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TECHNICAL REPORT

Organizing State and Local Health Departments for Public Health Preparedness

Jeffrey Wasserman, Peter Jacobson, Nicole Lurie,
Christopher Nelson, Karen Ricci, Molly Shea,
James Zazzali, Martha I. Nelson

Prepared for the U.S. Department of Health and Human Services



Center for Domestic and
International Health Security

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Published 2006 by the RAND Corporation
1776 Main Street, P.O. Box 2138, Santa Monica, CA 90407-2138
1200 South Hayes Street, Arlington, VA 22202-5050
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PREFACE

Improving the ability to respond to bioterrorism and other emergencies is an important challenge facing the U.S. public health system. Even with a knowledgeable workforce, practice and experience, capacity, and partnerships with other responders in the community, the system's ability to respond may depend largely on its structure. This study examines a key question: Are state and local public health agencies related to one another in a way that facilitates emergency response?

Our specific objectives are to explain the factors influencing the particular ways in which state and local public health systems are organized, how state and local public health departments have arrived at the various types of relationships that exist between them, and, most important, the consequences of such structures and relationships for emergency preparedness. We also examine alternative structures from several different types of service industries (public education, banking, the welfare system, and port authorities). Finally, we recommend concrete strategies to improve public health preparedness.

This report will be of interest to policymakers and to public health professionals at the state and local levels who are involved in bioterrorism response and emergency preparedness, as well as to other agencies involved in emergency response.

This work was carried out from the beginning of October 2004 through October 2005. This report was prepared specifically for the Office of Public Health Emergency Preparedness, but it should also be of interest to individuals working in public health preparedness at the federal, state, and local levels.

This work was prepared for the U.S. Department of Health and Human Services Office of Public Health Emergency Preparedness (OPHEP) and was carried out within the RAND Health Center for Domestic and International Health Security. RAND Health is a

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SUMMARY

The organization of the United States' governmental public health system varies dramatically across federal, state, and local levels. The federal government provides funding and support, but it delegates authority to the states to organize and deliver public health services (in accordance with the Constitution). Every state has an agency that is responsible for public health, but the structures of those agencies vary. In some states, the public health agency is a freestanding agency, functioning on its own; in other states, public health is part of a health and human services department, known as an umbrella organization.

Relationships between the state agency and local health departments also vary. Some states have a centralized organizational structure, in which the state agency has direct control over local public health services. Other states are decentralized, giving local health departments considerable discretion over decisionmaking and service delivery. Still others have mixed, or shared, authority. A 1998 National Association of County and City Health Officials (NACCHO) survey found that 13 states are centralized, 26 states are decentralized, and 11 states are mixed (NACCHO, 1998). Local health departments, again, vary widely in terms of their jurisdictional size and responsibilities. Some local health departments have jurisdiction over a city or individual county; others are more regionalized, with jurisdiction over multicounty blocs (ASTHO, 2004; Wall, 1998).

The menus of services provided by public health are equally diverse. Services are both population-based (e.g., environmental health services, screening, disease surveillance, health promotion, health education, and emergency response), and individualized (e.g., clinics for uninsured patients and maternal and child health care).

Since September 11, 2001 (9/11), bioterrorism preparedness has been a key focus of public health. Following the terrorist attacks and subsequent anthrax attacks, Congress passed an emergency supplemental appropriation that included \$900 million for

bioterrorism preparedness. The funding for preparedness has continued from 2002 through fiscal year 2006, with approximately \$1 billion per year allocated to state and local health departments—an unprecedented infusion of federal money into public health infrastructure development.

This study assesses whether there is a link between how state and local public health departments are organized and the level of their emergency preparedness. In particular, we examine organizational variations (i.e., differences in structure and function) of state and local public health departments and the relationships between state and local agencies. Additionally, we identify alternative governance structures and strategies from other sectors that could be applied to meeting public health preparedness goals and improving preparedness outcomes.

WORK INCLUDED STATISTICAL ANALYSES, CASE STUDIES, AND CROSS-INDUSTRY COMPARISONS

Our study methodology consists of three integrated tasks. First, we used multivariate statistical techniques to model the effects of various organizational structural characteristics on public health preparedness. Second, we conducted a series of comparative case studies to investigate how the structure of public health systems affects public health preparedness. Third, we conducted a comparison of current governance structures used in other sectors (such as port authorities) and strategies (such as regionalization) that may offer ways to improve the delivery of public health.

In addition to the three tasks outlined above, we interviewed key national, state, and local policymakers and stakeholders (both public and private) to ascertain participants' views of how the public health system can best meet preparedness goals.

FINDINGS

Statistical Analysis Found Relatively Little Relationship between Structure and Preparedness

Our analyses indicated that organizational structure, as measured by the degree of centralization, had little effect on states' levels of public health preparedness. In fact, analyses of variance models suggest that whether a state is centralized, decentralized, or mixed explains almost none of the observed state-to-state variation in the preparedness indices used in our analysis.

The analysis yielded similar findings for whether the state health department is freestanding or part of a larger umbrella agency. States with umbrella agencies reported slightly higher task-completion rates. However, once again, the differences are small relative to the amount of overall state-to-state variation.

Finally, regionalization does not explain the variations in self-reported preparedness among the states (and any differences across the groups were dwarfed by within-group variation).

We also considered the possibility that the effect of any one element of public structure might depend on other elements. For example, is centralization an effective organizational structure if it is accompanied by formal regionalization arrangements? Tentatively, the answer is yes. We found that centralized systems are associated with the lowest preparedness levels in nonregionalized states but the highest preparedness levels in regionalized states.

The Case Studies Revealed Some Common Themes

Public health's changing role in emergency preparedness has required reorganization. The national focus on bioterrorism and emergency preparedness since 9/11 and the subsequent influx of emergency preparedness funds have dramatically affected state and local public health departments. Although the increased funds were welcome, many health departments found themselves without the organizational infrastructure or constrained by overarching government policies (such as hiring freezes and bureaucratic barriers, etc.) to adequately manage and disburse the funds to both “traditional” public health functions, such as responding to infectious disease outbreaks, enforcing sanitary codes, and monitoring public water supplies, as well as “new” public health functions, such as bioterrorism preparedness. In all of the health departments we visited, some degree of restructuring was necessary, including creation of new positions, new programs, and/or new departments. However, tension between the traditional and new public health functions is widespread. Many feel that the focus on preparedness has diverted needed staff and other resources away from traditional public health activities.

Conflicts between state and local health departments are common.

Regardless of whether a state is centralized or decentralized, there are often conflicts over the respective roles of state and local departments. While there is general agreement that “all health is local in terms of immediate response” and that local health officials must have the basic skills to screen and triage, many state officials feel that certain types of expertise (such as outbreak management) reside at the state level. In some cases, these differences have impeded the ability to agree on an appropriate course of action.

Public health is a newcomer to emergency management. The influx of federal funds and new public health preparedness mandates has thrust public health into a more central role in statewide emergency response efforts. Respondents generally agreed that, since the events of 9/11 and the anthrax attacks, there is far greater involvement of public health at the local level as well. Some reported that, in the past, public health typically did not interact with law enforcement, firefighters, or other first responders. With the

funding influx and its associated requirements for building community-level relationships, interagency cooperation is growing. However, the quest for an equal seat at the table continues to be a difficult process.

Coordination with hospitals is improving. Hospitals are major stakeholders in local emergency preparedness activities. The relationship between hospitals and public health departments varies tremendously, but, generally, the relationships have been strengthened significantly by the Centers for Disease Control and Prevention (CDC) and the Health Resources and Services Administration (HRSA) requirements that public health departments and hospitals work with other members of the community on emergency preparedness activities. These activities have taken various forms. State and regional hospital associations and regional steering committees have proven successful in integrating hospital and public health preparedness activities (see Davis et al., 2006).

Barriers to improving preparedness. Common themes across many sites included the following:

- **Staff shortages.** Staffing for preparedness can “rob” needed staff of performing more-traditional public health activities. In addition, some staffing issues were due to turnover: Some state agencies’ inability to hire staff or fill vacancies is a result of state-level hiring freezes and overly burdensome bureaucratic processes that contribute to delays in disbursing federal grant monies for preparedness.
- **Inadequate training.** For some, the concept of Incident Command Structure and the new reality of public health’s first-responder role are foreign. Institutionalizing these concepts requires ongoing training.
- **Poor communication** within health departments, as well as between local and state health departments, is a barrier to organizational change. In some cases, communication problems were primarily the result of poor leadership; in others, they were due to lack of adequate funding.
- **Bureaucratic impediments**, especially at the state level, and politics at both the local and state levels can retard organizational change. In one decentralized state,

limited financial resources at the local level were a major barrier to state-wide change. Limited staff time and turf issues -“who’s in charge?”- can present additional barriers.

Facilitators of organizational change.

- **Funding** was most often identified as the main facilitator of organizational change at the state level. Without the increases in funding to state health departments, organizational change necessary to meet the requirements of the CDC Cooperative Agreements would not be possible. One of these requirements is that states show that they have a regional response structure in place. For some highly decentralized states, creating a regionalized structure is challenging. However, control over the funding allows the state health department to require local health departments to implement changes as a condition of receiving state funds.
- **Skilled leadership and good communication** facilitate organizational change, especially within health departments. Good leadership often takes the form of aggressive training programs for employees.
- **Regional alliances**, community work groups, or coalitions that were originally formed to achieve other goals (such as economies of scale, coordination of activities within a region, and sharing of information) can facilitate organizational change by encouraging both formal and informal communication and coordination.

Applicability to Public Health of Formal Organizational Structures Used in Other Sectors

Our review of organizational structures used in other sectors also yielded information on some of the formal structural characteristics that we examined in the quantitative analysis and in the case studies: degree of centralization and the regionalization of services.

Centralization-Decentralization. Our cross-sectoral analysis cannot speak specifically to the level of centralization or decentralization that is desirable for public health, but it is clear that the optimal level of centralization will be contingent upon the nature of the particular public health function or task. Our review of the public health literature did not reveal any extant criteria about which public health preparedness tasks might be centralized as opposed to those that should be decentralized and, as indicated previously, our empirical analysis did not provide any guidance in this regard.

Consistent with the case-study interviews, the cross-sectoral analysis suggests that decentralized structures are feasible for those activities based on community-specific needs that might not benefit from economies of scale. But centralization remains salient for certain functions. In education, centralized authority is required for developing standards that all students must meet to fulfill education's function of providing societal benefits. In public health, laboratories or epidemiological services that are specialized and applicable across a state should have centralized control because of their wide benefits. Even so, the risk-communication function in public health preparedness contains elements of both structures.

Regionalization. Regionalization of public health services is an idea generating considerable attention. Researchers have proposed that public health services might be more effectively and efficiently delivered on a regional basis, merging counties or states into geographic regions linked by similar health status, economic, or geographic characteristics. For example, the Mississippi Delta region might be more effectively served through a regional public health authority, rather than by county-level or state-level agencies (Mays and Halverson, 2005). Our cross-sectoral analysis suggests that regionalization of public health services might be incorporated, but that this approach must be directly linked to the public health objectives. Both Michigan and Wisconsin have imposed regional bioterrorism preparedness structures on existing local functions. Because the case studies were not designed to evaluate regionalization, our results are only suggestive that regionalization might be a useful structural mechanism.

Private-Sector Approaches. Local health departments frequently contract out public health services to for-profit companies in efforts to meet public health goals (Keane, Marx, and Ricci, 2001). Each of the four systems in our cross-sectoral analysis has been trying to determine the “right” degree of public versus private responsibility over ownership, service delivery, monitoring, and policy development. This approach requires the governmental partner to conduct smart, aggressive management.

In education, contracting out services that do not have a direct relationship to public education’s mission or values (such as cafeteria, janitorial, and transportation services) is relatively uncontroversial. But privatization of services related to education’s core function, such as vouchers and for-profit management, is much more controversial. The analogous challenge for public health is to articulate what the basic functions are that the public sector must maintain, either for ethical or pragmatic reasons, and what services might be contracted to private organizations.

Limitations

Our analyses are subject to a number of important limitations, which should be kept in mind when interpreting our findings and considering our policy recommendations. With respect to the multivariate analysis, the measures of preparedness employed are limited for a variety of reasons, not the least of which is that there is no agreed-upon definition of *preparedness*. Moreover, there are serious questions about the extent to which the self-reported data used to construct the preparedness indices represent valid indicators of capacity to actually mount a successful response.

A second limitation is that our measures of public health structure include only *formal* and institutional manifestations of structure. It is well known that the actual operation of institutions depends on a host of informal norms, relationships, and practices that are not represented in our analysis. As noted above, we speculate that regionalization might be a proxy for informal networks, but this speculation is just that.

Another important limitation is that structure may be endogenous. That is, it is possible that a given state may have adopted a more centralized organizational structure if it had reason to doubt the ability of local health departments to mount an effective response or because of the political history of the state (which may be unrelated to the historical development of public health within a given state).

The case-study analysis is also subject to a number of important limitations. First, although we attempted to select sites for study that are broadly representative of all CDC public health preparedness grantees (or awardees), we have no way of knowing whether we were successful in this regard. As a result, we cannot claim in any rigorous sense that our findings and policy implications are applicable to all grantees. Second, in conducting the site visits, we attempted to obtain multiple points of views and to synthesize what we heard to arrive at a reasonable portrait of how events unfolded, strategies were considered, and solutions implemented. But we have not subjected our syntheses to any formal validity and reliability testing, mainly for practical purposes. Finally, our case-study results are driven largely by the degree to which interviewees were candid in their responses to our questions.

