutions to EH problems and issues). One explanation for this is likely the fee-based structure of California EH service delivery.

As EH departments become progressively more fee-supported, service delivery is being limited to providing permits and enforcing regulations. Thus, while several directors reported an interest in conducting research and launching innovative programs, their ability to do so is dictated by their reliance on a fee-for-service structure. The most reported key need to providing services is increased resources (40%) and conversely, the most reported barrier is lack of resources

(56%). EH directors reported that securing non-fee generated funding is a key need to enhance EH services (Table 7.4.1).

RECOMMENDATION

We recommend the California legislature increase funding to support non-fee based activities. Increasing general fund support will maximize service provision flexibility and the option to support applied research, community outreach, and the provision of comprehensive services, with the ultimate aim of integrating these services to maximize the health benefits for all Californians.

Training

EH departments are expected to be prepared to respond to emergencies and emerging EH issues. However, this is an unrealistic expectation when we consider that in all assessed service areas, at least 25% of directors reported that their department would benefit from additional training (See Appendix H). Departments have limited resources—in fact, when asked to indicate the optimal number of employees to carry out regulatory obligations, 48 of the 55 reported that they need additional staff. Being understaffed results in a level of training that barely prepares staff to fulfill daily operations. Not surprisingly, 36% of EH directors reported that lack of training is a barrier in responding to unexpected events. Similarly, 18% identified training as a key need to provide enhanced EH services.

EH directors also reported a substantial training need in communication and management competencies. The areas of written/oral communication, problem solving, project management and conflict resolution are those in which directors (>45%) reported the highest need for training (Table 6.1). While these training needs are

considerable, it is promising that EH directors recognize that non-technical aspects in EH service delivery must be addressed.

Overall, however, the data do not support the notion that departments are not training their staff. For Essential Service Eight, 96% of respondents identified that their department assures a competent workforce through training (Table 7.1.2).

RECOMMENDATION

We recommend CCDEH consider the development of a statewide strategy to provide training in priority areas such as written/oral communication, problem solving, project management and conflict resolution. An overall learning management system may provide the backbone for a statewide approach to training in these areas as well as in other service areas. California DHS should develop and implement a continuing professional education requirement for all Registered Environmental Health Specialists.

Marketing EH Profession

An identified barrier to enhancing EH services is the lack of marketing of the EH profession. As previously noted, 31% of EH directors reported that increased advocacy and marketing of the profession is essential to enhancing EH service delivery. Similarly, 33% stated that poor marketing of the profession is a barrier to improving service delivery. Directors differ in their opinions about who is principally responsible for marketing

EH, and specific responses identified the state, academia and/or EH departments as parties that should provide leadership in raising awareness about the profession.

Directors noted several reasons to support their need for additional marketing. Respondents expressed that EH is an invisible profession leading to reduced funding and a dwindling REHS pipeline. Also, several directors indicated that EH lacks political status resulting in funds being diverted to other departments perceived as more important.

Because there is limited knowledge about the EH field, few people appear to be choosing EH as career track. Data from this study show that nearly half of the workforce is mid-career or older, and 73% of respondents indicated that because of retirement, staff has been lost in the last five years. Sixty-seven percent of EH directors reported that finding adequately qualified applicants is a major concern. With an aging workforce and a lack of qualified applicants, particularly among Hispanics and African Americans, EH directors are concerned about the fate of the profession. Many insist that promoting the EH field is essential to address these pertinent issues.

Lastly, directors reported difficulty in gaining support for the profession because it is one based on prevention. Directors expressed frustration about how to communicate to decision makers that they are effectively executing their duties. CDC presented the same issue in the *Revitalize* document*:*

> *A successful environmental public health program becomes invisible. If environmental public health is done right, nobody takes notice. As a result, it's hard to gain support for more resources. The public only knows you're there when you are not doing your job well. When things are going well, policy makers think: "Well they don't need all that money, there are no public health problems there." If the budget is cut, then the pubic health problems result.*[49]

This dilemma will likely always be present in environmental health, especially because the field is so prevention-oriented.

RECOMMENDATION

We recommend a national EH marketing strategy be developed and implemented to promote the profession, its services, the value it provides, and career opportunities, with emphasis on recruiting underrepresented minorities. Such a strategy would require the articulation of core customers, priority issues, appropriate messaging, and communication vehicles, among others.

Pipeline Issues

California's EH workforce can be characterized as aging, and comprised largely of Caucasians. EH health officers reported that the new employee pipeline is inadequate to meet existing and emerging needs for professional staff. Alternately, the DHS REHS program, at the time of the survey, possessed a database of over 400 qualified applicants. Some within the state believe the issue is one of compensation (providing a living wage relative to cost of living), not an issue of qualified applicants. Informally, several Health Officers revealed many entry-level employees must commute considerable distances to secure affordable housing.

RECOMMENDATION

We recommend CCDEH and the California DHS reconcile the perception of an inadequate labor pool, and consider efforts to recruit applicants who reflect the racial diversity of California's population. Efforts to increase compensation for EH professionals should be considered, in light of California's cost of living.

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10. RECOMMENDATION SUMMARY

Environmental health is diverse profession in which major changes are urgently needed. Recommendations proposed in this study are summarized below:

Recommendation #1:
We recommend standardization of EH terms and definitions to enhance communication among and between EH entities and with those outside the profession.

Recommendation #2:
We recommend California develop an inter-county system for sharing of best EH practices.

Recommendation #3:
We recommend that the EH profession, perhaps spearheaded by the National Environmental Health Association (NEHA), should develop, collect, and catalog customer-focused outcomes and performance measures, which demonstrate health and financial benefits of EH services.

Recommendation #4

We recommend that EH personnel systematically participate in local, regional, and national emergency preparedness, response, and recovery plans.

Recommendation #5:

We recommend the California legislature increase funding to support non-fee based activities. Increasing general fund support will maximize service provision flexibility and the option to support applied research, community outreach, and the provision of comprehensive services, with the ultimate aim of integrating these services to maximize the health benefits for all Californians.

Recommendation #6:

We recommend CCDEH consider the development of a statewide strategy to provide training in priority areas such as written/oral communication, problem solving, project management and conflict resolution. An overall learning management system may provide the backbone for a statewide approach to training in these areas as well as in other service areas. California DHS should develop and implement a continuing professional education requirement for all Registered Environmental Health Specialists.

Recommendation #7: We recommend a national EH marketing strategy be developed and implemented to promote the profession, its services, the value it provides, and career opportunities, with emphasis on recruiting underrepresented minorities. Such a strategy would require the articulation of core customers, priority issues, appropriate messaging, and communication vehicles, among others.

Recommendation #8:

We recommend CCDEH and the California DHS reconcile the perception of an inadequate labor pool, and consider efforts to recruit applicants who reflect the racial diversity of California's population. Efforts to increase compensation for EH professionals should be considered, in light of California's cost of living.

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12. LISTING OF FIGURES AND TABLES

Figures

Tables

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Appendix A: Listing of California County and City EH Departments

Alameda County
Alpine County*
Amador County*
Berkeley, City of
Butte County
Calavaras County
Colusa County
Contra Costa County
Del Norte County*
El Dorado County
Fresno County
Humboldt County
Imperial County
Inyo County
Kern County
Kings County
Lake County
Lassen County*
Long Beach, City of
Los Angeles County
Madera County
Marin County
Mariposa County*
Mendocino County
Merced County
Modoc County*
Mono County*
Monterey County
Napa County
Nevada County
Orange County
Pasadena, City of
Placer County
Plumas County
Riverside County
Sacramento County
San Benito County*
San Bernardino County
San Diego County
San Francisco County
San Joaquin County
San Luis Obispo County
San Mateo County
Santa Barbara County
Santa Clara County
Santa Cruz County
Shasta County
Sierra County*
Siskiyou County
Solano County
Sonoma County
Stanislaus County
Sutter County
Tehama County
Trinity County
Tulare County
Tuolumne County
Ventura County
Vernon, City of
Yolo County
Yuba County

*Contract counties
(Counties: 58; Cities: 4)

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Appendix B: Survey Instrument

Environmental Health Delivery Systems Survey 2005

ID:

Name: _____
Title: _____
Phone: _____
Fax: _____

Organization: _____
Department: _____
Email: _____

I. Numbers Employed

Please indicate the number of employees under each category.

	Professional Staff	Support Staff
Full Time		
Part Time		
Contract		
Temporary		
Total		

Unfilled Positions/ EH Professionals	Vacant*	Frozen**

*Vacant post is a post which the authority is seeking to fill or planning to fill

**Frozen post is a vacant post for which there is no current funding available

II. Workforce Profile

Please enter the number of employees in each category:

	EH Professionals
Gender	
Male	
Female	
Ethnic Origin	
White	
Black/African-American	
Hispanic/Latino	
Asian/Pacific Islander	
Other	

	EH Professionals
Age	
18-24	
25-44	
45-64	
65+	

III. Degree Required / Optimal # of Professionals

Please indicate the minimum certification/degree required for EH service delivery employment.

	Required	Preferred
M.S./MPH		
B.S./B.A.		
A.A.		
REHS		
Vocational		
Other		

Please indicate the optimal number of employees to carry out regulatory obligations.

	EH Professionals
Full Time	
Part Time	
Total	

IV. Challenges

What are the major challenges faced by this organization?

A. ☐ Lack of adequately qualified applicants
B. ☐ Applicant lack relevant experience
C. ☐ Retention
D. ☐ Compensation
E. ☐ Competition
F. ☐ Other: _____

V. Functions

Please indicate which of the following services are provided by your department.

	Check box if you provide this service	Indicate the number of EH professionals working in the field	Is your funding adequate to effectively provide this service?	Have any of the following EH services been reduced/eliminated in the past 5 years.	Have any of the following EH services been enhanced/added in the past 5 years.	Please indicate if technical training is needed in any of the following areas:
Outdoor Air			Y N			
Indoor Air			Y N			
Pesticides			Y N			
Housing			Y N			
Land Use			Y N			
Solid Waste			Y N			
Liquid Waste			Y N			
Biosolids			Y N			
Radiation Health			Y N			
Noise			Y N			
Food			Y N			
Animal Control			Y N			
Vector Borne Diseases			Y N			
Recreational Health			Y N			
Occupational Health			Y N			
Medical Waste			Y N			
Household Haz. Waste			Y N			
Superfund Sites			Y N			
Drinking/Water Supply			Y N			
Waste Water			Y N			
Water Wells			Y N			
CUPA			Y N			
Haz. Mat/Emrgncy Resp.			Y N			
Local Program Agency			Y N			
Dairy			Y N			
Other			Y N			

VI. Additional Training Needs

Please indicate the need for additional training in the following areas:

Competency Training

Communication

- Health Education ☐
- Written/Oral ☐
- Conflict Resolution ☐

Management

- Problem Solving ☐
- Org. Knowledge & Behavior ☐
- Project Management ☐
- Computers & IT ☐
- Reporting/Record Keeping ☐
- Collaboration ☐

Preferred Delivery System

- Face to Face ☐
- Web Based ☐
- Satellite ☐

Technical Training

- Statutes/Regulations ☐
- Institutions/Licensed Establishment ☐

Other: _____ ☐

VII. *Essential Services of Environmental Health*

Are you familiar with the 10 Essential Services of Environmental Health? ☐ Y ☐ N

Does your department:

1 Monitor environmental and health status to indentify community EH problems?
☐ routinely ☐ sometimes ☐ never

2 Diagnose and investigate EH problems and health hazards in the community?
☐ routinely ☐ sometimes ☐ never

3 Inform, educate and empower people about EH issues?
☐ routinely ☐ sometimes ☐ never

4 Mobilize community partnerships to identify and solve EH problems?
☐ routinely ☐ sometimes ☐ never

5 Develop policies and plans that support individual and community EH efforts?
☐ routinely ☐ sometimes ☐ never

6 Enforce laws and regulations that protect health and ensure safety?
☐ routinely ☐ sometimes ☐ never

7 Link people to needed EH services and assure the provision of EH services when otherwise unavailable?
☐ routinely ☐ sometimes ☐ never

8 Assure a competent EH workforce?
☐ establishing workforce standards ☐ continuing education ☐ training ☐ Other ☐ No

9 Evaluate effectiveness, accessibility, and quality of personal and population-based EH services?
☐ routinely ☐ sometimes ☐ never

10 Conduct research for new insights and innovative solution to EH problems and issues?
☐ routinely ☐ sometimes ☐ never

VIII. Trends

Have any trends presented themselves in terms of staff longevity and retention? If so, are they getting more stable, less stable or staying the same?

☐ More stable
☐ Less stable
☐ Staying the same

If members of your staff have left the unit within the past five years, where did they go?

Where	Number
Other Counties	
State	
Private Industry	
Academia	
Retired	
Other:	

IX. Emergency Response

Has the frequency of response to unexpected events changed over the past two years?

- ☐ Yes, it has decreased
- ☐ Yes, it has increased
- ☐ No, it has remained the same

Rate your department's potential to respond to unexpected events.

1 2 3 4 5 6 7 8 9 10

poor excellent

Describe barriers that have prevented optimal response to unexpected events.

_____

_____

Describe enabling mechanisms that enhance your department's potential to prepare for/respond to unexpected events.

_____

_____

X. Successes

Describe how success is measured and monitored by your department.

_____

_____

Describe an area in which your department particularly excels, i.e. your departmental best practice.

_____

_____

XI. Enhancing EH services

Identify key needs to enhance or better provide environmental public health services.

_____

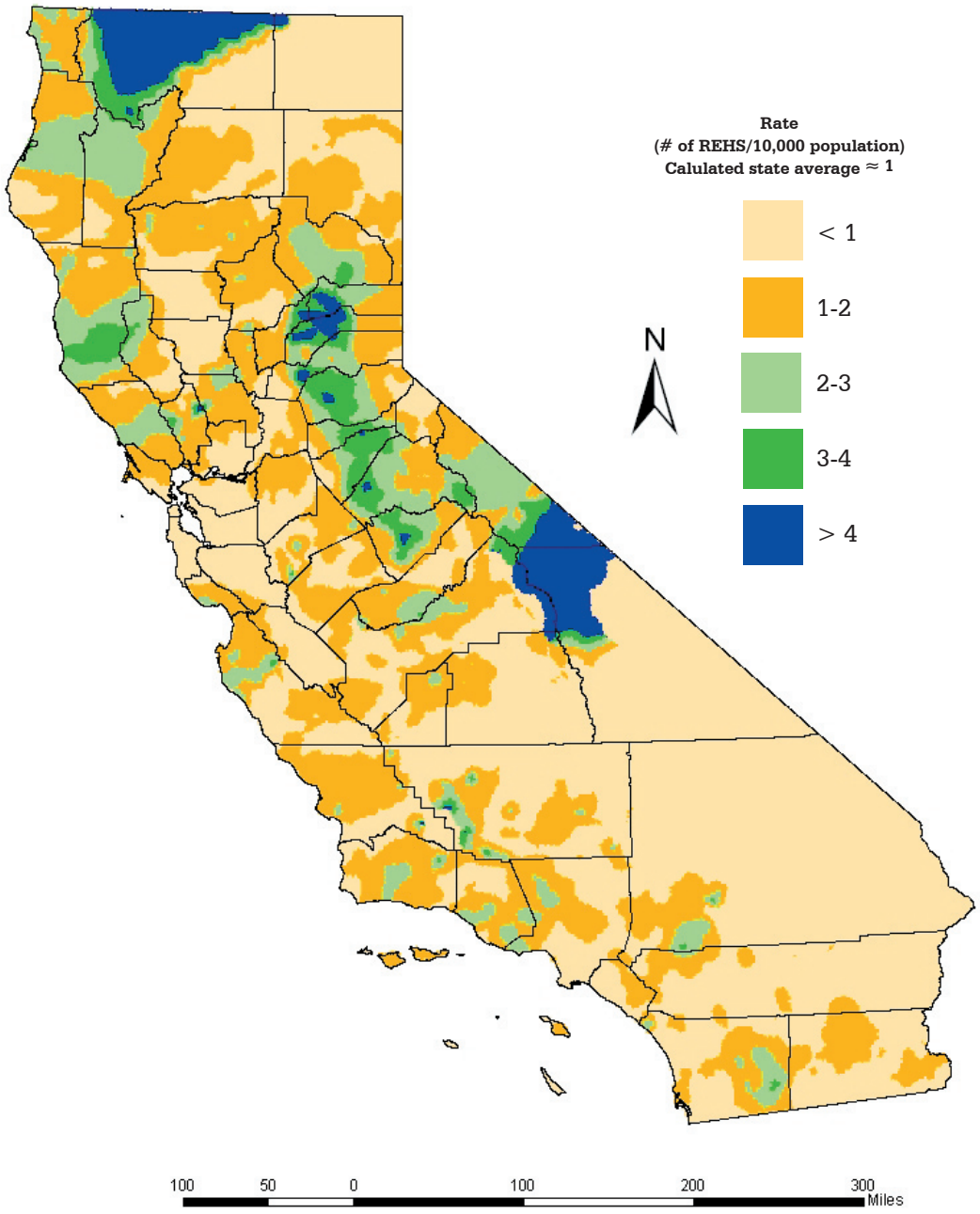
_____

What are the most significant barriers to improving environmental public health services?

_____

_____

Appendix C: Map—REHS Workforce Rate



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Appendix D: Environmental Health Specialist Monthly Salary Comparison within California

Jurisdiction	# of Positions	Low Pay	High Pay	Date Updated
Alameda	29	$5018	$6011	10/29/2003
Amador	0	$3536	$4298	11/24/2004
Berkeley	4	$5077	$5885	7/12/2005
Butte	8	$3417	$4154	6/14/2005
Contra Costa	3	$4737	$5758	4/5/2005
El Dorado	0	$0	$0	1/18/2005
Fresno	49	$3247	$4428	1/25/2005
Humboldt	6	$3198	$3904	1/23/2001
Imperial	4	$2947	$3761	5/29/2002
Inyo	3	$3383	$4115	6/14/2001
Kern		$0	$0	10/20/2003
Kern	0	$0	$0	7/28/2005
Kings	1	$3262	$3981	1/21/2005
Lake	2	$2979	$3620	6/16/2005
Long Beach	16	$3434	$4664	10/20/2003
Los Angeles	331	$3329	$4554	1/22/2001
Madera	4	$2908	$3715	6/25/2003
Marin	8	$4851	$5792	6/14/2005
Mariposa	2	$3184	$3871	10/24/2003
Mendocino	9	$3380	$4110	1/19/2005
Merced	0	$3585	$4361	1/25/2004
Monterey	7	$3544	$4610	10/29/2003
Napa	6	$4590	$5500	6/14/2005
Nevada	1	$3342	$4080	10/24/2003
Orange	48	$3675	$4950	2/3/2005
Pasadena	2	$3937	$4911	10/9/2002
Placer	20	$3742	$4549	11/19/2003
Plumas	1	$2909	$3536	10/30/2002

Continued Overleaf—

Jurisdiction	# of Positions	Low Pay	High Pay	Date Updated
Riverside	60	$3680	$4796	1/20/2005
Sacramento	8	$3772	$4585	7/21/2005
San Benito	5	$2979	$3620	4/1/2005
San Bernardino	43	$3776	$4820	1/19/2005
San Diego	89	$3978	$4834	1/21/2005
San Francisco	21	$5670	$6893	11/7/2003
San Joaquin	8	$4105	$4990	7/14/2005
San Luis Obispo	5	$3938	$4787	3/29/2005
San Mateo	16	$4807	$6379	1/27/2005
Santa Barbara	8	$3350	$4090	9/13/2002
Santa Clara	40	$4438	$5374	6/24/2001
Santa Cruz	7	$4456	$5822	3/25/2005
Shasta	3	$2876	$3671	4/23/2005
Siskiyou	0	$0	$0	11/5/2003
Solano	7	$4164	$5061	1/24/2005
Sonoma	10	$4385	$5329	1/20/2005
Stanislaus	17	$0	$0	10/20/2003
State Health	20	$3493	$4208	11/13/2003
Sutter	3	$2923	$3610	6/21/2001
Tehama	0	$2796	$3408	2/3/2005
Trinity	0	$0	$0	1/19/2005
Tulare	24	$0	$4035	10/20/2003
Tuolumne	3	$2564	$3130	2/1/2001
Ventura	30	$3384	$5271	1/21/2005
Vernon	4	$4645	$6758	11/1/2004
Yolo	2	$3392	$4123	3/10/2005
Yuba	3	$3026	$3678	7/7/2005

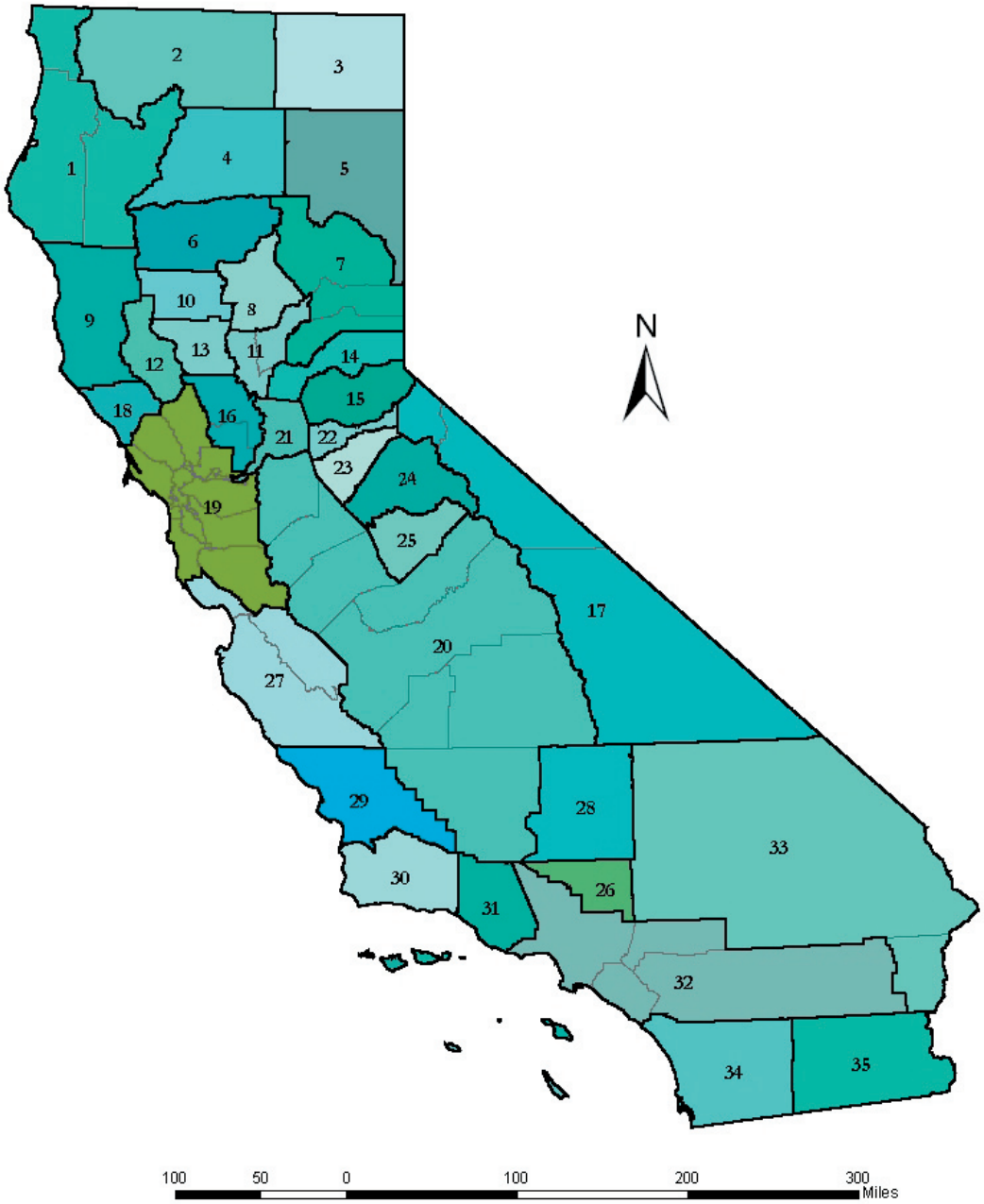
California Conference of Directors of Environmental Health
www.ccdehsurveys/data4_interface/ehs_journey-pub.asp

CCDEH 2005 Salary Survey – Journey of Environmental Health Specialist Salary Comparison

Retrieved August 29, 2005

Appendix E: Map—Air Districts

(Air districts legend overleaf)

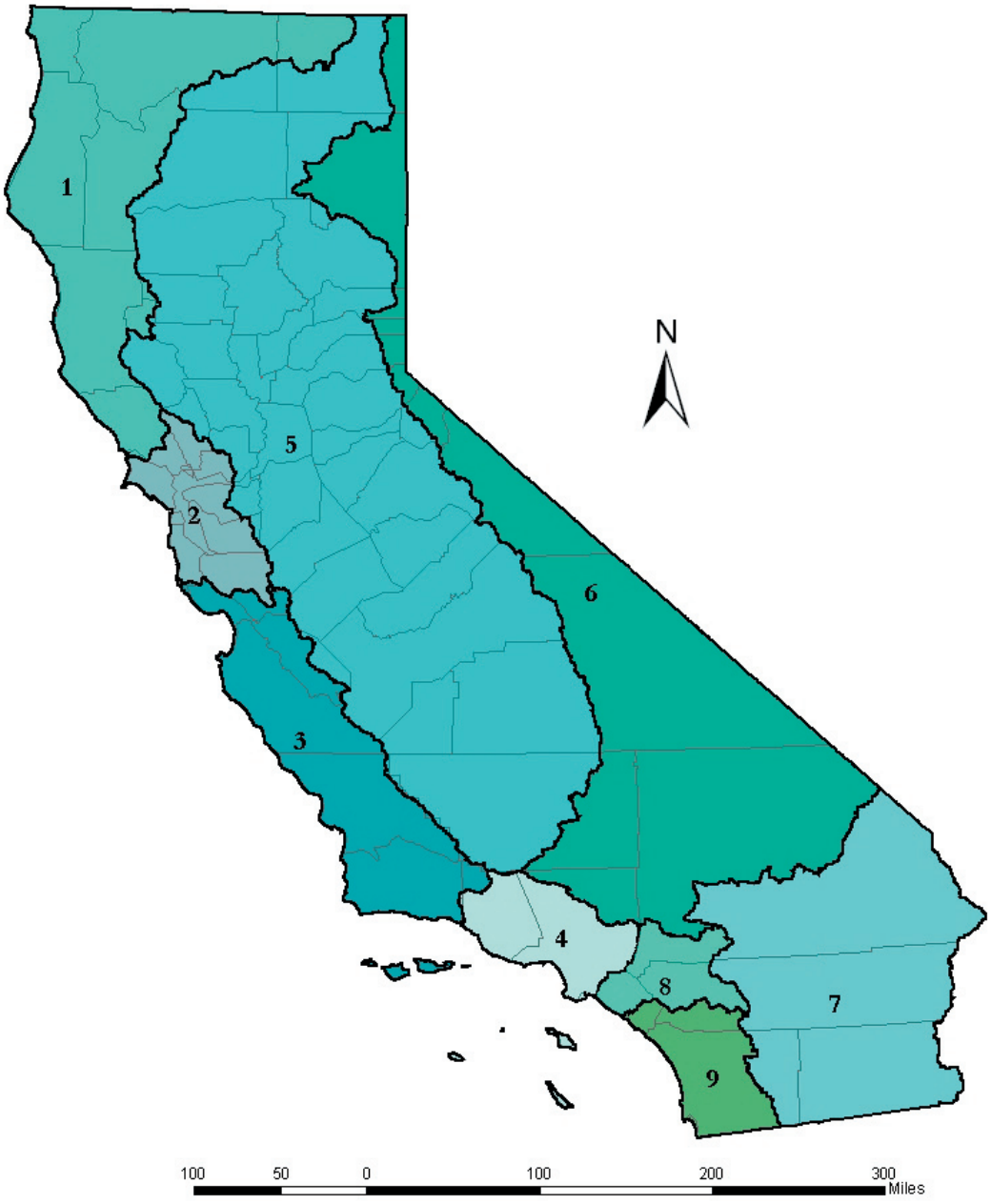


Source: California Air Resource Board

Legend: Air Districts	
1	North Coast Unified
2	Siskiyou
3	Modoc
4	Shasta
5	Lassen
6	Tehama
7	Northern Sierra
8	Butte
9	Mendocino
10	Glenn
11	Feather River
12	Lake
13	Colusa
14	Placer
15	El Dorado
16	Yolo Solano
17	Great Basin Unified
18	Northern Sonoma
19	San Francisco Bay Area
20	San Joaquin Valley Unified
21	Sacramento Metro
22	Amador
23	Calaveras
24	Tuolumne
25	Mariposa
26	Antelope Valley
27	Monterey Bay Unified
28	Kern
29	San Luis Obispo
30	Santa Barbara
31	Ventura
32	South Coast
33	Mojave Desert
34	San Diego
35	Imperial

Appendix F: Map—Regional Water Quality Control Boards

(Regional water quality control boards legend overleaf)

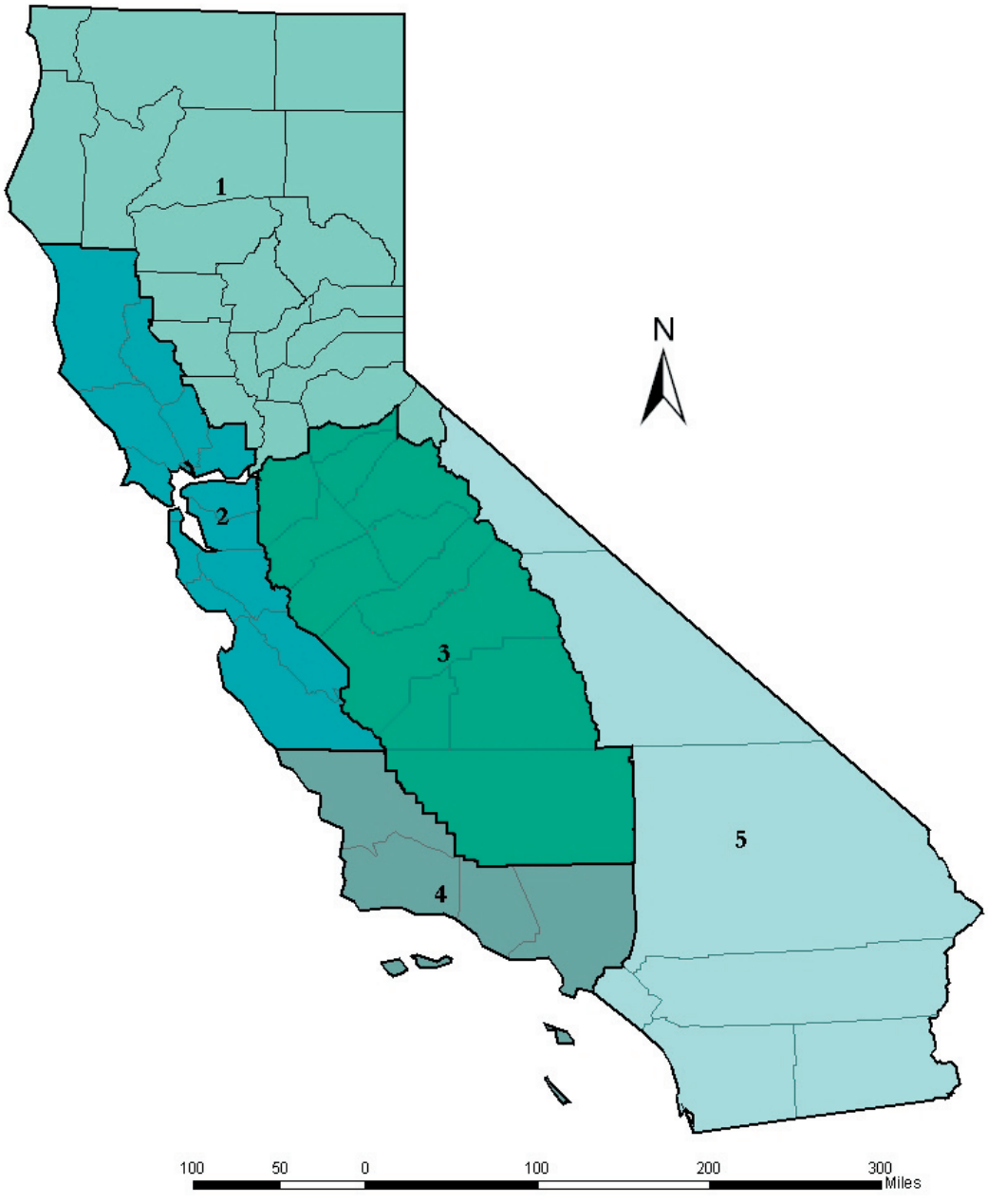


Source: California State Water Resources Control Board

Legend: Regional Water Quality Control Boards	
1	North Coast Region
2	San Francisco Bay Region
3	Central Coast Region
4	Los Angeles Region
5	Central Valley Region (3 subregions) 5R—Redding 5S—Sacramento 5F—Fresno
6	Lahontan Region (2 subregions) 6SLT—South Lake Tahoe 6V—Victorville
7	Colorado River Basin Region
8	Santa Ana Region
9	San Diego Region

Appendix G: Map—Drinking Water Districts

(Drinking water districts legend overleaf)

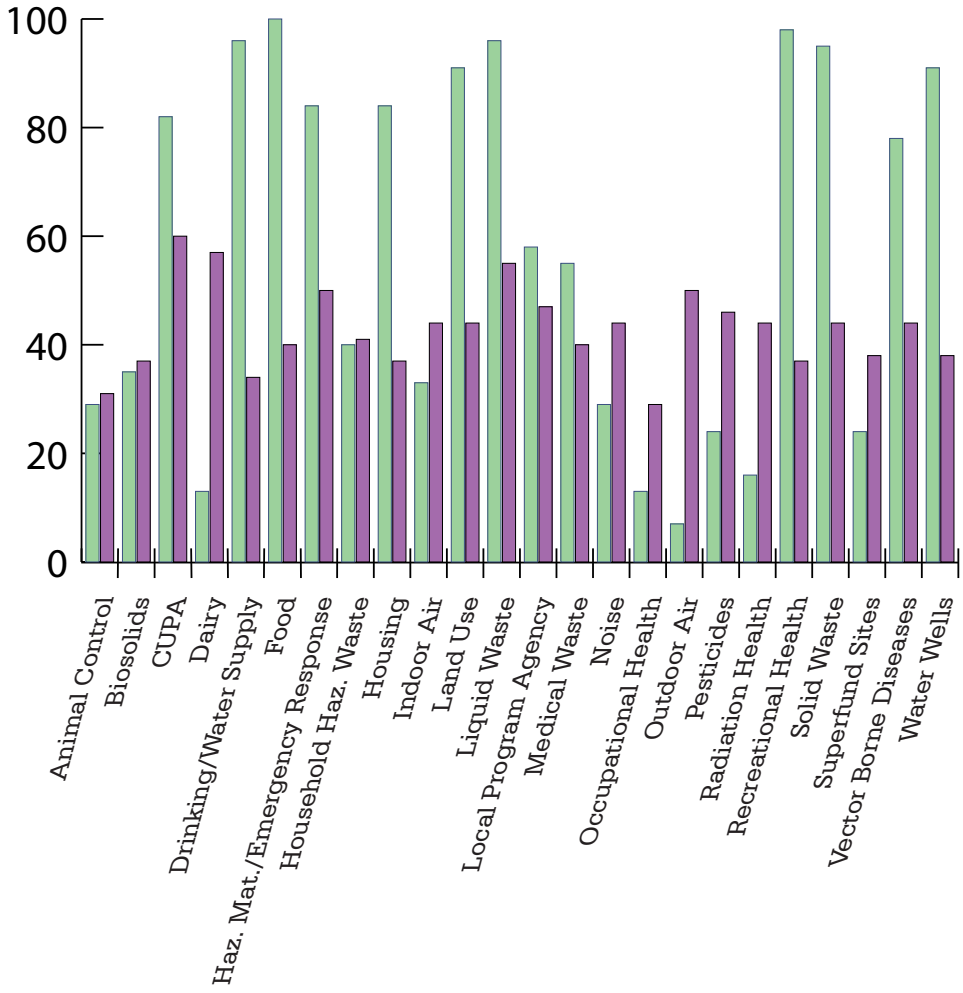


Source: CDHS Drinking Water Program

Legend: Drinking Water Districts	
Northern California Field Operations Branch	
1	Region I District 1—Klamath District 2—Lassen District 9—Sacramento District 21—Valley
2	Region II District 3—Mendocino District 4—San Francisco District 5—Monterey District 17—Santa Clara District 18—Sonoma
Southern California Field Operations Branch	
3	Region III District 10—Stockton District 11—Merced District 12—Visalia District 19—Tehachapi
4	Region IV District 6—Santa Barbara District 7—Hollywood District 15—Metropolitan District 16—Central
5	Region V District 8—Santa Ana District 13—San Bernardino District 14—San Diego District 20—Riverside

Appendix H: Graph—Training Needs

Reported environmental health services provided as a program or on a complaint basis and reported technical training needs within each of those reported services.



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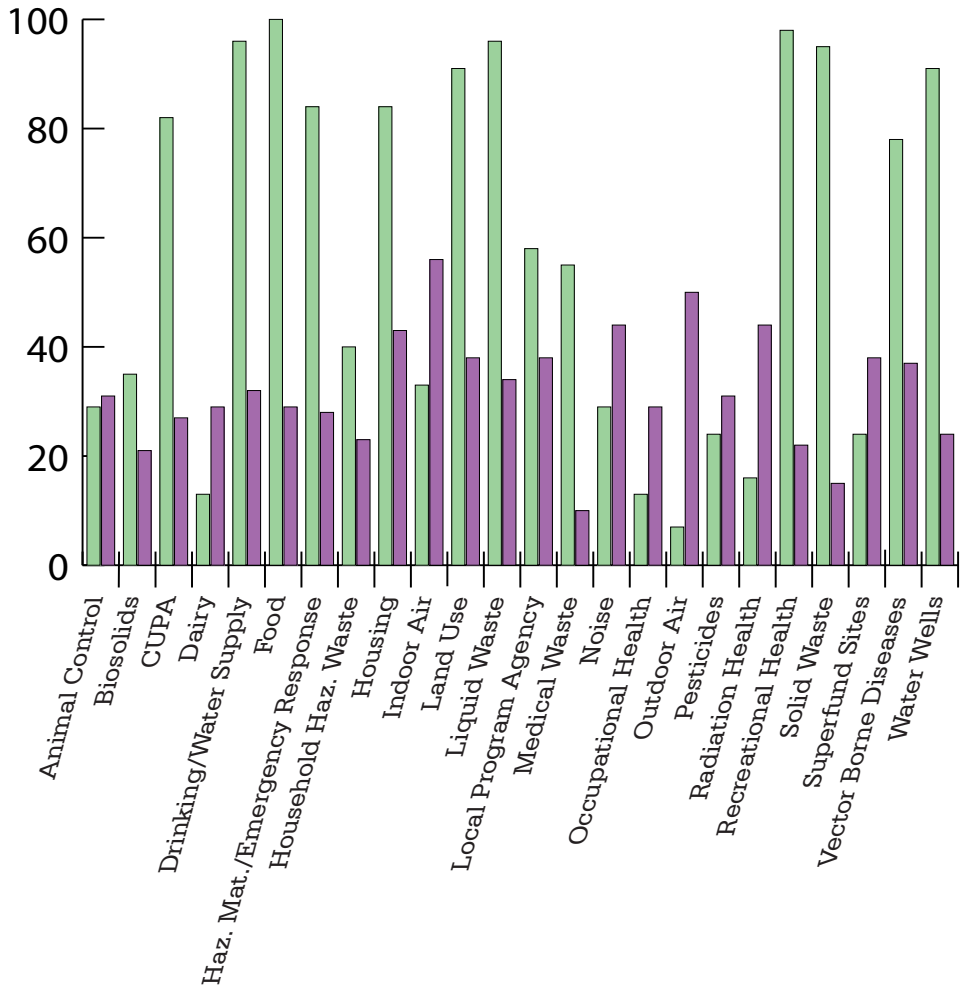
Appendix I: Funding Needs

Reported environmental health services provided as a program or on a complaint basis and reported funding needs within each of these provided services



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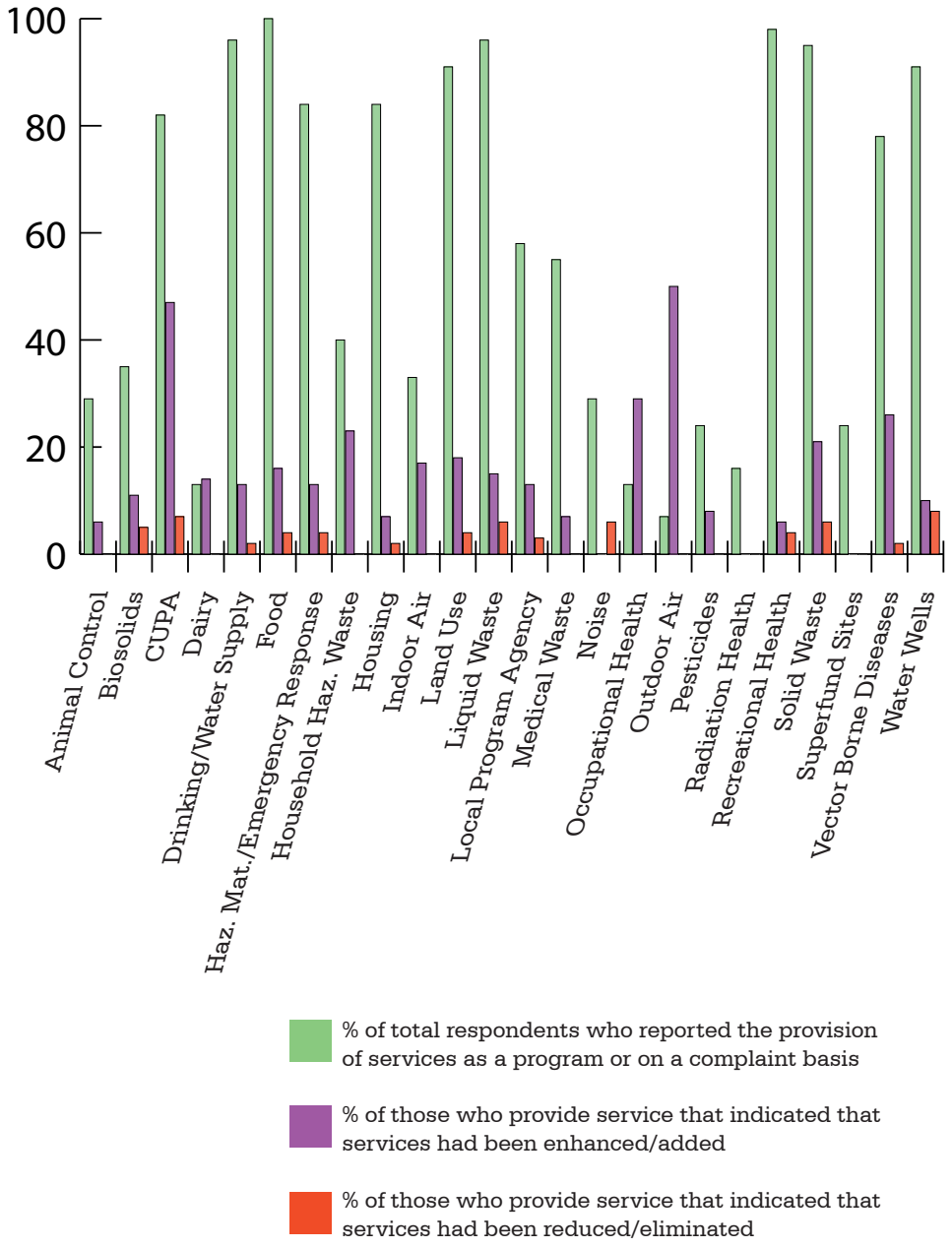
Appendix J: Graph—Enhanced and Reduced Services

Reported environmental health services provided as a program or on a complaint basis and percentages of providers reporting services that have been enhanced/added or reduced/eliminated



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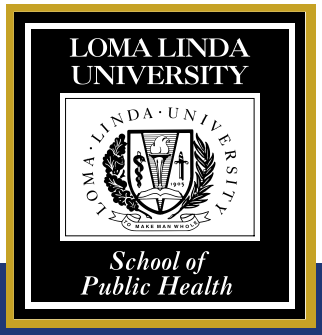

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School of Public Health
Office of Public Health Practice & Workforce Development
Loma Linda, California 92350