Availability and Perceived Effectiveness of Public Health Activities in the Nation's Most Populous Communities

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Objectives. We examined the availability and perceived effectiveness of 20 basic public health activities in the communities where most Americans reside.

Methods. A self-administered questionnaire was mailed to the 497 directors of US local health departments serving at least 100 000 residents.

Results. On average, two thirds of the 20 public health activities were performed in the local jurisdictions surveyed, and the perceived effectiveness rating averaged 35% of the maximum possible. In multivariate models, availability of public health activities varied significantly according to population size, socioeconomic measures, local health department spending, and presence of local boards of health.

Conclusions. Local public health capacity varies widely across the nation's most populous communities, highlighting the need for targeted improvement efforts. (*Am J Public Health.* 2004;94:1019–1026)

A strong public health infrastructure is essential for preventing, preparing for, and responding to health threats on a populationwide basis.[1,2] This infrastructure includes systems for identifying health risks in the population, preventing and controlling communicable disease outbreaks; educating the public and health professionals about health risks and prevention practices; ensuring access to needed health services; and protecting the safety of water, food, and other environmental health resources.[3] Although the importance of the public health infrastructure is widely recognized, efforts to measure and improve performance in public health have lagged behind comparable activities in medical practice.[4–11] In the present study, we sought to aid in addressing this gap by examining the performance of core public health activities in the nation's most populous communities.

The performance of the nation's public health system has received growing attention in recent years as this system has been challenged by emerging health threats and by trends in health policy and the health care marketplace. Fifteen years ago, a study commission convened by the National Academy of Sciences' Institute of Medicine (IOM) found that an array of factors—including stagnant public funding, new and resurgent diseases, a leadership deficit, and a persistent indigent care burden—had left the nation's public health system in disarray.[4] The IOM report and related studies helped to mobilize public health improvement initiatives across the nation, many of which focused on local health departments as the essential public health providers in most communities.[12–16]

Federal health objectives for the year 2000 established the target that at least 90% of the US population be served by a local health department that effectively carries out core public health functions.[17–19] More recently, growing public concern about health threats such as new and resurgent infectious diseases, community violence, and bioterrorism has given emphasis and urgency to the task of improving the nation's public health infrastructure.[20–24] Recognizing this fact, Congress passed the Public Health Improvement Act in November 2000 and, more recently, committed new federal funds for bioterrorism preparedness to help strengthen the public health infrastructure at the local, state, and national levels.

Previous efforts to measure the availability and adequacy of essential public health services at the community level have produced evidence of substantial gaps and wide variation in terms of performance. A 1993 study based on a national sample of local public health agencies showed that, on average, only 50% of 10 activities regarded as important elements of public health practice were performed by these agencies.[25] A similar study of local public health agencies in 6 states showed that in 1993 only 56% of 26 activities regarded as essential public health practices were available within the jurisdictions served by the departments.[26] A third survey involving a national sample of local agencies in 1995 revealed that only 56% of 20 activities deemed important to public health practice were performed by the average agency.[27] Because local public health agencies carry much of the responsibility for implementing state and federal public health programs, local gaps in basic public health activities may compromise the effectiveness of the nation's public health system in preventing, detecting, and controlling potential health threats.[4,5,13,16]

The adequacy of the nation's public health infrastructure cannot be determined fully without examining the contributions made by organizations other than official governmental public health agencies.[1,28–30] Studies in selected communities have suggested that medical care providers, community-based organizations, and even managed care plans are contributing to public health activities with increasing frequency and intensity.[31–39] Nonetheless, little systematic evidence exists regarding the roles that these organizations play within the nation's public health system.

This study revisited the question of local public health performance, seeking systematic evidence about who contributes to basic public health activities at the community level. We focused attention on the most populous local public health jurisdictions—those with 100 000 or more residents. We chose to examine these jurisdictions because they serve approximately 70% of the total US population and because they exhibit greater homogeneity in regard to public health resources than do smaller jurisdictions.[40] The goals of this study

were 3-fold: (1) to examine variation in the availability and perceived effectiveness of essential public health services in the nation's most populated areas, (2) to examine the types of organizations that contribute to these services, and (3) to examine the organizational and community characteristics associated with local public health performance.