Our review of alternative governance structures and strategies contains many of the limitations found in other studies. For instance, despite our efforts and intentions, we cannot claim that we have captured and analyzed all of the relevant literature. Second, it is entirely possible that other sectors may have provided important insights for public health, but budget and other constraints precluded us from casting too wide a net. Finally, we chose to organize our review by sector, as opposed to by practice (e.g., privatization), reasoning that doing so would provide a preferred context for analyzing our results. This decision, however, compromised our ability to use more formal analytic techniques, such as meta-analysis, for presenting the lessons learned from the relevant literature.

FINAL THOUGHTS

Overall, we are optimistic about the prospects for meaningful organizational reform of the public health system. The increased funding that public health has experienced as a result of 9/11 and the anthrax scares, coupled with a widespread recognition at the state and local levels of the importance of mounting an effective public health response to a wide range of emergencies, presents significant opportunities for change.

Our analyses, however, failed to reveal any panaceas or magic bullets. But, taken together, they tell us that the time is right for an extended dialogue that includes federal, state, and local public health officials regarding, essentially, *who* should do *what*. Our case-study results demonstrate convincingly that policymakers should refrain from imposing a one-size-fits-all approach and recognize that risks, infrastructure, and capabilities vary, and will continue to vary, among and within states. At the same time, efforts must be made to determine how public health systems can provide equal levels of protection to their jurisdictions' populations. Finally, policymakers need to harmonize public health preparedness measures across federal agencies, including CDC, HRSA, and the Department of Homeland Security (DHS), and arrive at a consensus regarding which governmental entities will be held accountable for developing and maintaining relevant public health preparedness capabilities, and at what level.

ACKNOWLEDGMENTS

The authors wish to thank the many state and local public health officials who contributed their time to helping us develop a deeper understanding of public health organizational structure and its relationship to preparedness. We greatly appreciate the assistance of Amanda Spendlove for help in preparing this manuscript. We also thank Pamela Russo and Yee-Wei Lim for their critical review of the report. And we are especially grateful for the support, feedback, and insights provided by project officer Lara Lamprecht.

CHAPTER ONE. INTRODUCTION

After years of neglect, the U.S. public health system is at a crossroads. Accustomed to living in relative anonymity, public health officials have been thrust into the limelight as the nation collectively confronts a wide range of new and dangerous threats to its well-being, especially bioterrorism and, more recently, natural disasters. The public health system provides multiple services, with the overarching goal of improving population health, including population-based services (i.e., environmental health services, screening, disease surveillance, and emergency preparedness) and individualized health services (including clinics for uninsured patients and maternal and child health care). By *public health system*, we are referring to the federal, state, and local governmental apparatus designed to assess and respond to threats to the public's health and to provide the core functions of surveillance, policy development, and assurances (Institute of Medicine [IOM], 1988).

The 2003 Institute of Medicine report *The Future of the Public's Health in the 21st Century* describes a multisectoral arrangement to deliver public health, involving six collaborative partners: the governmental public health infrastructure, communities, the health care delivery system, employers and businesses, the media, and academia (IOM, 2003). In reality, however, the public health infrastructure is largely governmental, and every state has a health agency responsible for public health. Local public health departments (LHDs) function in cities, counties, and multicounty or regional blocs to deliver population health and personal health services to the local population.

True to the IOM's vision of public health comprising multiple sectors, alternative organizational structures for public health have been suggested over the past decades. Public-private partnerships, including partnerships between public health agencies and managed care organizations, have been implemented and promoted over the past ten years. The Turning Point Program, an initiative of the Robert Wood Johnson Foundation and the Kellogg Foundation, has created a network of public-private collaborations in 23

states and 41 community-level organizations with the goal of transforming and strengthening the public health system (see <http://www.turningpointprogram.org>). In addition, there is a national network - the National Network of Public Health Institutes - (<http://www.nnphi.org/>) that supplements and complements the governmental public health infrastructure in 25 states.

There is great variation in how public health systems are organized across states. Although the federal government retains authority to protect the country's health and welfare, primary responsibility for protecting the public's health resides largely at the state level. The federal government delegates authority to the states to organize and deliver public health services. Every state has an agency designated as responsible for public health. In some states, this is a freestanding agency, an agency that functions on its own; in other states, public health is part of a state's health and human services department (known as an umbrella organization). States are evenly divided into umbrella and freestanding state organizations (ASTHO [Association of State and Territorial Health Officials], 2004).

Relationships between the state agency and local health departments (LHDs) also vary across states. Some states have a more centralized organizational structure, with the state agency having direct control over the state's local public health services; others are decentralized in their organization, giving local health departments more discretion over decisionmaking and service delivery. A 1998 National Association of County and City Health Officials (NACCHO) survey of state-local health department liaisons characterized states by their level of centralization as centralized, decentralized, or mixed/shared authority (NACCHO, 1998). By this typology, which is currently in the process of being modified, 13 states are centralized, 26 states are decentralized, and 11 states are mixed (the District of Columbia was not characterized). LHDs also vary in their jurisdictional size and responsibilities. Some LHDs have jurisdiction over cities or individual counties; others are more regionalized and have jurisdiction over multicounty

blocs within states (Association of State and Territorial Health Officials [ASTHO], 2004; Wall, 1998).

In several important respects, the public health system, generally speaking, resembles what the private health services delivery system looked like 20 to 30 years ago, when there were enormous variation in the quantity and quality of care delivered to patients with similar clinical conditions and few mechanisms to hold providers accountable for both the costs of care and patient outcomes. Currently, there is considerable variation across state and local health departments in meeting preparedness objectives, and accountability challenges persist at all levels of government. These challenges are exacerbated by the lack of evidence-based measures of public health system performance in general and of public health preparedness in particular. Moreover, the lack of evidence-based research on such systems means that there is limited consensus on how state and local health departments might optimally be organized with respect to public health preparedness and on how the relationships between such departments should be structured.

Improving our understanding of how the public health system should be organized is important because the system's organizational structure (i.e., whether freestanding or part of an umbrella organization, whether centralized, decentralized, or mixed) may explain differences in public health preparedness outcomes. How the system is structured influences practitioners' abilities to respond and the system's capacity to adapt to changing circumstances. In view of the scarce resources policymakers have allocated for public health, it is essential to have a structure in place that most appropriately and efficiently responds to preparedness needs - especially at a time when the public health system is expected to incorporate multiple mandates.

BIOTERRORISM FUNDS AND PUBLIC HEALTH

Following the September 11, 2001, attacks and subsequent anthrax attacks, Congress passed an emergency supplemental appropriation that included \$900 million for

bioterrorism preparedness, to be distributed by the Centers for Disease Control and Prevention (CDC). Beginning in 2002, a program of Cooperative Agreements was made available to state and four local health departments (the funding sent to the state is intended to be applied to local areas as well) to help strengthen capacity to respond to bioterrorism and other public health emergencies. The funding for bioterrorism preparedness has continued from 2002 through fiscal year 2006, with approximately \$1 billion per year allocated to state and local health departments.

In May 2005, U.S. Department of Health and Human Services (HHS) Secretary Michael Leavitt announced that HHS disbursed another \$1.3 billion to continue bolstering emergency preparedness levels around the United States. The 50 states and eligible territories received funding through two separate but interrelated cooperative agreements. CDC provided \$862.8 million for strengthening public health preparedness to address bioterrorism, outbreaks of infectious diseases, and public health emergencies. The Health Resources and Services Administration (HRSA) provided \$471 million for states to develop hospital surge capacity to deal with mass-casualty events. These funding streams represent an unprecedented infusion of money into the development of public health infrastructure and hold the promise of making a significant contribution to transforming the system's efficiency and effectiveness.

PURPOSE OF STUDY AND SPECIFIC OBJECTIVES

In light of the new infusion of funds for bioterrorism preparedness and the considerable variation that exists across states and localities with respect to public health organization, we examined the relationship between public health structure and preparedness. The findings of our investigation might inform decisions about how states and localities structure their public health emergency preparedness activities. Our specific objectives are to explain the factors influencing how and why states organize their public health systems in particular ways and how they have arrived at the various types of relationships that exist between state and local public health departments. We also analyze alternatives to the status-quo structure of public health. In particular, we

address variation in the organization (i.e., the structure and function) of state and local public health departments and the governance relationships (i.e., authorities, funding, decisionmaking, among others) between these departments. Finally, we identify strategies for improving public health preparedness outcomes.

As described in Chapter Two, we used a multipronged approach to address the study's objectives. We used the following research questions to guide our work:

- What are the key organizational factors in explaining public health preparedness outcomes? What key trends have been observed since 2001?
- Why have states chosen to organize their public health preparedness efforts in particular ways?
- How can the public health system be restructured to achieve improvements in public health preparedness outcomes?
- What specific roles should federal, state, and local governments play?
- What lessons can be learned from other sectors?
- Do any states and/or localities offer promising models for organizing public health preparedness functions?
- Are there critical differences in the ways in which public health preparedness and other public health functions are (or should) be organized?

The remainder of this report is organized as follows. Chapter Two describes our analytic approach, including a detailed discussion of our qualitative and quantitative research methods. Chapter Three presents the results of our analyses, and Chapter Four summarizes key lessons learned and discusses the policy implications of our work.

CHAPTER TWO. ANALYTIC APPROACH

We used qualitative and quantitative research techniques to address the questions posed in Chapter One. Our study methodology consists of three integrated tasks.

First, we used multivariate statistical techniques to model the effects of various organizational structural characteristics on public health preparedness.

Second, we conducted a series of comparative case studies to determine how and why state and local health departments have chosen to organize their public health preparedness work - specifically: how governmental officials at all levels have defined their roles in enhancing public health preparedness; how those roles have changed over time; the internal and external factors affecting decisions on how to organize the preparedness activities; gaps in preparedness activities; how those gaps are being filled - such as collaborations with the private sector; and how new models for state-local relationships are emerging.

Third, we conducted a synthesis of the literature on alternative governance structures (such as port authorities) and strategies (such as regionalization) that may offer ways of providing public health services, especially those related to public health preparedness. We also reviewed documents describing health department organizational structures.

In addition to the project's main analytic tasks, which are described in greater detail below, we interviewed key national, state, and local policymakers and stakeholders (both public and private) to ascertain their views on how the public health system can meet the preparedness challenges. These interviews were designed to learn how stakeholders view the current public health preparedness efforts, what changes should be made, commonalities of organizational structures (such as the two typologies described in Chapter One), emerging state-local preparedness models, and the ways in which federal

governmental initiatives contribute to improving integration of preparedness and response activities. The interviews also helped identify case-study sites.

QUANTITATIVE ANALYSIS OF PUBLIC HEALTH STRUCTURE ON PREPAREDNESS LEVELS

Variation is to be expected in public health structures, and it creates an opportunity to examine empirically whether public health emergency preparedness (PHEP) varies with public health departments' organizational structure and, in particular, the relationship between state and local health departments. *Public health emergency preparedness* is defined by the U.S. Centers for Disease Control and Prevention as the capacity to prevent, detect, investigate, control, and recover from a large-scale outbreak of a natural or man-made pathogen (CDC, 2005). The specific elements of structure included in this analysis are (1) degree of centralization, (2) regionalization, and (3) whether the state's public health department is part of a larger umbrella agency or exists as a freestanding agency. Given that the nation's focus on bioterrorism and other aspects of PHEP is fairly recent, it might be particularly important to examine the institutional structures that guide the development of the capacity to respond to public health emergencies and the actual deployment of assets in response to an emergency.

Our analysis relies on data provided by CDC and a number of public health organizations that track, study, and seek to develop PHEP capacity among the nation's state and local health departments. Before describing our data and analytic techniques, we consider how and why the elements of structure that we address might influence levels of PHEP.

Centralization

Centralization is the extent to which decisions are made by a relatively small number of individuals, groups, or organizational levels (Hendrick and Kleiner, 2001). In most instances, centralization implies that decisions are concentrated near the top of the organizational hierarchy. Yet, centralization might also be compatible with delegation of decisions to lower-level units, particularly where the "principals" who delegate such

discretion maintain some measure of control over the “agents” to whom discretion is delegated. The mechanisms by which principals maintain control might include providing performance incentives, specifying hiring criteria, or otherwise influencing selection of lower-level employees; oversight; training; and task standardization (see, e.g., Miller, 1992; Moe, 1984). Thus, centralization is a multifaceted concept that can be embodied in many different ways. In some cases, *centralization* might denote situations in which local officials are formally employed by a state agency. In other cases, local officials might be formally independent but, for all intents and purposes, quite constrained by policies and decisions made at the state level.

A considerable body of organizational and institutional theory provides reason to expect a linkage between degree of centralization and level of preparedness. First, centralization is often thought to be desirable when a comprehensive perspective is required to execute tasks (see, e.g., Hendrick and Kleiner, 2001; Fukuyama and Shulsky, 1997). For instance, public health surveillance systems will be more effective if composed of large networks of laboratories and human sensors - especially when, as is often the case, detecting a bioterrorism or other threat depends on observing anomalous patterns that are evident only in large samples.¹ Similarly, centralization might minimize coordination problems. The central direction of resources and staff, for instance, might speed the process of mobilizing staff for a large-scale response by avoiding the need to negotiate agreements between state and local authorities. Finally, to the extent that tasks are routine (e.g., handling biological samples), certain economies of scale might be exploited by centralized structures.

Decentralized structures, on the other hand, offer greater flexibility in adapting to local circumstances, which may call for very different preparedness strategies and responses across locales. However, the desirability of decentralization might depend on

¹ It should be noted that in recent times detection of disease outbreaks - including the anthrax attacks, West Nile virus, and monkeypox--was made by astute clinicians and laboratorians, as opposed to a mass surveillance system. See Stoto et al. (2005).

the level of skill, appropriate motivations, and resources possessed by local units.² Thus, decentralization might be a viable strategy in states with well-staffed local health departments, but not in other states. And even in the former states, the effect of centralization as opposed to decentralization might depend on the strength of formal and informal networks among the local health departments.

Regionalization

Regional approaches to public health preparedness can be implemented both within and across state boundaries. However, in this study, we confined our analysis of regionalization to formal, within-state arrangements. In some respects, *regionalization* might be viewed as a lesser degree of centralization—essentially the existence of multiple nodes of centralization in a system. Thus, many of the same arguments should apply to this structural element. However, regionalization might have the advantage of being perceived as more palatable in states with strong traditions of local autonomy. In some instances, regional structures have been initiated at the grassroots level by local health departments.

Freestanding Versus Umbrella Agencies

A final structural element we consider is whether the state's public health agency is part of a larger, umbrella agency or is a freestanding agency. As with the arguments about centralization, umbrella agencies might, by virtue of being integrated with other agencies, be more capable than freestanding public health agencies of providing a comprehensive perspective on problems. Additionally, economies of scale might accrue to umbrella agencies, because member agencies might be able to share the expenses associated with certain functions. There might also be spillovers from one agency to another, in much the same way that studies of firm structure have found that innovations are more likely to transfer from units within a common firm than between other locations (Darr, Argote, and Epple, 1995). On the other hand, umbrella agencies might have less

² This line of reasoning is evident in the literature on site-based management in education (see, e.g., Wohlsetter, Smyer, and Mohrman, 1994).

autonomy to pursue public health-oriented missions and find their fiscal and staff resources diluted by membership in a larger agency.

In short, organizational theory provides reasons to expect a relationship between public health structure and public health emergency preparedness. Yet, as the arguments above make clear, there is reason to think that the relationships might depend on the nature of the particular preparedness tasks in question and on the characteristics of the external environment.

Dependent Variables

The first requirement of a study of the relationship between public health structure and public health emergency preparedness is a measure of preparedness (the dependent variable). Good measures of preparedness, however, remain elusive, owing largely to the fortunate rarity of significant public health emergencies. While quality in clinical care and production and safety processes can often be measured by examining patterns in large numbers of events, researchers seeking to study public health emergency preparedness must base their measures on small numbers of actual events or on more-frequent-although less-serious-proxy events. After action reports based on exercises, drills, and actual events probably provide the richest and most nuanced view of preparedness. Yet, we need a relatively consistent measure that represents variation across *most or all* states. Given that after action reports provide information on very different kinds of exercises, and that there is no agreed-upon standard format for preparing them, we did not attempt to extract information from a large number of after action reports. Thus, we had to rely on other sources.

To measure or assess state-level preparedness, we used three sets of indicators, described in the Independent Variables subsection below, that provide information on most states: (1) the full-range of indicators that the CDC required grantees to report in 2004 in exchange for funding under the cooperative agreement; (2) a preparedness index that we created from a subset of CDC indicators, and (3) data on lab capacity provided by

the Association of Public Health Laboratories (APHLs). These indicators were used to calculate task-completion rates, which, in turn, served as our dependent variables.

Data Sources

To our knowledge, the most comprehensive and complete attempt to collect data on preparedness in all states comes from progress reports submitted by recipients of funds provided through the CDC bioterrorism cooperative agreements. Twice each year, the 62 states, metropolitan areas, and territories receiving these funds self-report their preparedness on a range of critical benchmarks that cover seven Focus Areas, shown in Table 2.1.

Our analysis focused on structured items (e.g., those calling for yes/no or percentage complete responses) from the 2004 reports. In the parlance of educational testing, *structured items* are akin to multiple-choice questions, and *unstructured items* are akin to “blue book essays.” The 2003 CDC reports included 11 critical benchmarks. However, few are clearly linkable to items in the 2004 reports. To keep the task manageable, we restricted our examination to the end-of-year CDC progress reports.³ Data were extracted from reports housed at HHS and entered into an electronic database.

³ One technical issue that required resolution was how to handle missing values (i.e., the grantee left the item blank). The average grantee left blank 24 percent of the 186 activities assessed. It is our understanding that all grantees are responsible for completing all items. Moreover, the reporting format did not include a “not applicable” response option. Accordingly, we treated missing values as incomplete items (in other words, they are considered to be “0 percent complete”).

Table 2.1: Focus Areas in 2004 CDC Progress Reports

Focus Area	Number of Items
A. Planning and readiness assessment	35
B. Surveillance and epidemiology	51
C. Laboratory capacity-biologic	14
D. Laboratory capacity-chemical	16
E. Communication and information technology (including the Health Alert Network)	37
F. Risk communication	22
G. Education and training	11

With 186 separate items, the CDC reports represent something of a “kitchen-sink” approach to measuring preparedness. Thus, we also developed a more focused measure of preparedness for use in this analysis. This measure is based on constructs identified by RAND researchers, who used a modified consensus process, as central to public health emergency preparedness. We then identified items from the 186 CDC indicators that map onto these constructs. The constructs are shown in Table 2.2, along with the number of CDC items. A detailed list of all CDC items, including those used in the index, is provided in Appendix A.

Table 2.2: Constructs and Items in Summary Preparedness Index

Construct	Number of CDC Items
Strong leadership	2
Surveillance capacity (passive)	2
Surveillance capacity (active)	3
Robust emergency plans that have been exercised	2
Clear legal authority	3
Clear and consistent communication	3
Laboratory capacity	4
Adequacy of workforce	2
Ability to do mass prophylaxis and vaccination	2
Surge capacity for mass critical care	2

We also obtained data from a survey of public health laboratories fielded by the APHL. This survey included items designed to assess states’ readiness to deal with bioterrorism and other public health emergencies. We extracted a number of relevant items from this survey, which we used to construct a simple additive index of

preparedness. The items used called for simple yes/no answers. The index, therefore, is simply the proportion of 22 relevant items on which the respondent answered yes. Appendix B provides a list of the APHL survey questions used in our analysis.

Independent Variables

As noted above, we examined three elements of public health structure: degree of centralization, whether a state has a regional public health structure imposed by the state (as opposed to one that develops “organically”), and whether the state health department is freestanding or part of an umbrella agency. Degree of centralization (according to NACCHO, 1998) was measured using the following coding scheme: 1 = decentralized, 2 = mixed, and 3 = centralized. *Centralized states* are those in which local health departments are a formal part of the state health department. *Decentralized states*, by contrast, have local health departments that are independent of the state health department. Finally, *mixed states* include those in which public health services are provided through some combination of activities on the parts of the state agency, the local health department, and possibly even local boards of health and other agencies in the health jurisdictions.

Data on whether state departments of health are freestanding or are part of an umbrella agency were obtained from the Association of State and Territorial Health Officers (ASTHO, 2004), and data on whether states employ a formal regionalization approach to organizing public health services were obtained from the states’ Web sites.

Analyzing the Relationship Between Structure and Preparedness

Using these measures, we employed a variety of statistical techniques to assess the extent to which there is an empirical relationship between the measures of preparedness and public health structure described above. Given the small number of cases (i.e., 46 states), we relied as heavily on inspection of graphs as on formal statistical methods. Statistical analysis began with graphical examination of bivariate relationships, but also included regression models for estimating the effect of each structure variable on preparedness, holding the others constant.

The regression analyses modeled the *task-completion rate* (TCR_i) - the proportion of all preparedness tasks reported as “complete”⁴ - for state i as a function of centralization, freestanding or umbrella, and whether a state has regional structures. Degree of centralization was represented by two dummy variables. The first variable ($MIXED_i$) takes the value 1 if state i has a mixed structure, 0 otherwise. Similarly, the variable $CENTRALIZED_i$ takes the value 1 if state i has a centralized structure, 0 if otherwise. Another dummy variable ($FREESTANDING_i$) takes the value 1 if the state health department is freestanding, 0 if it is part of an umbrella agency. Finally, the variable $REGIONAL_i$ takes the value 1 if the state employs regional structures, 0 if otherwise. These definitions yielded the following basic specification:

$$TCR_i = \beta_0 + \beta_1 MIXED_i + \beta_2 CENTRALIZED_i + \beta_3 FREESTANDING_i + \beta_4 REGIONAL_i + \varepsilon_i \quad (2.1)$$

$$\beta_5 LOGPOP_i + \beta_6 LOGDENSITY_i + \varepsilon_i \quad (2.2)$$

where β_0 is a constant, β_1 through β_6 are slope coefficients, and ε_i is an independently and identically distributed Gaussian disturbance term. We also included two measures of size as control variables, since providing effective coordination among state and local entities might depend on the overall scale of the intergovernmental system. The variable $LOGPOP_i$ is the logarithm of total population of state i for 2004, and the variable $LOGDENSITY_i$ is the logarithm of the number of people per square mile for state i in

⁴ It is worth noting that the CDC reports included several performance thresholds, including 0–25 percent complete, 26–50 percent complete, 75 percent complete, and 100 percent complete. However, approximately 40 percent of the 2004 progress reports employed a slightly different set of thresholds.

2004.⁵ Both size variables are centered at their means. Thus, the intercept term β_0 provides the mean task-completion rate for states of average size and density, and with decentralized, nonregionalized, umbrella structures.

Given the small number of cases, regression findings are likely to be highly sensitive to outliers. Thus, we used robust regression and iteratively reweighted least squares (IRLS) estimation to reduce sensitivity to outliers and the consequences of violations of standard regression assumptions. In light of the discussion above, it seems likely that any structure-preparedness relationships might be conditional on task and contextual conditions. Thus, where possible, we sought to allow slope-coefficient estimates to vary by task or contextual contingencies. Because of the small number of cases, we did not estimate interactions with tasks.

Given that structure varies by state, the unit of analysis in the regression models presented below is the state. As noted above, to make the reports comparable and to simplify the analysis, we treated preparedness as a simple dichotomy: “complete” or “not complete.”⁶

CASE-STUDIES APPROACH

In consultation with the project officer and various organizations representing state and local public health departments, we selected ten state and six local health departments for in-depth case studies. Criteria for site selection included geographic diversity, diversity of organizational structures, and states or localities that have a

⁵ The two size measures were only moderately correlated ($r = 0.40$, $p = 0.003$), which argues for including both terms in the model.

⁶ To ensure that our simplifying decisions did not bias the findings, we estimated models in which each of the 186 items in a state counted as a single case and used robust standard errors to correct for the fact that items are clustered within states. These models estimated the ordinal and multinomial logits of the responses as a function of the structure variables discussed above, which allowed us to estimate separately the relationship between the structure variables and each of the performance thresholds noted above. These models, however, produced findings very similar to those reported below and are not presented here.

reputation for creating innovative public health policies and programs. The states we visited are Florida, Hawaii, Massachusetts, Nevada, Texas, Oregon, New Mexico, New York, Ohio, and Washington. The local health departments included two rural locales and four urban locales (local sites are not identified, to protect confidentiality). To achieve economies of scale and reduce the burden of site visits on health department officials, we coordinated selection of local health departments with other tasks that are part of the larger project. Thus, the sample of local health departments was primarily a convenience sample with no specific selection criteria.

Data Collection

Within each state or local site, we conducted between six and ten in-depth interviews with key informants who have decisionmaking authority within the organizations. Such informants included state officials responsible for organizing public health preparedness efforts, the chief health officer of a local health department, and state or local political leaders. We developed and used a semi-structured interview protocol to conduct each interview. The interviews were designed to obtain information on the following:

- Why and how state and local public health organizational structures evolved the way they did
- Perceived internal and external barriers to organizational change
- Perceived opportunities for organizational change
- Previous attempts to change the organizational structure and subsequent evaluations
- Strategic planning under way to devise alternative structures
- Perceived feasibility of the alternatives established through our literature review of alternative governance structures and strategies
- The relationship between statewide and local responsibilities for projects
- The relationship between health departments and state, regional, and local emergency management functions

- Roles played by other local stakeholders (particularly private-sector actors) in preparedness activities
- The legal and political relationships of local public health departments to the state public health department
- Whether local public health departments have autonomy and ability to promulgate and enact local ordinances to address preparedness issues or whether state law preempts local responses
- Suggested modifications to existing legislation to facilitate change.

In addition to the interview data, we collected relevant documentation from each organization we visited, including analyses of the public health system's structure and organization, reports and brochures describing state and local public health initiatives, and descriptions of recently implemented programs.

Data Analysis

Our analysis of the site-visit data attempts to synthesize the documented evidence and interview data to portray the current organizational strategies being developed, along with options that public health systems might consider adopting. The analysis focuses on identifying common themes across sites. The primary form of analysis is descriptive, comparing and contrasting information across sites along several dimensions of interest, including the nature of the strategic adaptations considered and implemented; perceived successes and failures; organizational characteristics associated with these strategies; and financing implications.

REVIEW OF ALTERNATIVE GOVERNANCE STRUCTURES AND STRATEGIES

Although the case studies provided insight into ways of improving public health organizational structures and processes, we examined governance structures in other sectors that we believe may provide lessons for public health. Moreover, we thought that it was important to examine these sectors because a significant barrier to considering new organizational forms for the public health system is simply the lack of empirically tested

alternative models to consider. Despite the limited existing organizational research comparing the U.S. public health system with other social service or economic systems, several other public and private systems in the United States share organizational features and difficult challenges with public health. In the subsections below, we describe the criteria we used to select sectors for study, as well as our strategy for identifying and reviewing the relevant literature.

Selection Criteria

To select cases of alternative systems, we considered three criteria: a public-private continuum; multiple missions; and regional strategies. From an organizational perspective, these three dimensions capture some of the key issues a public health system would need to address in considering alternative ways of structuring public health delivery. Because public health is a service, not a consumer good, we selected from other systems that deliver a service and not a specific good (such as a retail product) to enhance comparability. Table 2.3 compares the four selected alternative systems - public education, welfare, banking, and port authorities - with public health across the three selection domains:

Table 2.3: Comparison of Systems by Selection Criteria

System	Public-Private Mix	Multiple Missions	Regional Strategies
Public health	Predominantly public	Yes	Yes
Public education	Predominantly public	Yes	Yes ^a
Welfare	Predominantly public	Yes	No
Banking	Predominantly private	Yes	Yes
Port authorities	Public-private hybrid	Yes	Yes

^a In rural areas only.

- **Public versus private.** Public health has been under pressure to adopt privatization or market competition as an approach to organizational reform. By *privatization*, we are referring to the transfer of decisionmaking authority, delivery, or financing from a public to a private entity. Public-private

partnerships are growing increasingly common. We thus chose alternative sectors characterized by a mix of public and private services. For example, public education is predominantly a public service, delivered by a combination of federal, state, and local (county) governments. Also as with public health, private reforms are often introduced into public education. Such reforms include vouchers for individuals to attend private schools, creation of charter schools, and private management of public school systems. The welfare system is predominantly public, whereas port authority systems are usually public-private hybrids, with the public regulatory mechanism monitoring the private sector's operational responsibilities. For contrast, we selected a sector, banking, that is delivered on a predominantly private basis, although there is considerable public regulation of banks.

- **Multiple missions.** The public health system is characterized by multiple, sometimes competing, missions. In particular, the public health system is expected to assume a bioterrorism preparedness function while delivering the three core public health functions of assessment (surveillance), policy development, and assurance of services. Traditionally, the public health system has also assumed a safety-net function, providing care of last resort to uninsured and underinsured populations. Therefore, we selected other sectors that equally face multiple missions. The public education system is expected both to convey knowledge and to contribute to future U.S. citizens' socialization and citizenship processes. The welfare system provides employment, self-sufficiency development, and aid to low-income individuals. As with public health, welfare agencies monitor policy adherence, along with service quality and effectiveness. The port-authority system simultaneously promotes the local or regional economies by facilitating trade and assures the safety of the port facilities. And banking serves a range of financial services too numerous to list.

- **Regional strategies.** One possible approach to reform is regionalization of public health services, either within states or among states (e.g., a Great Lakes Public Health System model). Because of our interest in regionalization as an organizational reform to the public health system, we selected systems in which regionalization may be a viable method for service delivery. Since port authority systems span state and local borders as a result of the naturally occurring distribution of ports and waterways, this system provides information on how services might be organized within and across states. Similarly, banks span state borders, providing banking services in certain regions or nationally. Here, it should be noted that both intra- and interstate regionalization strategies are potentially applicable to public health system reform.

Literature Review

For each of the five systems, we conducted a thorough review of published studies in the scholarly literature about organizational structures and/or features and their relationship to performance indicators. We also searched the Internet for reports (such as published reports about No Child Left Behind or Temporary Assistance for Needy Families) from national research and policy organizations. For the port authorities' case study, we combined a review of published literature with assessment of port structures and activities from Internet sites for individual ports. (For this report, we use the terms *port authorities* and *ports* interchangeably.)

We focused the literature review around several key concepts, divided into descriptive features and organizational features of the system. To organize our data, we constructed two matrices, following the methodology of Miles and Huberman (1984). The first matrix (see Table 3.4 in Chapter Three) displays information about descriptive features of each system, including what services were provided, the missions, the consumers of the service, the public or governmental responsibility, the “visibility” of the system, whether the system has strong advocacy support, quality issues, and

characterization of disparities and/or inequities within these systems. The second matrix (see Table 3.5) displays information about the organizational features of the system, including the traditional organizational structure, geographic distribution, accountability for performance, professionalism, the relationship of the system with the community, notable reforms to the organizational structure, structural factors related to improved performance, and barriers to change.

For each system studied, we analyzed the descriptive characteristics that were similar with or different from public health. We then assessed which approaches to reform or organizational features work for each system and which do not seem to work, incorporating organizational theory into our analysis. Finally, we looked for crosscutting themes and considered which ideas might be transported into public health.

CHAPTER THREE. RESULTS

In this chapter, we present the findings from our multivariate analysis, case studies, and literature review on alternative governance structures and strategies, respectively.

QUANTITATIVE ANALYSIS OF EFFECT OF STRUCTURE ON PREPAREDNESS

As noted above, theories of organization suggest that centralization might be desirable when, among other things, there is a need for a comprehensive perspective on a task or problem, economies of scale can be achieved, and the task at hand is relatively routine. However, given that preparedness involves a wide variety of tasks - each with potentially different organizational requirements - we might expect that centralization would not have much of an effect when all of these tasks are aggregated as a single indicator of preparedness. This is exactly what we found. Figure 3.1 provides box plots of state-to-state variations in the three preparedness indices according to whether the states are classified as decentralized, mixed, or centralized. Although there are differences in the median values across the three groups, they are small relative to the amount of within-group variation. Indeed, analyses of variance models suggest that whether a state is centralized or not explains almost none of the observed state-to-state variation in aggregate preparedness indices.⁷ Adding the other structure variables - freestanding, regional - does not change this basic picture. As is evident from the regression estimates reported in Table 3.1,⁸ the mixed and centralized states each reported task-completion rates of approximately 3 percentage points higher than decentralized states, but the differences were statistically indiscernible.

⁷ R^2 s for the three indices are, in order of appearance in Figure 3.1, 0.04, 0.01, and 0.01.

⁸ Examination of residuals suggests some heteroskedasticity. Thus, standard error estimates should be interpreted with caution.

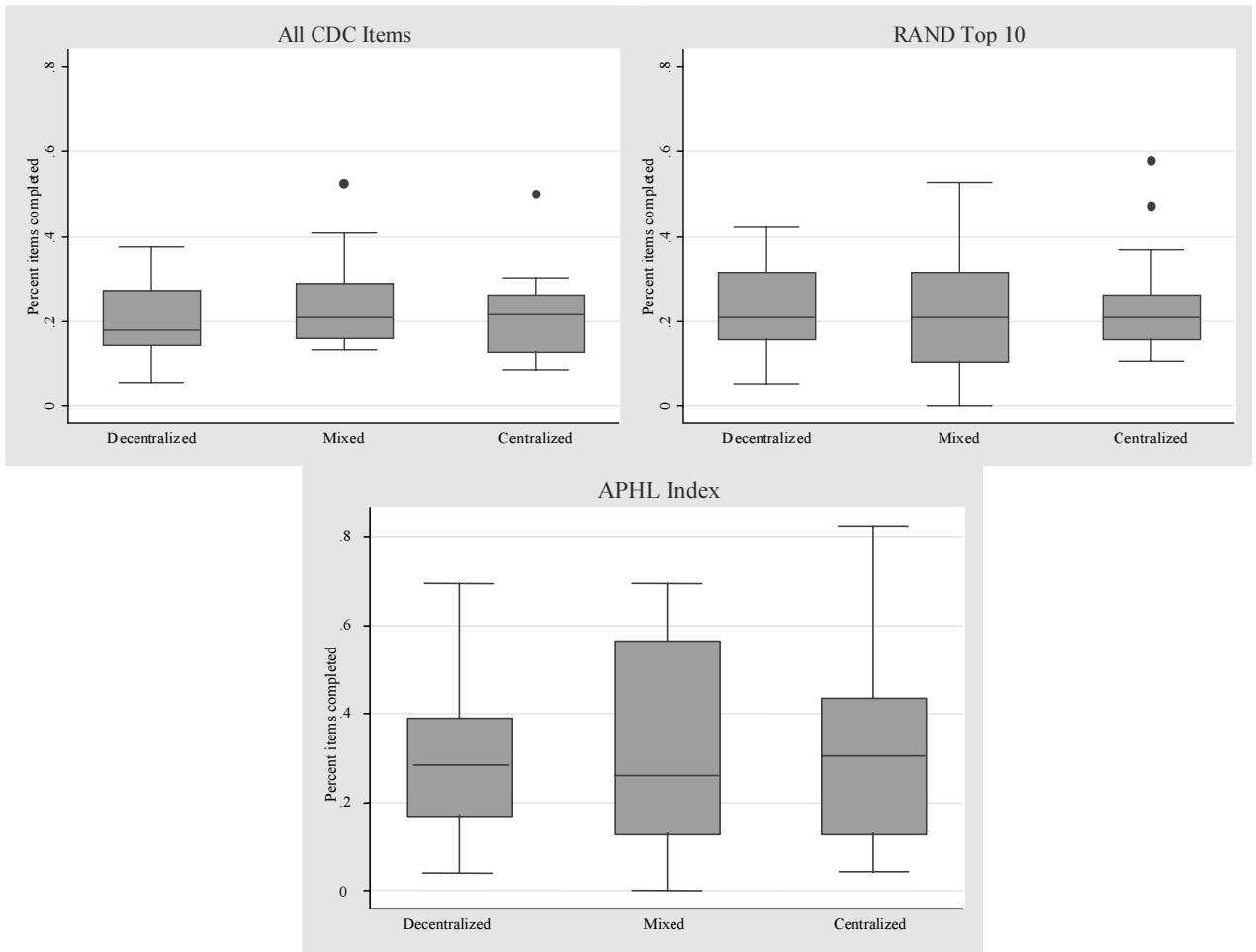


Figure 3.1: Preparedness and Degree of Centralization

Table 3.1: Robust Regression Results (standard errors in parentheses)

Variable	All CDC Items	Top 10 RAND Items	APHL Index
Intercept	0.21*** (0.03)	0.24*** (0.04)	0.27*** (0.08)
Mixed	0.03 (0.04)	-0.01 (0.05)	0.04 (0.08)
Centralized	0.03 (0.04)	0.02 (0.06)	0.05 (0.08)
Freestanding	-0.04 (0.03)	-0.02 (0.04)	-0.08 (0.07)
Regionalized	0.03 (0.03)	0.02 (0.04)	0.08 (0.06)
Log(density)	0.002 (0.02)	-0.007 (0.02)	0.03 (0.03)
Log(population)	0.001 (0.02)	0.002 (0.04)	<0.001 (0.04)
N^a	46	46	46
R^2	0.15	0.05	0.10
*** $p < 0.01$			
** $p < 0.05$			
* $p < 0.10$			

NOTE: ^a Four states were missing data on the “regionalization” variable. R^2 estimates are based on analysis of variance models.

The analysis yielded similar findings for whether the state health system is regionalized. As is evident in Figure 3.2, regionalized agencies reported slightly higher task-completion rates. Once again, however, the differences are small relative to the amount of overall state-to-state variation. The multivariate regression models present a picture similar to that for centralization, with small but statistically indiscernible differences between the two groups of states, even after holding other differences constant.

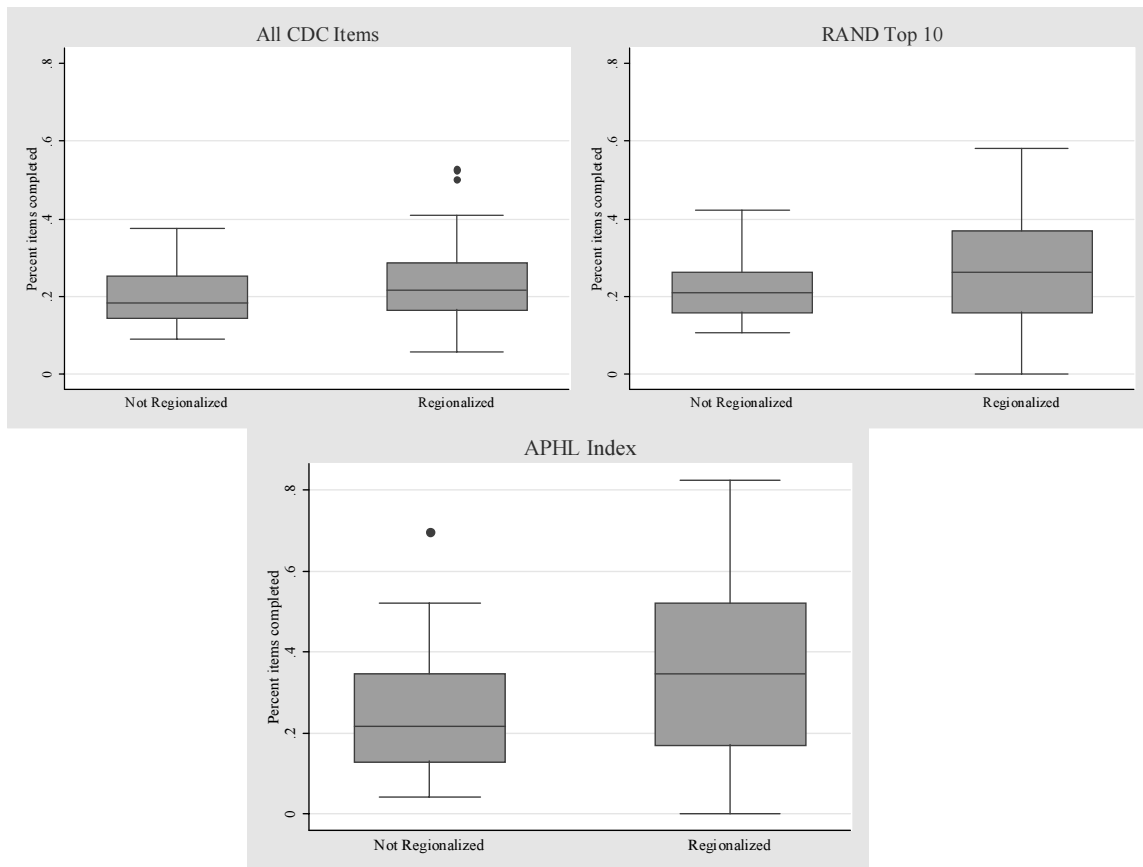


Figure 3.2: Preparedness and Structure of State Health Department

Finally, Figure 3.3 shows that whether a state health department is freestanding or part of a large umbrella agency it does no better in explaining variations in self-reported preparedness among the states: Any differences across the groups are dwarfed by within-group variation. Once again, the multivariate analysis yields similar findings.

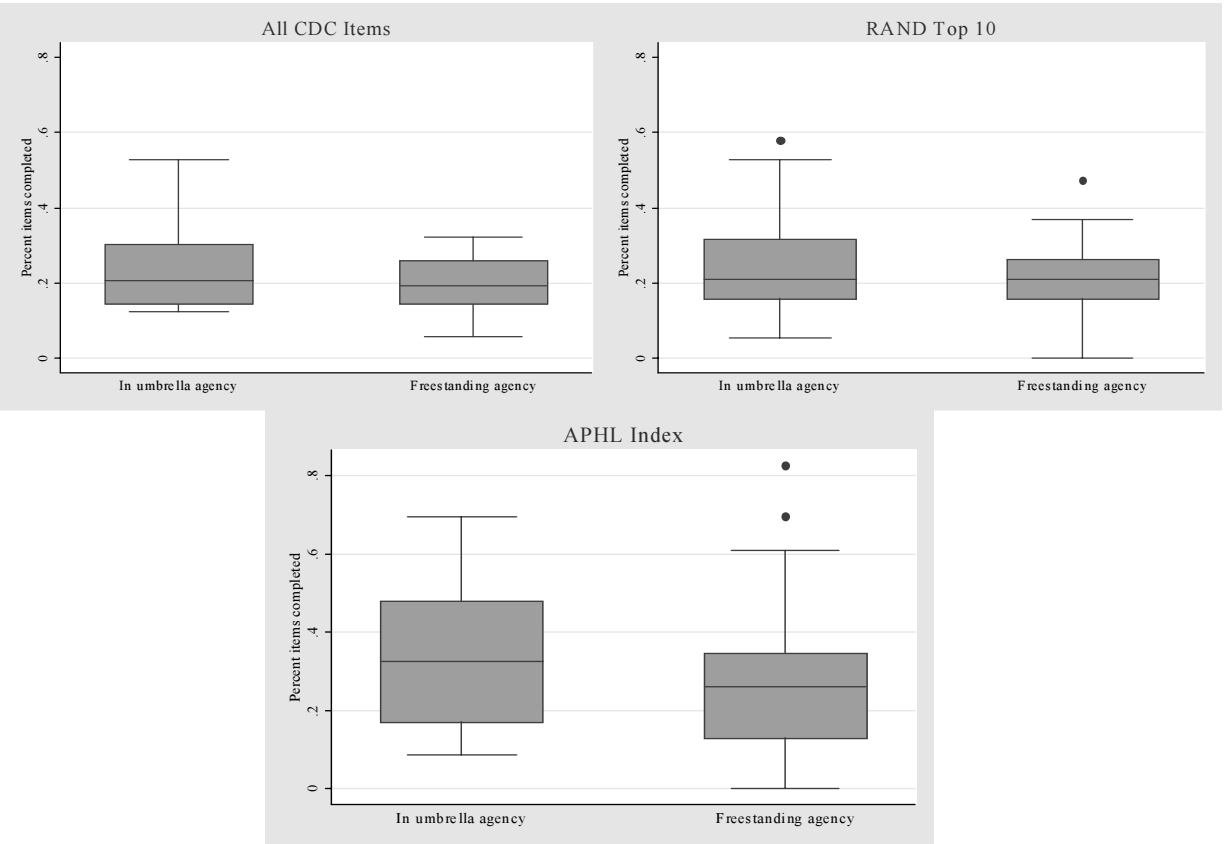


Figure 3.3: Preparedness and Regionalization

As noted above, it is possible that the added value associated with various elements of structure might depend on the nature of the task at hand and on features of the broader context. For instance, we might expect centralization or regionalization to explain more of the variance in task-completion rates when there are fairly clear economies of scale, as for education and training, for which states might produce standardized materials that could then be distributed to and adapted by local authorities. Similarly, we might expect similar economies of scale in Health Alert Networks⁹ given that the utility of such networks is directly related to their scope and inclusivity. Thus, we

⁹ The Health Alert Network (HAN) is a nationwide program to establish the communications, information, distance-learning, and organizational infrastructure for a new level of defense against health threats, including the possibility of bioterrorism (<http://www.bt.cdc.gov/documentsapp/HAN/han.asp>).

analyzed the data for each of the CDC Focus Areas shown in Table 2.1. The more granular findings are presented in Table 3.2. Structure explains more of the variation than before, especially with respect to education and training (Focus Area G; $R^2=0.22$) and Health Alert Network (Focus Area E; $R^2=0.26$). However, the coefficient estimates do not suggest any clear advantage to centralization in these Focus Areas. Thus, there are no clear interactions between structure and task characteristics.

Coefficients on the specific models do not provide a clear picture of what types of structures might be most effective. States with mixed intergovernmental structures reported task-completion rates of approximately 13 percentage points higher for the Health Alert Network Focus Area. But there was no such advantage for mixed states for education and training activities. Overall, however, these findings are suggestive, but far from conclusive.¹⁰

¹⁰ Another limitation of these findings is that, by estimating regressions on seven dependent variables, we increase the odds of finding significant relationships by chance alone. Using the Bonferroni correction, the standard criterion of $\alpha = 0.05$ must be divided by the number of models ($0.05/7 = 0.007$). By this standard, only the “Regionalized” variable in the Focus Area E regression is statistically discernible ($p = 0.004$).

Table 3.2: Robust Regression Results by CDC Focus Area (standard errors in parentheses)

Variable	A	B	C	D	E	F	G
Intercept	0.25*** (0.05)	0.20*** (0.05)	0.18*** (0.06)	0.05* (0.03)	0.18*** (0.03)	0.16*** (0.05)	0.28*** (0.04)
Mixed	0.07 (0.06)	0.02 (0.06)	0.02 (0.08)	0.03 (0.03)	0.16*** (0.04)	0.04 (0.06)	-0.05 (0.05)
Centralized	0.07 (0.06)	-0.03 (0.06)	0.05 (0.08)	(0.01) (0.04)	0.05 (0.04)	-0.02 (0.07)	0.04 (0.06)
Freestanding	-0.03 (0.05)	-0.02 (0.05)	0.05 (0.06)	-0.005 (0.03)	- 0.09*** (0.03)	-0.006 (0.05)	-0.11** (0.04)
Regionalized	0.03 (0.05)	0.01 (0.05)	0.10 (0.06)	0.05* (0.03)	0.07** (0.03)	0.02 (0.05)	-0.05 (0.04)
Log(density.)	0.02 (0.02)	-0.02 (0.02)	-0.01 (0.03)	0.008 (0.01)	0.03** (0.02)	<0.001 (0.99)	0.02 (0.02)
Log(pop.)	-0.003 (0.03)	0.05 (0.03)	-0.02 (0.04)	-0.01 (0.02)	-0.005 (0.02)	0.002 (0.03)	-0.03 (0.03)
N^a	46	46	46	46	46	46	46
R^2	0.14	0.09	0.12	0.14	0.26	0.03	0.22

*** $p < 0.01$

** $p < 0.05$

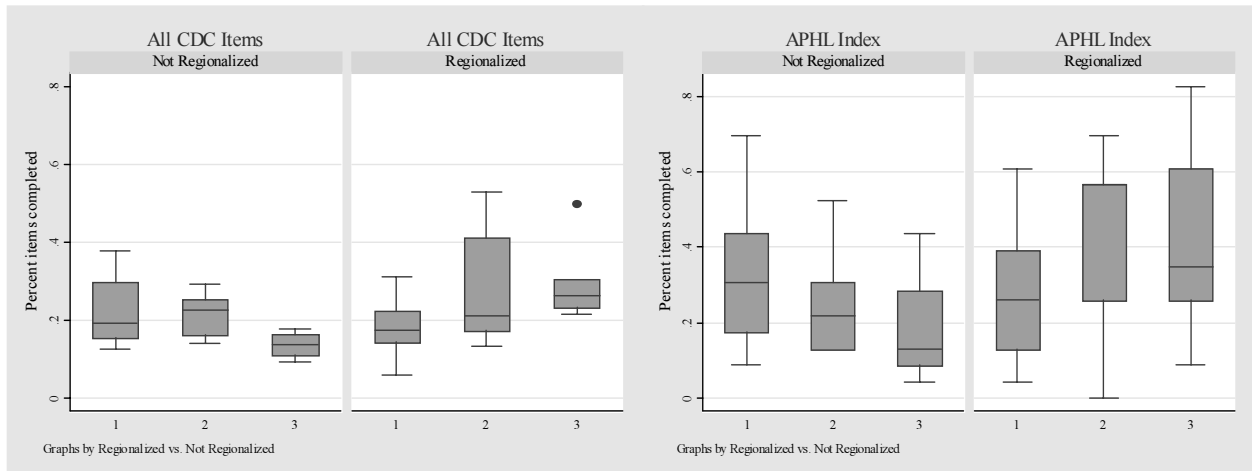
* $p < 0.10$

NOTE: ^a Four states were missing data on the “Regionalized” variable.
 R^2 estimates are based on analysis of variance models

We also considered the possibility that the effect of any one element of public structure might depend on other elements. To operationalize this possibility, we created separate box plots for regionalized and nonregionalized states (the small number of cases [i.e., 46 states] made regression models with interactions impracticable).

The left panel in Figure 3.4 shows the preparedness-centralization relationship in regionalized and nonregionalized states using all CDC items as the measure of preparedness. The panel on the right shows the same relationship using the APHL index as the preparedness measure. In both panels, centralized systems are associated with the lowest preparedness levels in non-regionalized states but the highest preparedness levels in regionalized states. These findings are confirmed by a regression model (see Appendix C), which included interactions between the regionalization variable and the mixed and

centralization variables. Using the CDC data as a dependent variable, we found that the performance advantage for states that are both regionalized and centralized is statistically significant ($p = 0.01$ and 0.07 , respectively).¹¹ One possible explanation for this finding is that centralization might be more effective if accompanied by regional structures that help ensure the development of less-formal relationships among state and local officials. More generally, formal centralization might have little effect without other mechanisms designed to foster more routine, face-to-face collaboration and communication.



KEY: 1 = Decentralized 2 = Mixed 3 = Centralized

Figure 3.4: Effect of Centralization in Regionalized and Nonregionalized States

RESULTS FROM CASE STUDIES OF STATE AND LOCAL PUBLIC HEALTH DEPARTMENTS

Organizational Structure of Case-Study Sites

The states and locales we selected for case studies represent a diverse range of geographic locations and public health organizational structures (Table 3.3). We visited four centralized states, five decentralized states, and one mixed state. Having visited only ten states total, the site visits should not be viewed as a comprehensive study of states and

¹¹ Given the small samples and the exploratory nature of this work, consideration of p -values of 0.10 or lower seems justified.

local health departments but, rather, an investigation of sample states for potential trends in health departments related to structural organization. In this section, we present observations from visits to health-department sites and discuss trends found within centralized and decentralized state structures, as well as trends found across the various organizational structures. Finally, we discuss observed barriers to and facilitators of change within health departments.

Centralized States Included in Site Visits

Generally, in states with centralized public health structures, the state health agency or board of health has direct authority over local health departments (NACCHO, 1998).¹² In all of the centralized states we visited, local health department staffs are state employees. However, the similarity ends there. The four states, which are described below, are unique in size, population, geography, and future risks for types of public health emergencies.

New Mexico is divided into five health districts created by the state department of health, and health offices are located in each of the 33 counties. The state funds all public health employees at all levels (state, district, and county), and county health offices are facilitated through the larger health districts.

Nevada has only three local health districts, all of which function with a considerable degree of autonomy and provide public health coverage for the more-populated portions of the state. The remaining rural areas that are not included by a local health district receive services directly from the state health department.

¹² State categorizations are from responses to the NACCHO survey of state-local health department liaisons from October 1998, which based typologies for its questionnaire on categories presented in the 1990 Profile of State and Territorial Public Health Systems (a report prepared by the CDC in 1991), available at http://wonder.cdc.gov/wonder/sci_data/misc/type_txt/stprof91.asp.

Florida and Hawaii represent different approaches to one of the challenges that a state with a centralized public health structure faces: balancing local ownership with state-level support. In Florida, the public health system is made up of 67 county health departments that report to the state as part of a state-county contract. However, day-to-day public health activities are managed at the local level. In contrast, Hawaii is highly centralized and has only four district health offices. The state health department is located in Honolulu, on the island of Oahu, and District Health Offices are located on the other major islands--Kauai, Maui, and Hawaii. Public health policy and budget decisions are made at the state level, although local public health officials are encouraged to implement policies in ways that are best suited for them. Local residents view these officials as the “local health department.”

Decentralized States Included in Site Visits

There is an equal amount of variation across the five states we visited with decentralized public health structures. In decentralized states, local governments have direct authority over local health departments, with or without a board of health. The local health department staff is generally hired at the local health department level; in some cases, they are hired at a regional level. In New York and Oregon, local health departments are organized for the most part along county lines. New York has 57 county health departments, 36 of which are considered “full-service,” meaning that they are capable of conducting all public health services, including environmental health. Twenty-one of the 57 county health departments are considered “partial-service” and are supported by nine state district health offices. The “partial service” health departments operate much like the rural areas in Nevada, both relying on the services and support from the state health department to provide the same services as the “full-service” departments.

Oregon has 34 local health departments, but these local health departments have levels of functionality that differ with the population of the county and therefore the amount of funding received from the state. In the state of Washington, there are 35 local health jurisdictions, each governed by a local board of health. In contrast, in Ohio there are 137 local health jurisdictions: Some are city-level, some are county-level and some

comprise multiple counties. Unlike the other decentralized states we visited, Massachusetts is structured uniquely. There are local boards of health in each of 351 municipalities¹³ in the state, no county-level public health departments, and no county-level government structure.

Unlike centralized states, the decentralized states had a higher degree of autonomy to hire staff and could more easily allocate funding according to local needs. However, with a greater degree of local control, coordination within the state (i.e., redirecting resources or providing standardized training across a state) can become more challenging.

The extent to which local health departments rely on the state for technical assistance, templates, and personnel varies to a greater degree in decentralized states than in centralized states. For example, in a centralized state, many directives on technical assistance and training would apply to the entire state, regardless of the size of the local health department; however, in decentralized states, large cities do not need to rely as heavily on state assistance because resources have been apportioned to address these issues, and local health departments in home-rule¹⁴ states are expected to be self-reliant. Rural areas of decentralized states present yet another view: Local health departments may be as reliant or more reliant on state assistance than the local health departments in centralized states. Usually, local health departments in decentralized states receive a portion of their funding from local entities - county, city, or town government - and thus are accountable to those entities, as well. Federal funds for public health activities are

¹³ Massachusetts Municipal Association; available at: http://www.mma.org/links/city_town_websites.html.

¹⁴ Broadly defined, *home rule* is the principle or practice of self-government in the internal affairs of a dependent country or other political unit. (http://www.answers.com/main/ntquery;jsessionid=4hq3h6lm2gwpd?method=4&dsid=222&dekey=Devolution&gwp=8&curtab=2222_1&sbid=lc01b&linktext=home%20rule). In local governance, “home rule” is a system that, in limited circumstances, prevents the state legislature from directly affecting a city without that city's consent (Kirshnitz, 2000).

typically funneled through the state to local health departments, although some local health departments can apply directly for federal dollars for particular programs. In some decentralized states, local health departments also receive limited per-capita funding from the state. Although the local health departments in these states are autonomous, public health activities can be heavily influenced by state policies and, in some cases, regulated by state public health laws. For example, New York is a home-rule decentralized state. Although county health departments in New York have significant autonomy in day-to-day public health activities, the State Health Commissioner's powers are broad. In addition, the state determines public health regulations and policies, which local health departments are responsible for implementing. Moreover, the state health department reviews the hiring of county-level health directors, and these local health directors are considered to be "deputies" of the State Health Commissioner. This is one way in which the State Health Commissioner has oversight of local health departments, especially in emergency situations.

Mixed State Included in Site Visits

In those states in which the public health structure is considered "mixed," local health services are provided by a combination of the state agency, local government, boards of health, or health departments in other jurisdictions. The public health system in Texas, the only mixed state we visited, is a combination of local-, regional-, and state-level health departments. The local health departments are either county- or city-level departments that staff and govern themselves according to federal guidelines and grants. State employees staff the regional health services offices, and they deliver public health services to those areas that are not served by a local health department. Since we visited only one mixed state, there is not enough information to make generalizations regarding trends in mixed health departments across the country.

Table 3.3: Organizational Structure of Case Study States

State	Geographic Location	Degree of Centralization^a	Organization of Public Health Activities at the State Level^b	Local Health Department Organization^c
Florida	Southeast	Centralized	Freestanding	Traditional
Hawaii	Pacific	Centralized	Freestanding	Traditional
Massachusetts	Northeast	Decentralized	Umbrella	Regional
New Mexico	Southwest	Centralized	Freestanding	Regional
Nevada	Southwest	Centralized	Freestanding	Unknown
New York	Northeast	Decentralized	Umbrella	Traditional
Ohio	Midwest	Decentralized	Freestanding	Regional
Oregon	Northwest	Decentralized	Umbrella	Traditional
Texas	South	Mixed	Freestanding	Regional
Washington	Northwest	Decentralized	Freestanding	Regional

^aThe extent to which decisions are made by a relatively small number of individuals, groups, or organizational levels.

^bWhether public health functions are administered by a freestanding agency or are part of a single umbrella health organization.

^c*Traditional*: States in which local health departments have jurisdiction over individual counties or cities or, in some cases, multiple county blocs. *Regional*: States that are divided into regional units (health regions or health districts) with local health departments operating within them.

Observations from Site Visits

Similarly to the quantitative findings, we were unable to discern any strong relationship between formal organizational structures and respondents' perceptions of their level of preparedness. The success of public health emergency preparedness programs seemed to be more conditional upon the presence of other factors, such as personal relationships, forms of coordination across levels of government, effective leadership, and norms of cooperation, or other ties borne of past experience or other arrangements. For example, in one centralized state we visited, the Emergency Program Manager at the state health department responsible for coordinating preparedness efforts of hospitals across the state was mentioned in every interview we conducted. Repeatedly, we heard that his strong communication and coordination skills and ability to reach consensus were critical factors in the success of that state's preparedness efforts in the past few years, particularly with regard to coordination among hospitals. By contrast, in a

different centralized state, local health officials claimed that the state's leadership style and lack of cooperation on key preparedness issues were major barriers to coordination and hindered the overall strength of the preparedness efforts at both the state and local levels.

There was also variability both across and within states in the degree to which the state and local governments integrated their public health preparedness-related activities with other public health-related work. There was limited support for the notion that some local public health departments were better able to integrate their preparedness and nonpreparedness activities than the larger state bureaucracies. Although we did not study the barriers and facilitators to integrating preparedness and nonpreparedness activities, the smaller size of local health departments may facilitate their being able to adopt an integrated approach because smaller organizations generally have less differentiated structures (i.e., less departmental specialization) and staff is frequently required to adjust for multiple functions.

Large state bureaucracies, on the other hand, may be more likely to have more-specialized structures and may be more difficult to change because of their sheer size. For example, in one state in which the state-level health department was moving toward an integrated approach, there was a parallel organizational structure outside of public health that was designated to deal with "disasters." While the functions that such parallel structures provide may indeed be required for states to plan and respond to disasters, their existence points to the challenges that states face in trying to integrate public health preparedness and non-public health preparedness activities. Caution needs to be exercised in generalizing these results, because integration was not systematically assessed in our study. Future research should be focused on the organizational barriers and facilitators that state and local governments face in moving toward an integrated approach.

Structure may not have a main effect or account for much of the variation in preparedness between states. Centralized, decentralized, and mixed state organizations

are all working to modify state and local health departments in order to effectively address issues of public health emergency preparedness. While each type of structure requires attention to slightly different aspects of the process, all three structures seem capable of preparing effectively for public health emergencies. Within centralized and decentralized structures (we visited only one mixed state and thus cannot draw conclusions regarding the degree of variation in such states), the case studies revealed a wide range of preparedness levels within health departments, regardless of the type of structure, a finding that is quite consistent with our quantitative results.

Public Health's Changing Role in Emergency Preparedness and Its Effect on Organizational Structure

In many of our site visits, we heard that the national focus on bioterrorism and emergency preparedness since 9/11, and the subsequent influx of emergency preparedness funds, dramatically affected state and local public health departments in various ways. Although the increased funds were welcome, many health departments found themselves with neither the organizational infrastructure to adequately manage and disburse the funds nor the ability to perform the new functions that were expected. In all of the health departments we visited, some degree of restructuring was necessary--creating new positions, new programs, new departments, etc. One state health department made major organizational changes that created tension within the health department and, according to some respondents, has hindered their statewide preparedness activities. Other health departments reported tension within their departments because some key staff members felt that both the financial and the programmatic focus on preparedness has negatively impacted traditional public health activities.

Most public health departments were not accustomed to serving as first responders, and they were not structured in a way that would facilitate a quick, coordinated response. Nor was the traditional first-responder community accustomed to public health's new role. In some communities, this new role created tension, especially since large amounts of funds were involved. In one state we visited, turf issues with a critical emergency response agency were hindering final strategic planning for national

stockpile distribution. As one respondent indicated, “There was lots of collaboration until the terrorism money started to come in; the money is coming from several sources; it caused rifts and questions about who’s in charge. This was an unintended consequence.”

We also heard from two different states that public health’s new role thrust them into a new light with hospitals and others in the community - that state public health departments are now viewed more as partners than as simply a licensing agency or as “big brother.” However, this new role in the community has also created pressure on health departments to develop better communications capabilities. One health director indicated that, as a result of public health’s changing role in the community, his department now needs a group of employees that can handle “tumult and confusion.” This recent addition to the role of public health practitioners is congruent with findings from our work on the integration of public health and hospital preparedness programs (see Davis et al., 2006). In that report, hospitals appear to have been more extensively involved in interagency coordination on preparedness and for a longer period of time than have local health departments.

Organizational Barriers to Improving Preparedness

In our case study visits, we asked respondents about what they perceived to be organizational barriers to improving public health emergency preparedness. Although many of the responses were specific to the individual state or health department, some common themes emerged. However, these commonalities tend to be related more to problems with public health infrastructure in general than to specific types of public health organizational structures.

The most common organizational barrier to improving preparedness that we heard about during our site visits was the shortage of public health staff. As one respondent indicated, there needs to be enough personnel to maintain the focus on public health preparedness without “robbing” the other areas of public health. Some of the staffing issues were a result of turnover. In two of our case studies, turnover among the senior state-level staff was a major issue. In one of these states, local-level respondents reported that turnover contributed to a lack of coordination between the state and local agencies on

preparedness issues. In the same state, the inability of the state agency to hire staff or fill vacancies as a result of state-level hiring freezes and overly burdensome bureaucratic processes for obtaining exceptions contributed to delays in federal grant monies for preparedness issues being disbursed to local levels.

A related issue is staff training and how best to institutionalize the changing role of public health within an agency. For some health department officials, Incident Command Structures (ICS)¹⁵ and the notion that public health staff must be prepared to serve as first responders are entirely foreign concepts. As one respondent stated, "...it takes time, training, exercises, and discussion." States - whether centralized, decentralized, or mixed - are struggling to incorporate sufficient ICS practice and training so that the health department staff would all be able to smoothly function in an emergency situation, since (unlike law enforcement officers) they are not accustomed to participating in emergency situations on a regular basis. Although staffing, turnover, and training challenges were common themes among respondents when asked about organizational barriers to preparedness, we did not find evidence to indicate that these issues are related to a particular public health organizational structure.

Other organizational barriers to improving preparedness included lack of technological capabilities, especially in rural areas; the continued presence of "silos"; and outdated public health laws and regulations. Again, these issues may be related more to the big picture of public health infrastructure across the country than to the structure of public health in any particular state. In some states, laws that govern public health interventions were developed years ago and were based on organizational structures that are not conducive to current public health needs, especially with regard to emergency preparedness. For example, in Massachusetts, local boards of health have jurisdiction

¹⁵ To organize an emergency incident or a non-emergency event, the Incident Command Structure system is built around five major management activities. The ICS system has a clear chain of command and is designed to help organize the personnel responding to an emergency.

over isolation and quarantine policy, but they do not have the staff or the expertise to make isolation and quarantine decisions.

Barriers to Organizational Change

In our case-study interviews, we also addressed barriers to organizational change that both state and local health departments are struggling with as they attempt to alter their public health structures. Such barriers include poor communication within and between health departments; large bureaucracies that need to quickly move resources; turf issues confronted when coordinating across agencies or local health departments; and time and personnel required to implement changes in the system. Again, many of the responses were specific to the individual state or health department, but there were some common themes. Some respondents noted poor communication within health departments, as well as between local and state health departments, as a barrier to organizational change. One local health department indicated its frustration with poor communication from the state by claiming that they could “count on a weekly surprise from the state health department.” Some of the respondents felt that communication problems were primarily the result of poor leadership.

Bureaucratic impediments, especially at the state level, were also mentioned as barriers to organizational change in public health--particularly with shifting resources. In one decentralized state, limited financial resources at the local level were a major barrier to organizational change across the state. Specifically, the state health department tried to regionalize testing for sexually transmitted diseases and tuberculosis; however, none of the communities in the regions wanted to contribute money. A turf issue of “who’s in charge?” was a barrier mentioned by respondents in many different locations. Lastly, time and personnel were an issue in many locations in which health departments struggled to keep up with traditional health department functions and received little funding, but were expected to adjust to multiple new responsibilities for preparedness in a short amount of time.

Facilitators of Organizational Change

Despite these barriers, respondents were quick to identify those factors that, from their experience, are facilitators of organizational change. We observed several facilitators across the sites we visited, such as strong leadership and successful regional coordination within states. Interestingly, although increased funding caused some difficulties, as noted above, it also cut the other way, because many respondents identified funding as the main facilitator of organizational change on the state level. An underlying tenet of the CDC Cooperative Agreements is to “...upgrade and integrate State and local public health jurisdictions’ preparedness for and response to terrorism and other public health emergencies with Federal, State, local, and tribal governments, the private sector, and Non-Governmental Organizations” (CDC, 2005). For some highly decentralized states, improved integration has been and continues to be a difficult but necessary struggle. Given that decentralized states do not have authority over local health departments, organizational change cannot be legislated. Consequently, the state health department may persuade local health departments to implement changes--e.g., regional approaches--by requiring such changes as a condition of receiving state funds. According to some respondents, this has been a very effective method for facilitating change that otherwise would be extraordinarily difficult.

The importance of skilled leadership and good communication in facilitating organizational change, especially within health departments, is another common theme apparent from our case studies. This facilitation often took the form of aggressive training programs for employees. In one health department, we were told about a program promoting public health leadership and cultural change in which employees are taught how to manage meetings, manage performance, etc. As one interviewee commented, this type of training can be helpful in promoting emergency preparedness in an organization.

Another facilitator of organizational change, which we heard about in more than one state, is the existence of regional alliances, community work groups, or coalitions that

were formed to achieve certain goals, such as economies of scale, coordination of activities within a region, and sharing of information. Such coalitions are not formal structures that the states developed but, rather, their formation was more organic and from the bottom up. For example, in one decentralized state, downsizing state government in the late 1980s spurred counties to pool their resources and create their own surrogate regionalization in the form of alliances. Even as state government and, consequently, the state public health department, recovered from this downsizing, the regional alliances have remained active and continue to effect change in the structure and function of public health in particular areas. In fact, the strength of these alliances and their desire for individualized information technology (IT) systems was the impetus for a compromise. The state provided support to the alliance by creating space on the main statewide system, thus ensuring that both the state and alliance IT systems are integrated and compatible while meeting the alliance's individualized preferences and needs. The state also helps to maintain integration by setting data standards. This well-integrated system has increased connectivity between state and local health departments, among local health departments, and between the various players involved in emergency preparedness (e.g., hospitals), thus enhancing communications capabilities during emergency situations.

There were other facilitators of organizational change that we heard about from a single state or local health department but that may be common to other states with similar characteristics. For example, many respondents in one state felt that the relatively small size of the state was a critical factor in facilitating organizational change even at the legislative level. One interviewee commented, "...you can reason with the legislators and get it through; it's the smallness of the place." Similarly, in our report on integration of public health and hospital preparedness programs (Davis, 2006), we found that, in general, smaller localities with fewer stakeholders find it easier to coordinate on preparedness. Another facilitator of organizational change that may be common to other states is past experience with natural disasters or other events that bring people together to work for the common good. As one interviewee stated, "Coordination is great because of past events, exercises; we have no choice but to work together." Finally, and not

surprisingly, involving those people who will be affected by change in the planning and implementation was noted by many to be a strong facilitator of organizational change.

The Relationship Between State and Local Health Departments

Regardless of whether a state is centralized or decentralized, there are often conflicts between state and local public health departments, especially with regard to the role each one plays. In centralized states, conflict may be related primarily to the degree of autonomy that local health officials should have. We heard repeatedly that, “all health is local in terms of immediate response” and that local health officials must have the basic skills to screen, triage, and know when they need additional assistance. However, one centralized state we visited reported struggling with this issue. On the one hand, the state wants to empower the locals and increase their ability to function independently. Yet, on the other hand, some state officials feel that the expertise resides at the state level especially with regard to control of outbreak management. In some cases, there have been significant differences of opinion between local-level and state-level officials on the appropriate course of action; since each situation varies, it has been difficult to formalize a procedure.

In decentralized states, the tension between state and local health departments is related primarily to the degree of guidance state officials should give to locals, and when and under what circumstances appropriate hand-offs should occur. In rural areas of a decentralized state, the locals are often looking for more assistance and guidance from the state; whereas, in the larger cities with potentially more funding than at the state level, the cities are waiting for the state to catch up with regard to preparedness activities. In two instances, health officials in rural counties in decentralized states expressed a need for more specific guidance from the state, especially in the form of templates for plans and documents. Local officials reported that templates typically received from the state have been focused on large urban areas and are not applicable to small rural locales. Yet, in some larger, more advanced local health departments, officials felt that the state health department’s role should be more policy-oriented and less directive.

Some respondents reported that there was poor coordination between state and local levels of the public health infrastructure. In states that have highly decentralized organizational structures, the need for some forms of coordination across levels of government may be particularly important. In strong home-rule states, however, introducing such coordinating mechanisms will be a challenge. In the course of our case studies, there were two examples of major cities in strong home-rule states that had a reputation for rebuffing state involvement. However, tension between state officials and health departments in large cities was also found in some centralized states.

The Relationship Between Health Departments and State, Regional, and Local Emergency Management Functions

In all of our case-study sites, we heard about the changing role of public health in relationship to other agencies and organizations involved in emergency preparedness and response. At the state level, the influx of federal funds has thrust public health into a more central role in statewide emergency response efforts, regardless of whether they were centralized or not. Although it has been challenging, respondents generally agreed that, since the events of 9/11 and the anthrax outbreaks, there is far greater involvement of public health at the local emergency-response level, as well. Some reported that, in the past, public health typically did not interact with law enforcement, firefighters, or EMS. With the CDC preparedness funds and the associated requirements for building community-level relationships, public health and other first responders have started to work more cooperatively. However, public health's quest for an equal seat at the table has been a difficult process that many in public health had little experience with. Some public health officials with whom we spoke reported that they have had to learn to deal with very savvy players on the public safety side who are well organized and part of strong unions. One respondent stated, "Keep relationships open with the mayor's office and figure out the key people in the fire department. Know who to make phone calls to and get a constituency before you walk into meetings."

It is important to note that all of the foregoing observations in this subsection pertain to both centralized and decentralized states.

Roles Played by Other Local Stakeholders in Preparedness Activities

In the course of our case-study visits, hospitals were noted as major stakeholders in local emergency preparedness activities (sometimes hospitals are as large a stakeholder in emergency preparedness as are police and fire). The relationship of hospitals and public health departments varies tremendously, but generally the relationships have been strengthened significantly as a result of the federal preparedness funds to both public health departments (through the CDC cooperative agreements) and to hospitals (through the HRSA cooperative agreements). Over the past few years, CDC and HRSA have expanded their requirements that public health departments and hospitals work together with other members of the community on emergency preparedness activities. These activities have taken various forms. However, state and regional hospital associations are a strong collaborating force in at least three of the states we visited - Hawaii, New York, and Texas. In other states, regional steering committees have also proven successful in integrating preparedness activities between public health and hospitals. But from our perspective, there was no discernible relationship between the roles played by these stakeholders and any formal organizational-structure variables.

LESSONS LEARNED ON ALTERNATIVE GOVERNANCE STRUCTURES AND STRATEGIES FROM OTHER SECTORS

In addition to relying on the case studies for insight into organizational changes that might lead to improvements in public health preparedness outcomes, we examined governance structures in four other sectors - public education, welfare, banking, and port authorities, as described in Chapter Two - with an eye toward identifying promising strategies from those sectors that could be applied to public health. After providing an overview of the descriptive and organizational features found in each of these sectors, as well as in public health, we discuss key themes that emerged from our comparative analysis.

Tables 3.4 and 3.5 display descriptive and organizational features of public health and the four alternative sectors that we used to form the basis of our comparative analysis. Our analysis suggests several important organizational themes that cut across

the sectors. Public health might learn from the structural features with which the other systems have experimented, including private-sector approaches, use of information technology (IT), accountability mechanisms, adaptation to the community and environmental factors, collaborations and networks, and enhanced professionalism.

Table 3.4: Comparison of Services by Descriptive Features

	Service(s) Provided	Multiple Missions	Consumers	Public or Governmental Responsibility	Visibility	Advocates	Quality Issues	Equity Issues
Public Health	Medical care and population health services; preparedness	Protect health; deliver health services; provide bioterrorism/emergency preparedness	Individuals and populations	Gov't has primary responsibility for delivery of service	Invisible	Advocates exist, but are disorganized	Quality deficits documented in IOM report (2003)	Prominent
Public Education	Education	Convey knowledge; promote socialization; develop citizenry	Individuals (children; also parents and community members)	Gov't has primary responsibility for delivery of service	Visible	Unions, public policy centers, community organizations, parents; well-organized	Quality deficits documented in U.S. Dept of Education (1983)	Prominent
Welfare	Eligibility determination; self-sufficiency plan development; employment-seeking assistance	Case management and eligibility for public programs	Individuals and populations	Accountability for services resides with government, but some functions have shifted to private-sector contracts	Invisible	Few; not very visible or effective	Private-sector contracts believed to provide higher quality, more choice, greater competition; integrated services meet client demands	Programs may vary by state, and outreach efforts may result in inequities and/or disparities
Banking	Accounts; deposits; loans; safe-deposit boxes; trusts; investments	Increase profits for owners and shareholders; lend funds; provide access to funds for creditors and debtors	Individuals, businesses, government	Mainly a private-sector function, but gov't serves an insurance function to protect against risk	Visible	Shareholders; people trying to get loans, build businesses; equal-lending advocates, community advocates	Concerns about access to accounts (automated teller machines [ATMs], branches), and services	May be unfair lending practices; concern about staff diversity; geographic maldistribution of banks in low-income areas
Port Authorities	Transportation and commerce	Promote local and/or regional economy by facilitating trade and transportation; ensure safety of port facilities	Private businesses, government (U.S. Navy, Department of Defense); individuals	Generally governmental or independent agencies established by the state	Invisible (became more visible following 9/11 attacks)	Private businesses (i.e., merchants), other port authorities, local gov't, Am Assoc Port Authorities	Congestion, capacity, customer satisfaction, queuing time, safety; new port models incorporate quality-improvement business models	None

Table 3.5: Comparison of Services by Organizational Features

	Traditional Organizational Structure or Geographic Distribution	Accountability for Performance	Professionalism	Relationship with Community	Reforms to Traditional Organization Structure	Structural Factors Relating to Improved Performance (Efficiency)	Barriers to Organizational Change
Public Health	State-by-state variation in public health centralization, type of bureaucratic structure, and distribution of local health departments	Shared accountability across federal govt, states, and local health departments	Multidisciplinary; variable and inconsistent training	Local public health departments often have relationships with community-based organizations	Privatization; public-private partnerships, regionalization; Public Health Institutes	Little is known about how the system should be organized to respond to public health needs	Funding; lack of technology; competing ideology; legal statutes; lack of continuity; fragmented funding; lack of coordination
Public Education	State by state variability in centralization of education, with some states and localities more decentralized; generally structured around local school districts	NCLB (2002) makes schools and districts accountable for student performance	Variable training (some states require certification, licensing)	Many school districts have strong relationship to community (may be related to better-performing districts); community members serve on boards	Decentralization; privatization/school choice; NCLB-accountability restructuring	Mixed evidence related to school choice (vouchers and charter schools); better-performing districts are smaller and have more interaction with community members and other agencies; smaller class sizes	Funding; lack of technology; competing ideology; disagreement about standards; bureaucracy; leadership changes; difficulties disseminating information

Table 3.5--Continued

	Traditional Organizational Structure or Geographic Distribution	Accountability for Performance	Professionalism	Relationship with Community	Reforms to Traditional Organization Structure	Structural Factors Relating to Improved Performance (Efficiency)	Barriers to Organizational Change
Welfare Reform	Traditionally entirely public; each state has separate welfare office with some variability of eligibility	Accountability still rests with state; must monitor policy adherence, financial integrity, and service quality/effectiveness of contracts	Relies heavily on on-job training and experience; profession often creates "state government lifers"; social workers; some employees trained in human services	State agencies may use community-based organizations to publicize availability of programs and eligibility processes; some CBOs serve as contractors	Shift to TANF introduces case-management privatization and collocation of services	Increased competition by broadening service-provider pool; reduced bureaucracy; more client choice; information technology for integrated services	Bureaucracy; large state-agency structure; funding
Banking	National banking systems, regional banking systems, local banking systems; organizational forms related to risk and demand	Federal Reserve; FDIC; shareholders; creditors and debtors	Training for tellers and management	Variable; depends on the size and location of bank	Deregulation (allowed megabanks to cross state lines); increased competition; flexible structures; cross-functional team approach	Bank size should relate to type of information and decisionmaking authority needed; large, geographically diversified banks have no competitive advantage; type of hierarchy should match consumer needs; cross-functional team approaches; use of information technology	Costs, high risk, time
Port Authorities	Geographically distributed around seaports; organizational structure has evolved with mix of state agencies and independent authorities owning and/or regulating port	State agencies or state-sponsored independent agencies held accountable; increasing business model accountability measures	Various backgrounds and professional qualifications	Attempts to reflect community's interests and potential benefits in port organization	Containerization; "agility ports," which incorporate private-sector business practices	Consumer demand, increased competition, regionalization, public/private structures	Costs; risks; narrow missions; jurisdictional issues; attitudes

NOTES: CBO = community-based organization; FDIC = Federal Deposit Insurance Corporation; NCLB = No Child Left Behind Act; TANF = Temporary Assistance for Needy Families.

Private-Sector Approaches

Our cross-sectoral analysis revealed that each of the sectors studied has had a long history of experimenting with private-sector approaches. There are many possible models in which public services can incorporate approaches from the private sector, with the expectation that doing so will make service delivery more efficient. Public-sector services can incorporate market forces through arrangements with private not-for-profit or for-profit organizations, such as by contracting out services, using single-bidder or multiple-bidder approaches, and establishing other partnerships (Kettl, 2003). Each system in our cross-sectoral analysis has been trying to determine the appropriate mix of public and private responsibility for specific partnership arrangements for ownership, service delivery, monitoring, and policy development. For any service, the optimal degree of private responsibility depends on economic considerations, and also administrative and employee concerns, practical challenges, and public acceptance.

Despite these challenges, our cross-sectoral analysis suggests that benefits can be related to the introduction of competitive forces in these services. In the port system, for example, increased competition has improved port efficiency in smaller cities. In the ideal type of port, the public sector would control regulation and land ownership, concentrating on core functions, while the private sector manages operations. Research suggests that quasi-public ports are likely to be most effective when the ownership and regulatory functions remain public and the public sector focuses on a few core functions, such as surveillance and traffic control. In banking, competitive forces have spurred greater entrepreneurship and the creation of new organizational forms (such as cross-functional teams).

Our analysis of wide-ranging market-based strategies used in the sectors we studied implied an important lesson for public health: There need to be *criteria* to help determine the public sector's role - what can be shifted to the private sector (through contracts or partnerships) and what must remain public. In education, contracting out services that do not have a direct relationship to the mission or values of public education

(such as cafeteria, janitorial, and transportation services) is relatively uncontroversial. But when new, private structures are introduced, as with vouchers and for-profit management of schools, criteria for the public role must be linked to the mission and core competencies of the public service. In the welfare system, there is much variability across states in which services are contracted, although criteria to make this determination are beginning to be developed. Potential balancing criteria for contracting out in welfare include costs, savings, technology needs, skill-set needs, and the effect on clients (which includes access, quality, and equity) (Bandoh, 2003).

In addition to various privatization approaches, there are other ways to incorporate concepts from the private sector into public health while preserving the public role. For instance, there may be a role for a “public entrepreneur” in public health: individuals who are challenged to create innovative, efficient solutions to public health problems within the governmental structure. While entrepreneurship generally refers to innovative behaviors that result in profits (in a business model), this concept might be applied to public-sector employees as well.

One model of public-sector entrepreneurship, used in urban redevelopment, is known as *municipal capitalism* (Chapin, 2002). In this model, the public sector plays a more active entrepreneurial role than in a managerial service delivery approach. According to Chapin, in municipal capitalism “the public sector is now the lead player during the entirety of the redevelopment process, an actor as focused on the return of investment . . . as the private sector.” Given the nature of public health functions, it seems highly unlikely that public health entrepreneurial activity will generate revenue.

Nonetheless, the port-authority literature provides examples of entrepreneurial activity in generating revenues within a public-private organizational structure. Likewise, the banking system provides an example of how organizational structures can influence entrepreneurial attitudes. When decentralized decisionmaking is encouraged, entrepreneurial and innovative activities result (such as cross-functional teams). Continuous education of employees also helps to stimulate innovation. These concepts

should be incorporated into public health. Decentralized decisionmaking (combined with enhanced training of public health professionals) should be encouraged when there is a need for local decisions that are tailored to individual situations or communities, because such encouragement could spark ingenuity.

Use of Information Technology

Our cross-sectoral analysis demonstrates that information-technology capacity has proven to be an essential component for facilitating decisionmaking in collaborations (real and virtual) in the banking, ports, and welfare sectors. Fukuyama and Shulsky (1997) argue that, over the past 50 years, the major change organizations have faced has been the change from organizations that produce a product to information-based organizations that deliver services. In the future, they suggest, information technology will be integral to organizational change toward flatter organizational structures dependent on efficient information flow. In banking, information technology is required to make decisionmaking less dependent on proximity. In ports, information technology is necessary to coordinate various partners. In welfare, the development of information technology is required to integrate programs effectively. Public education could benefit from better information technology for information dissemination.

In public health, enhanced information technology is consistently cited as a requirement for better surveillance functions, but it could also be used to facilitate collaboration. As noted in CDC's Focus Areas (particularly for the Health Alert Network) and in our case-study interviews, the development of information technology is a key element in successful bioterrorism preparedness. What emerges from our interviews is the need to understand better how to develop sophisticated but user-friendly IT systems for public health departments. Enhancement of IT will likely be an essential component of any reforms to the public health system.

Accountability

Broadly speaking, public health departments at all levels of government are subject to political accountability; but there is a notable absence of specific financial and

outcomes-related measures. In other words, what is lacking are a measure of whether the returns generated by the public health systems are worth the money invested and a system for linking any performance shortfalls to consequences, financial or otherwise.

Our review of alternative structures suggests the need across all sectors for better empirical evidence to assess performance and measure accountability. Yet the accountability challenges of public service contracting are manifest in the sectors selected for study. As the welfare system demonstrates, increased contracting of services introduces the need to evaluate and manage the contracts, including adding full-time staff dedicated to oversight of external contacts. In public health, most staff members have been trained to organize and deliver services and may not have been trained to manage contracts or external relationships. The trend toward contracting out suggests that the public health system must, as in welfare, devote staff members and resources to contract oversight.

Another accountability-related challenge of private approaches to public services is exemplified by school choice programs (e.g., vouchers, and magnet and charter schools). For such programs to be effective and accountable there must be well-publicized information about each school option and its performance in a given region. One barrier to the implementation of private approaches in education is a lack of data about quality, which may remain elusive because of not just the methodological complexity of the research but also the ideological commitments of researchers. The experience in public education should provide a lesson to public health about the necessity, yet difficulty, of good evaluations of such private-sector approaches.

Thus, data-driven approaches to accountability are essential. To implement such approaches well, performance measures for the public health system must be developed and tested, and better informatics must be developed to track performance indicators (Roper and Mays, 2000; Mays et al., 2004; Barry, 2000). One might imagine implementing jurisdiction-level accountability changes for health departments that underperform on key statistics, such as the No Child Left Behind Act does. For example,

in public education, the superintendent might be removed from a consistently poorly performing district. One might consider similar punitive actions in public health, such as removing the health officer from a health jurisdiction or department. Another option that might be imported from NCLB is implementing a “coach” at a health department to provide guidance and consultation for improvement, the strategy that underperforming public schools in Michigan employed. Although such actions are not standard for public employees, the NCLB model suggests that these governance changes are possible even within a public system.

Accreditation. Of course, the use of any standards or testing measures is predicated upon knowing *what* to measure and *how* to measure it, which is not yet clear in the case of public health (Roper and Mays, 2000). In response, public health organizations, such as the American Public Health Association and the National Association of County and City Health Officials are currently developing a mechanism to accredit public health professionals. Doing so will establish criteria and performance measures to hold public health professionals accountable.

Valuation. Another related aspect of accountability is to examine how to value the outputs of public programs. It is much easier to estimate value of private goods and services than to assess the value-added of public goods and services. For instance, there are methodological limitations to examining the value of preventing a flu pandemic. Yet the port-authority literature provides some elements that might be extended, particularly to provide insight into the value of public entrepreneurship. Understanding how to value public health services is important for the resource-allocation decisions facing public health practitioners. As our case-study interviews imply, practitioners need to make choices on how to integrate bioterrorism preparedness with responsibility for ongoing activities. Inevitably, the necessary trade-offs will be easier to make with more information about which functions and services deliver the greatest return on the public’s investment.

Applicability of Formal Organizational Structures Used in Other Sectors to Public Health

Our review of organizational structures used in other sectors also yielded information on some of the formal structural characteristics that we examined in the quantitative analysis and in the case studies: degree of centralization and the regionalization of services.

Centralization-Decentralization. Our cross-sectoral analysis cannot speak specifically to the level of centralization or decentralization that is desirable for public health, but it is clear that the optimal level of centralization will be contingent on the nature of the particular public health function or task. Our review of the literature did not reveal any extant criteria regarding those preparedness tasks that might be centralized as opposed to those that should be decentralized, and, as indicated above, our empirical analysis did not provide any guidance in this regard.

Consistent with the case-study interviews, the cross-sectoral analysis suggests that decentralized structures are feasible for those activities that are based on community-specific needs that might not benefit from economies of scale. But centralization remains salient for certain functions. In education, centralized authority is required for developing standards that all students must meet to fulfill education's function of providing societal benefits. In public health, labs or epidemiological services that are specialized and applicable across a state should have centralized control because of their wide benefits. Even so, the risk-communication function in public health preparedness contains elements of both.

Regionalization. Regionalization of public health services is an idea generating considerable attention. Researchers have proposed that public health services might be more effectively and efficiently delivered on a regional basis, merging counties or states into geographic regions linked by similar health status, economic, or geographic characteristics. For example, the Mississippi Delta region might be more effectively served through a regional public health authority, rather than through county-level or

state-level agencies (Mays and Halverson, 2005). Our cross-sectoral analysis suggests that regionalization of public health services might be incorporated, but that this approach must be directly linked to public health objectives. Both Michigan and Wisconsin have imposed regional bioterrorism preparedness structures on existing local functions. Because the case studies were not designed to evaluate regionalization, our results are only suggestive that regionalization might be a useful structural mechanism.

However, although there is no reason to believe *a priori* that regionalization of public health services will always be the best approach for meeting public health challenges, it might be a promising strategy. Small, less-affluent communities lack the resources to meet all of their public health needs (Mays and Halverson, 2005). The current structure places too many responsibilities on local units with inadequate resources to address them. Thus, combining resources across local units has the potential to provide more services through economies of scale and scope currently lacking in certain communities. Further, many of the risks to which public health must respond do not respect political boundaries. And a regional approach helps attenuate the manpower shortage facing smaller units.

Yet, there are two major impediments to a regional approach. The overriding difficulty is political. Local political units will lose the considerable control over resource allocation that they now enjoy (as suggested in our case-study interviews). Losing control over public health removes one mechanism for demonstrating to constituents what the county officials have done for them. The other difficulty is logistical. Which counties should be grouped within a regional structure? Combining the proper local units into a larger, regional entity is a solvable, but complex, issue (Mirvis, 2005). Encouraging the development of informal, or organic, regional approaches may provide an attractive alternative to “top-down” regionalization approaches, as well as a means for dealing with these two difficulties.

Cross-Sectoral Barriers to Reform. Our cross-sectoral analysis suggests some persistent barriers to organizational reform within the public health system. The most-

cited barriers include prohibitive costs and time needed to plan and implement change, lack of adequate IT capacity, and lack of quality empirical data on performance factors.

CHAPTER FOUR. SUMMARY AND CONCLUSIONS

This analysis employed various data sources and analytic methods with an eye toward identifying relationships between public health department organizational structures and preparedness outcomes. Our hope was that we could use the data sources and methods to triangulate on a clear set of recommendations regarding how public health systems should be restructured to increase their effectiveness. However, as is often the case, reality is more complicated than we would like, and judging from our analysis, we are not able to recommend any wholesale restructuring of the public health system to better meet preparedness goals and objectives. However, a clear set of lessons emerged that can and should be applied to public health systems, regardless of the formal structural characteristics that may exist. Below, we summarize our key findings and discuss their implications for improving public health preparedness in state and local health departments.

RESULTS OF THE QUANTITATIVE ANALYSIS

This research sought to assess whether there is a linkage between degree of centralization in states and the degree to which states are prepared to respond to public health emergencies. We defined *structure* in terms of three elements: (a) degree of centralization, (b) degree of regionalization, and (c) whether the state's public health department is part of a larger umbrella agency or exists as a freestanding agency. Such structural features might affect the extent to which state public health systems can effectively coordinate the activities of their own and local jurisdictions' activities in response to a bioterrorism event or other public health emergency. To the extent that there is such a relationship, it might inform decisions about restructuring state public health structures as the nation seeks to improve its capacity to respond to such emergencies.

Inasmuch as we found evidence of empirical relationships between structure and preparedness, they were weak and conditional on other variables. For instance, we found

that in some of our analyses mixed and centralized states generally reported somewhat higher task-completion rates than other states. But we must emphasize that the findings were hardly consistent. