Public Health At Center Stage: New Roles, Old Props

Given the magnitude of responsibility the public health system has undertaken, it's time to recalibrate the health spending rheostat.

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ABSTRACT: The public health system represents a wide variety of actors playing key roles in the ongoing script to improve the quality and quantity of life for the U.S. population. The specific parts that public health is being asked to play and the resources available to support its infrastructure for prevention and response to infectious diseases, chronic medical conditions, and disasters are discussed here in light of new national survey data from state and local jurisdictions. Although the public health system has both traditional and newly defined roles to play, resources, as measured by per capita spending and workforce availability, have not kept pace. [*Health Affairs* 25, no. 4 (2006): 911–922; 10.1377/hlthaff.25.4.911]

As Shakespeare so famously stated, "All the world's a stage." Indeed, public health has long been accustomed to performing its essential functions before an audience. In a post-bioterrorism world, however, public health now finds itself at center stage, a position it has not occupied since the discovery of the polio vaccine. Ironically, even though recognition has been delayed, the twentieth century may justifiably be termed the "Golden Age of Public Health." This designation is largely based upon the gain of more than 60 percent in life expectancy during the past hundred years, mostly attributable to gains in public health knowledge and its successful application.[1] Yet, remarkably, these life-extending benefits have accrued to the American public despite the relatively limited funding for governmental public health and its oft-neglected infrastructure.[2] In fact, financial support for public health stands in stark contrast to its more glamorous sibling, the private health care delivery system, which has contributed more modestly to overall life extension during this time frame.[3]

Despite public health's long history, relatively little is known about how U.S. public health agencies are organized, their specific functions, and, in particular,

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DOI 10.1377/hlthaff.25.4.911

precisely how limited their resources are.[4] In this paper we present salient findings of two recent, unique surveys conducted by the Association of State and Territorial Health Officials (ASTHO) and the National Association of County and City Health Officials (NACCHO). We use this information to briefly describe the structures and functions of U.S. public health departments and to examine their financial support and infrastructure. Lastly, based on the data we provide and on our collective experiences, we make specific policy recommendations.

Background

To place these new data into proper perspective, the recent evolution of public health practice needs to be viewed in context. Early in the twentieth century, public health was primarily concerned with controlling the spread of infectious diseases. The introduction of environmental sanitation, hygienic practices, immunizations, and reduction of overcrowding had the most dramatic impact. By contrast, the heralded development of antibiotics, surprisingly, had only a marginal effect on overall life expectancy during these years.[5] After mid-century, as the population aged, in part because it no longer succumbed to communicable illnesses, the burden placed on society by largely preventable chronic diseases became more apparent. In response, public health has sought to galvanize the public's attention in the direction of changes in lifestyle: diet, tobacco, and exercise, with some, albeit limited, success. But trends in the epidemic of obesity underscore how elusive the fight to tame chronic disease may in fact be.

More recently, after September 11, 2001, many of these initiatives have been deemphasized as public health has focused its collective attention once again on issues of health protection. It differs from the original twentieth-century era of health protection because this new period must also address both human-created and natural disasters. In addition, emerging infectious diseases, including threats from avian flu and a global influenza pandemic, endanger human life around the planet. These threats serve to remind us that public health must not completely divert its attention and resources away from its more traditional roles.

Despite the fact that public health approaches were the primary contributors to the achievement of the unprecedented milestones in life expectancy during the twentieth century, still more is expected of the public health system in the twenty-first. Indeed, as one epoch transitions into another, additional responsibilities have been added to state and local public health agencies. Yet seldom have prior responsibilities been scaled back as new roles have been further defined.

It is our contention that resources committed to these endeavors have not kept pace nor are commensurate with the tasks assigned. To bolster our argument, we examine here available resources supporting the public health infrastructure. Specifically, using the newly collected data, we calculate estimated U.S. staffing levels and per capita public health spending for 2005. We also discuss these in the context of overall per capita health care spending.

Study Data And Methods

Our analyses are based on two distinct recent surveys, from ASTHO and NACCHO, which provided information on public health infrastructure, including organizational framework, functions, and spending.

■ **ASTHO survey.** ASTHO conducted its survey during April–June 2005. All current state health officials (the chief public health official in each state) were contacted and encouraged to participate. Nonrespondents' involvement was further solicited by e-mail and telephone. Either the state health official or his or her designee was asked to complete the twenty-nine-question instrument and submit it electronically, by mail, or via facsimile.

■ **NACCHO survey.** NACCHO used a core survey questionnaire with more than 100 questions, targeted to 2,865 local U.S. public health agencies.[6] In addition to the core survey, three topical modules were developed, and a stratified sampling technique was used. A health department was eligible to receive only one module. NACCHO's primary contact, most typically the local health official, was e-mailed an invitation to participate in the survey beginning in June 2005. This e-mail provided an electronic link to the survey Web site. Alternatively, the survey could be printed out, then completed offline and mailed to NACCHO. Health departments that did not have e-mail addresses or that did not respond were mailed a paper copy of the questionnaire. Data collection culminated in November 2005.

■ **Analysis methods.** For purposes of describing our findings, data were aggregated across all states that participated. Prior to aggregating the data, we calculated per capita public health spending by using information from both the ASTHO and NACCHO surveys, divided by estimated state populations from the U.S. census.[7]

Specifically, the ASTHO survey sought information on the total state public health agency budget, including federal, state, and other sources. Total contributions passed from the state budget to local public health were also requested. Medicaid resources were identified separately. NACCHO, through its questionnaire, asked for total local public health agency spending and percentages of revenue sources, subdivided into thirteen categories. All budgets and expenditures were assumed to be spent for public health–related activities. Cross-tabulations and subanalyses were conducted, using a variety of previously employed approaches, including U.S. census geographic regions and state population size.[8] States' populations were defined as large (more than 9.9 million), medium (4–9.9 million), or small (less than 4 million). Statistical significance of our findings was determined using chi square or analysis of variance tests as appropriate.

Study Results

The ASTHO survey was completed by all fifty states, for an overall response rate of 100 percent. In the NACCHO survey, 2,298 local public health agencies participated, for a response rate of 80.2 percent.[9]

■ **Structure and governance.** Results from the 2005 ASTHO survey suggest

that 58 percent of state public health agencies are freestanding, independent departments (Exhibit 1). "Organizational configuration" describes the relationship between state and local public health agencies. No form of organizational control predominates, although decentralized configuration is the most common.[10] State boards or councils of health exist in approximately half of the states and typically play a major role in public health policy making and regulation.

EXHIBIT 1
Structure And Governance Of U.S. State And Local Public Health Agencies, 2005

State public health agency	Percent	Number
Agency structure		
Freestanding (independent)	58.0	29
Part of umbrella agency	42.0	21
Organizational configuration		
Centralized	26.0	13
Decentralized	42.0	21
Mixed/shared	32.0	16
State board of health		
Yes	48.0	24
No	52.0	26
Board of health has policy-making and regulatory power		
Yes	75.0	18
No	25.0	6
Appoints state health officer		
Governor	66.0	33
Secretary of health and human services	24.0	12
Board of health	8.0	4
Secretary/governor	2.0	1
Local public health agency		
Jurisdiction		
City	7.1	164
County	58.7	1,348
City/county	13.8	318
Town/township	8.8	202
Multicounty/district	10.1	233
State	0.3	6
Other	1.1	26
Local board of health		
Yes	74.4	1,709
No	25.6	587
Functions of local board		
Governing	54.5	1,253
Policy making	57.5	1,321
Advising	62.2	1,430
Governing body for the local agency		
County commission	32.1	738
City/town council	9.0	208
Local board of health	44.8	1,029
State health agency	25.9	596
Other	9.8	226

SOURCE: Data extracted from the responses by state and local health departments to surveys conducted by the Association of State and Territorial Health Officials (ASTHO) and the National Association of County and City Health Officials (NACCHO), 2005.

The NACCHO survey data demonstrate that public health serves the local community through a variety of jurisdictional forms. However, county structure predominates, with nearly six in ten local agencies organized by county jurisdiction (Exhibit 1). Regardless of the type of local service area, boards of health are a major presence, serving almost 75 percent of all local jurisdictions. More than half of them have critical governing and policy-making roles. Moreover, local boards of health play a major role as governing bodies for local public health agencies.[11]

■ **Programs and functions.** The ASTHO study also revealed that state public health agencies are engaged in a wide array of activities (Exhibit 2). Although Exhibit 2 categorizes the responsibilities into individual programs and functions, collectively, they encompass the core functions of public health: assessment, policy development, and assurance.[12] The breadth and scope of these programs and functions are vast, ranging from disease monitoring (surveillance) and data collection to environmental regulation and Medicaid administration. Nearly all state public health agencies have responsibilities in some of these arenas. For example, preparedness programs, funded through cooperative agreements with the federal Centers for Disease Control and Prevention (CDC) and the Health Resources and Services Administration (HRSA), are performed by all state public health agencies. Similarly, nearly all state agencies collect vital statistics data, maintain public health laboratories, and have antitobacco programs. However, relatively fewer states include Medicaid or mental health within the responsibilities of their public health agencies.

Similarly, NACCHO data show that local public health agencies also have a wide breadth of activities routinely performed (Exhibit 3). These activities in-

EXHIBIT 2
Programs And Functions Of U.S. State Public Health Agencies, 2005

Program/function	Total (%)	Full (%)	Partial (%)
Preparedness	100	100	0
Vital statistics	98	94	4
Tobacco prevention and control	96	80	16
Public health laboratories	96	90	6
Women, infants, and children (WIC) program	96	90	6
Environmental health	92	46	46
Food safety	92	58	34
Health facility regulation	90	76	14
Drinking water regulation	80	40	40
Environmental regulation	74	20	54
Health professional licensing	70	32	38
Substance abuse prevention	52	28	24
Medical error reporting	50	30	20
Mental health	34	16	18
Medicaid	32	16	16

SOURCE: Data extracted from the responses by state and local health departments to surveys conducted by the Association of State and Territorial Health Officials (ASTHO) and the National Association of County and City Health Officials (NACCHO), 2005.

EXHIBIT 3
Programs And Functions Of U.S. Local Public Health Agencies, 2005

Program/function	Performed by agency (%)	Contracted by agency (%)
Adult immunization	87.5	6.0
Communicable disease epidemiology	86.9	4.0
Child immunization	86.9	5.5
Tuberculosis screening	82.5	5.0
Food service inspection	74.4	1.7
Tobacco control	66.6	5.8
Women, infants, and children (WIC) program	64.0	4.5
Septic tanks	63.7	2.0
HIV/AIDS screening	59.3	7.1
Sexually transmitted disease treatment	57.1	5.7
Obesity	55.3	2.7
Family planning	54.7	6.5
Early and Periodic Screening, Diagnosis, and Treatment (EPSDT)	44.0	2.7
School health	39.8	1.8
Injury prevention	39.2	1.8
Prenatal care	37.0	7.0
Syndromic surveillance	32.7	1.4
Public water supply monitoring	29.4	1.1
Oral health	27.0	5.5
Home health	25.0	3.7
Hazardous materials handling	19.1	0.9
Primary care	11.8	2.7
Mental health	10.0	3.9

SOURCE: Data extracted from the responses by state and local health departments to surveys conducted by the Association of State and Territorial Health Officials (ASTHO) and the National Association of County and City Health Officials (NACCHO), 2005.

clude adult and childhood immunizations, communicable disease epidemiology (surveillance), and screening for infectious diseases like tuberculosis. Services less likely to be performed directly by local agencies are typically, but not exclusively, clinical (for example, mental health and primary care). Many prevention-oriented activities such as obesity prevention, tobacco control, and injury prevention fall between these extremes.[13]

■ **Infrastructure and support.** By integrating data from both the 2005 ASTHO and NACCHO surveys, we also examined several key components of state and local public health agency infrastructure and support (Exhibit 4). We report the results in both mean and median values to capture the diversity and range of state and local capacity more fully and to deemphasize the impact of larger or more financially secure public health jurisdictions on the average values.

Public health versus all health spending. Mean total per capita state and local public health spending for 2004–05 from all sources (federal, state, local, and other) was $149. This figure constitutes a likely "ceiling" for total U.S. public health spending

EXHIBIT 4
U.S. State And Local Workforce Infrastructure And Per Capita Public Health (PH) Spending, 2005

	State FTEs	LPHA FTEs	State budget contribution ($ millions)	Federal contribution (%)	Total LPHA spending ($ thousands)	State per capita PH budget ($)	LPHA per capita spending ($)	Total state and local per capita spending ($)
Overall								
Mean	1,924	66	1,030	64.4	4,639	109.3	39.7	149.0
Median	1,145	16	80	71.5	1,044	68.0	28.7	
Region								
Northeast								
Mean	1,720	51[a]	2,740	53.3	3,392	124.9	27.9[a]	124.9
Median	1,309	6	240	51.7	488	84.9	14.6	
South								
Mean	2,905	80[a]	390	67.2	5,393[a]	98.8	44.0[a]	98.8
Median	1,688	30	110	75.0	1,533	66.0	31.9	
Midwest								
Mean	1,054	35[a]	370	65.4	3,101	51.6	37.3[a]	51.6
Median	1,684	13	70	79.0	903	30.1	29.4	
West								
Mean	1,512	136[a]	1,390	67.5	8,507[a]	161.5	50.5[a]	161.5
Median	1,301	22	140	68.3	1,680	81.6	38.1	
Population size								
Small								
Mean	1,227[a]	26	130	65.9	2,083[a]	132.1	32.8[a]	132.1
Median	743	10	50	71.5	537	80.4	24.9	
Medium								
Mean	1,980	53	390	65.6	3,832[a]	87.2	38.6[a]	87.2
Median	1,133	14	110	73.5	950	47.1	27.8	
Large								
Mean	3,722[a]	149[a]	5,070[a]	55.0	9,578[a]	96.2	50.7[a]	96.2
Median	3,087	43	820	59.3	3,350	63.1	27.4	

SOURCE: Authors' calculations based on data extracted from the responses by state and local health departments to surveys conducted by the Association of State and Territorial Health Officials (ASTHO) and the National Association of County and City Health Officials (NACCHO), 2005.

NOTES: FTE is full-time equivalent. LPHA is local public health agency.

[a] Significant analysis of variation (ANOVA), $p < .05$.

and might be a considerable overestimation. This was caused in part by the fact that all assumptions implicit in the calculations accepted the highest budget numbers available as being entirely dedicated to public health functionalities, a somewhat remote possibility. However, we endeavored to ensure that resources were counted only once and allocated to the public health agency level where they would be used. Median values were considerably lower for both state per capita budget and local per capita spending.

To place the per capita support of public health in context, we reviewed other related sectors and their budgets. Because of the close kinship of public health to medicine, we first analyzed overall U.S. per capita health spending. The spending of state and local public health agencies constituted 2.37 percent of all U.S. health

spending for 2004 (based on a total of $6,280 per person) and 2.32 percent for 2005 (based on a total of $6,423 per person).[14]

Spending on health protection. Another perspective might consider public health's health-protection role. Although this responsibility has always been a part of the public health portfolio, it has assumed greater prominence and emphasis in a post-9/11 world. Therefore, we considered the funding for other governmental "protective services," focusing on police and firefighters. Nationally, per capita spending was $254 for police in 2001 and $81 for firefighters in 2000, placing public health somewhere in the middle for overall support, with the important caveat that protection encompasses only one aspect of public health responsibilities.[15] Moreover, spending for police and fire protection have risen considerably since 9/11.

Workforce size. For public health in general, and local public health agencies in particular, the primary purpose of budget is to support a dedicated workforce to meet community needs. On average, local agencies employed sixty-six full-time-equivalent (FTE) workers (median of sixteen FTEs) in 2005. The mean state public health agency workforce was much greater, with 1,924 FTEs (median, 1,145).

Geographic and population variation. The per capita spending of local public health agencies demonstrated much variation by geographic region and state population. Local agencies in the western states spent significantly more than those in the Northeast and Midwest (West versus Northeast, $p < .001$; West versus Midwest, $p < .001$), as did local public health agencies in more populous states compared with those in less populated states (large versus medium, $p < .001$; large versus small, $p < .001$). Total local agency spending revealed similar differences by state population (large versus medium, $p < .001$; large versus small, $p < .001$). Local agencies in the South and West had significantly greater resources than those in the Northeast or Midwest (South versus Northeast, $p = .02$; South versus Midwest, $p < .001$; West versus Northeast, $p < .001$; West versus Midwest, $p < .001$).

With respect to FTEs in local public health agencies, differences across all of the regions were substantial (West versus each region separately, $p < .01$). However, only the local agencies in more populous states differed when compared with those in less populated states (large versus small, $p < .001$; large versus medium, $p < .001$). State per capita public health budgets revealed no significant variation across regions or by population size. However, the numbers of FTEs in state agencies were more likely to be greater in the states with larger populations than in those with the smallest populations (large versus small, $p = .02$).

Discussion And Recommendations

In a turbulent post-9/11 world, public health continues to reinvent itself. However, unlike many previous periods in public health history, a great deal of attention and scrutiny is given to recent public health activities, including bioterrorism and hurricane response. Such interest, while warranted, might be accompanied by expectations that exceed the public funding commitment to the areas of immedi-

ate focus. Somewhat incongruously, epidemics of chronic disease account for the vast majority of U.S. morbidity and mortality but, aside from obesity, capture only marginal public interest or financial support. Nonetheless, public health remains responsible for the full spectrum of its mission: protecting and promoting health and preventing disease. Diversion exclusively in one direction or another does not fully serve the public interest. Likewise, limited funding formulas that ignore the breadth of public health responsibilities, while subscribing to a disease-of-the-month-club philosophy (which fails to recognize the cumulative extent of program requirements amid a threatened and fragile public health infrastructure), do the public a disservice. As an alternative, given the present findings documenting broad public health responsibilities with relatively limited infrastructure and support, we desire to offer a persuasive argument for striking a new balance for U.S. health care spending. This new equilibrium should both account for the past successes of public health and be commensurate with the magnitude of the current responsibilities entrusted to it.

The data presented herein and collected in 2005 form the basis for these assertions. It has been more than a decade since the last comprehensive nationwide examination of state health department structure and functioning.[16] In the intervening years, both ASTHO and NACCHO have surveyed state and local health departments to update key elements of the database.[17] In addition, work that we conducted in 2001 has provided supplementary information.[18] Nonetheless, recent infrastructure changes spawned by alterations in post-9/11 public health responsibilities have not been described elsewhere. Although we can describe this structure, to date research has not been funded to undertake and address the critical questions: Which structures are most conducive to the efficient operation of public health; which structural designs provide greater protection to the public; and, ultimately, is there a relationship between agency structure and overall community health status?

■ **New versus old responsibilities.** Although we highlighted only a limited number of the many public health programs and functions, we did underscore the broad range of responsibilities within the state and local public health mission. Local public health services varied dramatically from region to region and by state population size; state-level programs less so. Nonetheless, health protection, health promotion, and disease prevention activities were manifest in all jurisdictions. Moreover, as health departments take on additional roles and responsibilities, previous functions are seldom jettisoned. In other words, there is a net cumulative effect that could strain the limited infrastructure.

■ **Funding and workforce levels.** Our study also examined critical components of the infrastructure supporting public health. Importantly, we found total per capita state and local public health spending (including federal sources) to be less than 2.5 percent of overall health care spending. Although state and local public health spending data have not been systematically collected for more than a decade,

there are other estimates available for comparison.[19] Our results are considerably higher, representing a ceiling rather than a floor of support for the public health infrastructure. We assumed that all budget and expenditures were specifically for public health activities. Yet even with this "high" estimate, we must ask, given the magnitude of responsibility the public health system has undertaken, is it not time to recalibrate the health care spending rheostat? Americans engage in relatively little formal debate before feeding the country's ravenous appetite for medical care. We simply spend more or "attempt" to slow the pace of the ascent. But as baby boomers age, and Americans grapple with epidemics of preventable chronic diseases, of necessity, we need to ask ourselves whether the twentieth-century model U.S. health care system remains viable or affordable in the twenty-first century. Other options are available, such as dramatically increasing the public health budget. Canada dedicates 5.5 percent of its smaller per capita total health spending directly to public health.[20] In fact, the United States has conducted far larger health care experiments based upon far less compelling data—witness the managed care revolution.

The largest percentage of the public health budget is invested in its workforce. For both state and local public health agencies, there is much difference between the mean and median number of FTEs, which suggests greater variability at the extremes. Notably, both mean and median FTE figures for local agencies were practically identical to the data collected in 1999–2000, prior to 9/11.[21] State agencies in the South tended to have larger staffs, perhaps reflecting the demonstrated need to improve health status in much of this region, their frequent involvement in direct clinical care, and their centralized organizational structure. Local agencies in the South also had the largest median number of FTEs.

The United States has long accepted the large standby costs associated with fire departments, ambulance services, and emergency rooms. We are now asking public health to be on call around the clock with the same workforce that was numerically insufficient for the daunting tasks it faced before bioterrorism and Hurricane Katrina. Moreover, funding often flows in rigid categorical streams, which must be spent in specific ways, thereby reducing flexibility and efficiency. In addition, staff with differing talents and skills are often necessary to complement the existing workforce, to meet the evolving mission and responsibilities.

■ **Study limitations.** Although we feel that our study adds important new information regarding public health infrastructure, several limitations must be mentioned. First, some of our assertions stem from survey data, which, by their very nature, present bias from the vantage point of the respondent. Second, not all local public health agencies were included in the database, despite efforts that yielded a high response rate. Third, questions regarding programs and functions were posed in broad terms, perhaps obscuring considerable differences in magnitude and scope, thereby reducing the granularity of the analysis. Fourth, state and local agencies around the country have dramatically different organizational structures and accounting processes. These differences increase the difficulty inherent in calculating

per capita public health budgets and spending.

■ **Policy recommendations.** Public health is not funded well enough to meet the demands and expectations of an aging population that is further threatened by terrorism and natural disasters. Resources are simply inadequate to provide the optimal balance of health promotion/disease prevention and health protection, yet both are needed. This is especially important in the area of chronic disease, if prevention and future growth of health care spending are to be tamed, or if the U.S. population is to be as healthy as those in other developed nations with which the United States competes in a global economy.

What are the take-home messages for policymakers? As a modest starting point, provide states and localities with explicit assurances that preparedness resources can be used to benefit the entire public health infrastructure, under the theory that strengthening the agency increases its overall capacity to perform its myriad functions. Second, double the federal investment in public health capacity over the next ten years. This strategic investment should be accompanied by adequate oversight, with assessment and evaluation to assure that adequate value is returned. Third, invest wisely in public health systems research, unleashing the U.S. entrepreneurial spirit and establishing a strong evidence base through research that demonstrates what actually works, to build healthy communities. Fourth, develop adequate systems to continuously track public health spending and workforce levels, so that appropriate measures of infrastructure and support can be determined. Finally, as a corollary of an earlier recommendation, explore the proper range of functions that health departments should be responsible to provide, so that ultimately a national public health system is in place to provide public health services consistently across the country.

PUBLIC HEALTH FINDS ITSELF AGAIN at center stage, with the spotlights focused on its performance. The script, however, has been rewritten. In fact, public health will continue to be challenged by the mandate to appear on multiple stages and play multiple parts, often with a modest supporting cast. Despite vast experience with very public performances and an impressive résumé of achievement on stage, it is only recently that public health is being viewed as a leading player. Given the prominence public health must now again assume, it is a propitious time to reassess its infrastructure and resource needs.

The authors thank George Hardy and Jason Hohl of ASTHO for their invaluable assistance in the preparation of this paper.

NOTES

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9. The complete ASTHO survey results can be found at http://www.astho.org/pubs/2005SalarySurveyComplete.pdf (accessed 15 May 2006).
10. Centralized control indicates that local public health agencies are units of the state health department, whereas decentralized agencies are functional units of local government. The mixed/shared designation reflects an intermediate relationship and governance structure that differs from either extreme.
11. From the standpoint of structure at the state level, there was significant variation only for organizational configuration across U.S. census geographic regions (data not shown). For example, southern states tended to be centralized, while midwestern states exhibited a preference for decentralization (South, 43.8 percent; Midwest, 83.3 percent; $p = .02$). Conversely, nearly all of the local agency configurations and governance components surveyed differed significantly by region and state population size.
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