METHODS

Measuring Local Public Health Performance

We measured local public health performance using an instrument developed through a series of research projects sponsored by the Public Health Practice Program Office of the US Centers for Disease Control and Prevention.[25,28,41] These projects identified activities regarded as important for maintaining and improving public health at the community level, and each activity was linked to 1 of the 3 core public health functions of assessment, policy development, and assurance as articulated by the IOM.[4] These activities were identified through expert panel meetings, literature reviews, and local health department case studies and surveys.[28,42–46] In 1995, findings from the projects were reviewed and consolidated such that a combined set of 20 public health activities were identified to serve as indicators of local public health performance.[27,47]

Activities were selected on the basis of expert opinions of their importance in improving public health and their statistical association with other summary measures of public health performance.[43,48,49] Each activity was measured with a simple yes/no question asked of the local health department director concerning whether a specific public health activity is performed in the department's jurisdiction (Table 1). Researchers surveyed a nationally representative sample of 298 local health department directors in 1995 and found agreement with the 20 activities as indicators of local public health performance.[27]

The 20 public health activities were included on a survey instrument administered to local health department directors. All of the performance measures based on these activities were self-reported by local health department directors and therefore reflected the perceptions and perspectives of the respondents. No evidence of systematic overreporting or underreporting was found for any of the measures during extensive in-person site visits conducted in the jurisdictions of 8 departments that responded to the survey during 1995.[30]

Four types of performance measures were examined in this study, all of which were developed and tested in earlier studies of local public health performance.[28,48,49] First, *availability measures* were computed from responses to each of the 20 questions asking whether the activity is performed in the jurisdiction. A second set of measures reflected the *perceived effectiveness* of each activity based on the local health director's rating on a 5-point Likert scale ranging from "meets no needs" to "fully meets needs." A third set of measures

TABLE 1—Questions Used to Measure Availability of Public Health Activities

Assessment activities

1. In your jurisdiction, is there a community needs assessment process that systematically describes the prevailing health status in the community?
2. In the past 3 years in your jurisdiction, has the local public health agency surveyed the population for behavioral risk factors?
3. In your jurisdiction, are timely investigations of adverse health events conducted on an ongoing basis—including communicable disease outbreaks and environmental health hazards?
4. Are the necessary laboratory services available to the local public health agency to support investigations of adverse health events and meet routine diagnostic and surveillance needs?
5. In your jurisdiction, has an analysis been completed of the determinants of and contributing factors to priority health needs, the adequacy of existing health resources, and the population groups most affected?
6. In the past 3 years in your jurisdiction, has the local public health agency conducted an analysis of age-specific participation in preventive and screening services?

Policy development activities

7. In your jurisdiction, is there a network of support and communication relationships that includes health-related organizations, the media, and the general public?
8. In the past year in your jurisdiction, has there been a formal attempt by the local public health agency to inform elected officials about the potential public health impact of decisions under their consideration?
9. In your local public health agency, has there been a prioritization of the community health needs that have been identified from a community needs assessment?
10. In the past 3 years in your jurisdiction, has the local public health agency implemented community health initiatives consistent with established priorities?
11. In your jurisdiction, has a community health action plan been developed with community participation to address priority community health needs?
12. In the past 3 years in your jurisdiction, has the local public health agency developed plans to allocate resources in a manner consistent with community health action plans?

Assurance activities

13. In your jurisdiction, have resources been deployed as necessary to address priority health needs identified in a community health needs assessment?
14. In the past 3 years in your jurisdiction, has the local public health agency conducted an organizational self-assessment?
15. In your jurisdiction, are age-specific priority health needs effectively addressed through the provision of or linkage to appropriate services?
16. In your jurisdiction, have there been regular evaluations of the effects of public health services on community health status?
17. In the past 3 years in your jurisdiction, has the local public health agency used professionally recognized process and outcome measures to monitor programs and to redirect resources as appropriate?
18. In your jurisdiction, is the public regularly provided with information about current health status, health care needs, positive health behaviors, and health care policy issues?
19. In the past year in your jurisdiction, has the local public health agency provided reports to the media on a regular basis?
20. In the past 3 years in your jurisdiction, has there been an instance in which the local public health agency has failed to implement a mandated program or service?

Note. Sources used in formulating questions were Turnock et al.[27] and Turnock.[47]

reflected the *local health department contribution* to each public health activity based on the director's rating, on a 5-point scale ranging from "none" to "all," of the level of total community effort contributed by the department.

Finally, we asked directors to indicate the types of organizations other than the local health department that participate in performing each activity, using a defined checklist of 11 organizational categories and an open-ended response option for "other." These responses were used to compute *participation measures* for each organization type and each public health activity. In the case of activities that explicitly referenced tasks performed by the local public health agency (e.g., activity 2 in Table 1), the contribution and participation measures captured the extent to which local agencies collaborate with other organizations in carrying out these tasks. Because 1 of the 20 public health activities examined in this study related exclusively to public health agency responsibilities (activity 20 in Table 1), we computed contribution and participation measures using only 19 public health activities.

We computed the 4 types of measures for each of the 20 public health activities individually. In addition, we combined the activity-specific measures to compute average measures of availability and perceived effectiveness for each of the 3 public health functions identified by the IOM: *assessment* (activities 1 through 6 in Table 1), *policy development* (activities 7 through 12), and *assurance* (activities 13 through 20). We also combined the 3 function measures to compute aggregate measures of availability and perceived effectiveness. The aggregate measure of availability indicated the proportion of the 20 activities performed in the jurisdiction, while the aggregate measure of perceived effectiveness indicated the average effectiveness score assigned to activities performed in the jurisdiction.

Sample Selection and Survey Methodology

The National Association of County and City Health Officials' *1997 National Profile of Local Health Departments* was used to identify the 497 health departments that reported serving jurisdictions of at least 100 000 residents during 1996–1997.[40] These organizations represent approximately 17% of all US local health departments but serve jurisdictions that contain approximately 70% of the total US population. In August 1998, a self-administered survey was mailed to the director of each department. One additional mailing, 2 postcard reminders, and 2 telephone reminders were made to nonresponding departments during a 4-month data collection period between August and November 1998.

Data Analysis

We computed descriptive statistics for each of the local public health performance measures, providing national estimates of performance in the nation's largest local health department jurisdictions. In addition, we estimated 2 multivariate ordinary least squares regression models to examine how performance varied across groups of local jurisdictions defined by observable community and institutional characteristics. The first model included as a dependent variable the proportion of the 20 public health activities performed in each jurisdiction. The dependent variable in the second model was the aggregate measure of perceived effectiveness of activities performed in each jurisdiction. The dependent variable for each regression model was transformed to the natural logarithm scale to reduce skewness and thereby improve model fit.

The independent variables used in each model are summarized in Table 2. Two of these variables, local health department staffing and educational background of department directors, were dropped from the models after preliminary analyses produced

TABLE 2—Descriptive Statistics Among Responding Local Health Departments

	Sample (n = 356)
Continuous variables	
Mean population of jurisdiction (thousands), 1996 (SD)	400 (726)
Mean percentage of population below federal poverty level, 1989 (SD)	12.3 (5.8)
Mean percentage of population non-White, 1996 (SD)	18.6 (16.8)
Mean no. of community hospital beds per 100 000 population, 1996 (SD)	395 (673)
Mean no. of active nonfederal physicians per 100 000 population, 1996 (SD)	272 (563)
Mean local health department expenditures per capita, $, 1996 (SD)	38.58 (62.70)
Categorical variables	
Type of jurisdiction, %	
County	59.8
City	9.3
Township	0.3
Multicounty	14.7
Joint city/county	12.2
Educational background of local health department director, %	
Physician (MD or DO)	32.5
Other doctoral degree (DDS, DVM, PhD, DrPH)	4.8
Nursing degree (including MSN)	7.3
Master's degree (other than MSN)	37.6
Other	17.8
Local board of health with policymaking authority, %	75.4
Type of administrative relationship between state and local health agency, %	
Centralized state authority	21.2
Decentralized local authority	21.5
Mixed state and local authority (varies by function)	32.2
Shared state and local authority (for all functions)	25.1
Types of services directly provided by department, %	
Comprehensive primary care services	30.6
Environmental health services	51.6

no evidence of association with the dependent variables and evidence of multicollinearity with other independent variables included in the models. Two other variables, population size and local health department spending, were transformed to the natural logarithmic scale to preserve a linear relationship with the dependent variables, because this specification provided a model fit that was superior to the nonlinear specifications tested (logarithmic, quadratic, and step functions).

To assess the possibility of estimation bias owing to outlier values, we reestimated models while excluding the largest 5% of observations based on population size and spending variables, and we found results consistent with the full-sample estimates. In the case of all dichotomous independent variables, we used the method suggested by Kennedy to transform semilogarithmic regression coefficients into measures of each variable's relative effect on the dependent variable.[50] We computed the standard errors for all regression coefficients using the Huber–White covariance matrix to correct for correlations among observations taken from the same state.[51,52]

RESULTS

We received usable responses from 356 departments out of 497 departments, representing a 71% response rate. Analyses (*t* tests) confirmed that no statistically significant differences (at the $P<.05$ threshold) existed between responding and nonresponding departments according to population size of jurisdiction, ethnic composition of jurisdiction, departmental full-time-equivalent staffing, or annual departmental expenditures. Chi-square tests indicated that response rates did not vary significantly (at the $P<0.05$ threshold) by type of jurisdiction (city, county, or multicounty) or by educational background of the respondent (physician, nonphysician graduate degree, other). We therefore concluded that our 29% nonresponse rate was unlikely to have been a substantial source of bias in our results.

Descriptive characteristics for the responding public health agencies are presented in Table 2. One third of the department directors were physicians, 7% were nurses, and most of the remaining directors held master's degrees in other disciplines. Most departments were organized as units of county government, with fewer than 10% of the organizations operating as city or township agencies. Departmental budgets for fiscal year 1996 averaged almost $39 per capita, and department staffing averaged 60 full-time-equivalent positions. Most departments operated under the authority of a local board of health composed of community representatives, health professionals, or elected officials.

One fifth of the departments functioned as centralized units of a state health agency, while another 22% operated as fully decentralized agencies under local governmental control. In the remainder of the departments, administrative control was either shared by state and local governments through intergovernmental agreements or divided between state and local governments on the basis of functional areas/geographic regions (a "mixed" authority relationship).[53] Fewer than one third of the departments were responsible for directly providing comprehensive primary care services such as routine medical care for underserved children and adults, while more than half of the departments were responsible for providing a full range of environmental health services, including monitoring of water quality, food safety, and environmental toxins.

Availability and Perceived Effectiveness Measures

The availability and perceived effectiveness of public health activities varied considerably across local communities. On average, two thirds of the 20 public health activities were performed in the local public health jurisdictions surveyed. Three quarters of the local health department directors reported that 10 or more of the 20 activities were performed in their jurisdictions, but fewer than 10% reported that 18 or more activities were performed. The activity types most likely to be available in these jurisdictions included investigation of adverse health events (99% of jurisdictions), provision of laboratory services (96%), implementation of mandated public health programs and services (91%), and implementation of programs in response to priority health needs (82%) (Table 3).

In contrast, the activities least likely to be performed included evaluations of the effects of public health services on community health status (35%), analyses of participation in preventive and screening services (28%), and resource allocation planning based on priority health needs (26%). When we grouped public health activities into 1 of the 3 core functions identified by the IOM, we found, on average, only slight differences in availability.

Perceptions regarding the effectiveness of public health activities varied widely across communities and appeared to cluster at lower ranges of the distribution. On average, local health directors rated the effectiveness of their jurisdiction's public health activities at 35% of the maximum possible score that would be obtained if all activities were performed at levels fully meeting community needs (Table 3). Only 2 of the activities examined in this study had an average effectiveness score of at least 50%, indicating that the activity meets at least half of the community need on average. These 2 activities—investigation of adverse health events and access to laboratory services—also were reported to be the most widely available activities in the jurisdictions surveyed.

Other activities had relatively low ratings in terms of perceived effectiveness despite being available in more than three quarters of the jurisdictions surveyed. These activities included providing health information to the public (33%); addressing health needs through service provision or linkage to services (36%); and developing support and communication networks among health-related organizations, the media, and the public (42%). Effectiveness ratings appeared to be somewhat higher for assessment activities and assurance activities than for policy development activities ($P<.05$).

Perceived Contribution and Participation Measures

Local health department directors reported that their agencies were directly responsible for contributing an average of 67% of the total effort devoted to the 20 public health activities in their jurisdictions (Table 3). This result indicated that the remaining one third of the community public health effort was contributed by organizations other than the local health department. The average local health department contribution was higher in the case of assurance activities (80%) than in the case of assessment and policy develop-

TABLE 3–Performance of 20 Public Health Activities in the Nation's Most Populous Public Health Jurisdictions

Activity (Ordered by Availability)	Availability (% of Jurisdictions)	Perceived Effectiveness (Mean Score on 0–100 Scale)	Perceived Contribution by Local Health Department (Mean Score on 0–100 Scale)
Investigation of adverse health events (3)	98.6	75.1	75.7
Access to laboratory services (4)	96.3	72.9	49.5
Mandated programs/service implementation (20)	91.4	91.4	. . .
Implementation of public health initiatives (10)	81.9	34.7	58.0
Information provision for elected officials (8)	80.9	37.7	73.8
Support and communication networks (7)	78.8	42.3	46.2
Provision of/linkage to health services (15)	75.6	35.9	47.9
Public information dissemination (18)	75.4	32.5	58.7
Media information dissemination (19)	75.2	39.5	76.8
Community health needs assessment (1)	71.5	35.3	54.5
Prioritization of health needs (9)	66.1	33.8	57.6
Analysis of health determinants (5)	61.3	29.4	52.8
Self-assessment of local health department (14)	56.3	31.3	87.6
Resource deployment for priority needs (13)	48.6	18.4	50.1
Use of process/outcome measures (17)	47.3	21.6	70.9
Behavioral risk factor surveillance (2)	45.8	21.0	51.0
Community action planning (11)	41.5	16.2	49.6
Evaluation of public health services (16)	34.7	15.9	67.8
Analysis of preventive service use (6)	28.4	12.1	59.3
Planning for resource allocation (12)	26.2	10.5	57.1
Average: assessment activities (1–6)	66.7	40.8	59.9
Average: policy development activities (7–12)	60.2	27.5	57.7
Average: assurance activities (13–20)	64.4	37.7	80.0
Average: all activities	63.8	35.4	67.1

Note. Numbers in parentheses represent the question numbers from Table 1.

ment activities (60% and 58%, respectively). The average local health department contribution to specific public health activities ranged from a high of 87% for conducting organizational self-assessments to a low of 46% for maintaining support and communication networks among health organizations, the media, and the public.

In most jurisdictions, a mix of state and local governmental agencies, medical care providers, and nonprofit community organizations contributed to performing public health activities along with the local public health agency. Participation by federal agencies, managed care plans, and community health centers appeared to be considerably less common (taking place in 44%, 45%, and 47% of jurisdictions, respectively), although community health center participation was much higher in the subset of jurisdictions that had centers located within their boundaries (75% of jurisdictions).

Hospitals and state government agencies appeared to participate in the largest scope of public health activities on average (37% of the 20 activities), followed by local government agencies and community nonprofit organizations (32%). The most limited scope of participation was reported for federal agencies and managed care plans. In the case of most types of organizations, participation in policy development activities was reported to be somewhat more frequent than participation in assessment and assurance activities.

Correlates of Performance

Results derived from multivariate regression models indicated that the availability and perceived effectiveness of activities performed in local jurisdictions varied significantly according to several community and institutional characteristics (Table 4). Proportions of public health activities performed were significantly higher in communities with larger populations, lower poverty rates, and higher per capita local health department expenditures ($P<.05$). For example, the regression coefficient estimate of 0.07 for the logged expenditure variable indicated that a 10% increase in local health department spending per capita was associated with a 0.7% increase in the proportion of activities performed, after other variables in the model had been taken into account.

Results also indicated that approximately 13% fewer public health activities were performed in jurisdictions with centralized state–local health agency relationships than in jurisdictions with shared or mixed state–local relationships. In addition, approximately 10% more activities were performed in jurisdictions with policymaking boards of health than in jurisdictions without these bodies ($P<.05$).

The perceived effectiveness of public health activities varied significantly according to community poverty rates, racial composition, and presence of local boards of health (Table 4). Coefficient estimates indicated that a 10-percentage-point decrease in the community poverty rate was associated with a 1% increase in the perceived effectiveness score. Moreover, this score was 14% higher in communities with policymaking boards of health than in communities without them.

Perceived effectiveness also appeared to be positively associated with local health department spending, but this finding was statistically significant only at the $P<.10$ level. Other community and institutional characteristics—including measures of hospital and physician resources, type of governmental jurisdiction, and types of categorical services offered by the local health department—were not significant predictors of the availability or perceived effectiveness of public health activities after other model variables were taken into account.

DISCUSSION

The availability and perceived effectiveness of public health activities appear far from ideal within the communities in which most Americans reside. On average, one third of

TABLE 4—Regression Estimates for Characteristics Associated With the Availability and Perceived Effectiveness of Public Health Activities

Characteristic	Availability of Activities[a]			Perceived Effectiveness of Activities[a]		
	Coefficient	SE	Relative Effect[b]	Coefficient	SE	Relative Effect[b]
Population size (log)	0.0606	0.0298**		0.0539	0.0346	
Population density (per square mile)	–0.0000389	0.0000378		–0.0000227	0.0000438	
Percentage of population below poverty level	–0.1088	0.0372***		–0.0989	0.0431**	
Percentage of population non-White	–0.00214	0.00146		–0.00347	0.00169**	
Hospital beds per 100 000 residents	0.0000067	0.0000283		0.0000201	0.0000328	
Physicians per 100 000 residents	0.00096	0.00330		0.00098	0.00382	
Local health department spending per capita (log)	0.0672	0.0254***		0.0559	0.0294*	
State–local administrative relationship (0, 1)						
Centralized authority	–0.1377	0.0609**	–0.130	–0.1144	0.0705	–0.110
Decentralized authority	–0.0326	0.0506	–0.0333	–0.0244	0.0587	–0.0258
Reference: shared or mixed authority						
Type of governmental jurisdiction (0, 1)						
County or joint city/county	0.0207	0.0564	0.0193	0.0243	0.0653	0.0224
City or township	0.0954	0.0909	0.0955	0.115	0.107	0.116
Reference: multicounty or regional						
Local board of health with policy authority (0, 1)	0.0945	0.0445**	0.0980	0.136	0.0518***	0.144
Categorical services offered by health department (0, 1)						
Comprehensive primary care services	0.0234	0.0392	0.0229	0.0666	0.0455	0.0678
Environmental health services	–0.0243	0.0450	–0.0250	–0.0252	0.0523	–0.0262
Intercept	2.765	0.393***		2.281	0.456***	
Adjusted R^2	0.17			0.14		
No.	352			352		

[a]The dependent variable for each regression equation was transformed via the natural logarithm to reduce skewness and the influence of outlier values.
[b]For each dichotomous variable, the coefficient estimate was transformed into a relative effect indicating the percentage change in the dependent variable associated with a change in the dichotomous variable from 0 to 1. The transformation method provided by Kennedy was used for this purpose.[50]
*P < .10; **P < .05; ***P < .01.

the 20 activities considered to be basic elements of local public health practice were not performed in the jurisdictions surveyed. Of the activities that were performed, most were rated only partially effective in meeting the existing community need. Among the activities least likely to be available in local jurisdictions were those that have been argued as essential features of a responsive and effective public health system, such as allocating public health resources in ways that are consistent with priority health needs, analyzing the implementation of recommended preventive and screening services, and evaluating the effects of public health services on community health status.[1] Together, these findings suggest that many of the nation's largest local public health systems have relatively limited capacities for ensuring that available public health resources are being used most effectively and efficiently to improve community health.

Two public health activities that are essential for addressing emerging public health threats such as bioterrorism and new and resurgent infectious diseases—investigation of adverse health events and provision of laboratory services—were found to be widely available and were rated as highly effective in the jurisdictions studied. These results suggest that most local health officials believe their jurisdictions are relatively well positioned for detecting new public health threats. However, it is important to recognize that these responses were obtained before the discovery and investigation of anthrax exposure cases in October 2001, events that may have led many health officials to reconsider the adequacy of their investigative capacities.

Moreover, health officials expressed much less confidence about the effectiveness of other activities likely to be essential for responding to emerging public health threats. These activities include support and communication networks among health-related organizations to enable a coordinated response to new threats, the capacity to deploy and redirect public health resources as necessary to address newly emerging health needs, and the capacity to inform the public about health issues and risks. Gaps in the performance of these activities raise troubling questions about the ability of the nation's local public health infrastructure to respond swiftly and effectively to emerging health threats such as bioterrorism.

Evidence of wide variation and substantial gaps in public health capacity within the nation's largest population centers lends urgency to the call for improvements in the public health system. Findings from this study suggest several promising approaches for local public health improvement. First, we found that many organizations other than the local health department make significant con-

tributions to the local public health effort, suggesting that successful improvement strategies should target the full complement of organizations that currently contribute to, or can potentially contribute to, public health activities.[54] We found that in most communities these organizations participate in a relatively narrow scope of activities, suggesting that there are untapped opportunities for collaboration—especially in regard to activities that go beyond planning and policy development efforts. At the same time, we found evidence that local health departments provide large and often dominant shares of their community's total public health effort, indicating that improvement efforts must also focus on building and maintaining a strong and effective local governmental presence within public health delivery systems.

Second, findings from multivariate analyses suggested that strategies for improving public health infrastructure should consider the economic and institutional structures that shape local public health endeavors. In particular, we found evidence that local public health spending levels, governing boards, and state–local administrative relationships are all associated with the availability or perceived effectiveness of public health activities. These findings suggest a need for policymakers to examine the adequacy of funding streams and administrative structures for local public health systems, especially now that new federal funds are becoming available for upgrading state and local public health jurisdictions' preparedness for bioterrorism and other public health threats.[55] In making use of these additional resources, policymakers should consider the types of public health activities that are currently underfunded and underperformed in local jurisdictions, along with the administrative relationships and governance structures needed to support effective public health decisionmaking and response at the local level.

Third, our findings suggest that public health improvement strategies should focus special attention on communities at elevated risk of being underserved by public health activities. Similar to the results of studies of medically underserved areas, our results indicate that less populous communities, those with higher poverty rates, and those with larger minority populations are most vulnerable to underservice. Additional work is needed to elucidate the factors contributing to underservice within these communities, which may include a lack of available organizations to contribute to public health activities,[56,57] economies of scale in the performance of activities, and competing health and social service needs that draw resources away from activities. Because this study did not include public health jurisdictions with fewer than 100 000 residents, our findings may understate the degree to which smaller communities are underserved by public health activities.

The results of this study should be interpreted carefully in view of several important limitations. First, our findings cannot be generalized beyond the surveyed population of large local health department jurisdictions with at least 100 000 residents. Although these jurisdictions contain approximately 70% of the total US population, they represent only about 20% of the total number of local public health jurisdictions.[58]

Second, although the 20 public health activities examined were identified by experts as important basic elements of local public health practice, they do not represent a comprehensive and exhaustive set of activities required for effective local public health systems. As a result, our findings cannot be generalized beyond the 20 public health activities studied, and some of our evidence may overemphasize or underemphasize selected types of public health activities. In particular, the aggregate measures of availability and perceived effectiveness examined in this study assigned considerable weight to planning and policy development functions while omitting other potentially important tasks such as enforcement of public health laws and regulations and assurance of a competent public health workforce.

Third, the public health performance measures included in our study did not capture possible variations in public health performance levels within local jurisdictions. Consequently, we may have overstated the availability of public health activities if some of the activities reported as taking place were performed only in certain parts of a jurisdiction.

Because this study took place before the terrorist events of 2001, it provides a useful baseline for future research examining whether and how the nation's public health infrastructure has evolved since that time. The study's findings and its limitations highlight the need for additional efforts to define, measure, and improve core elements of public health practice, such as the activities now under way as part of the Centers for Disease Control and Prevention's National Public Health Performance Standards Program.[59] This and related efforts promise to stimulate additional research aimed at identifying gaps in the nation's public health infrastructure and providing insight into how best to strengthen this infrastructure. Only through such activities can we develop the evidence base needed by local public health organizations to fulfill their role as the nation's first line of defense against and response to emerging health threats. ■

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G.P. Mays designed and conducted the data analysis and led the interpretation of findings and the writing of the article. P.K. Halverson conceived the study and participated in interpreting findings and writing the article. E.L. Baker, R. Stevens, and J.J. Vann participated in interpreting findings and in revising the article.

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Human Participant Protection

This study was approved by the institutional review board of the University of North Carolina School of Public Health, and all participants consented to completing the survey.

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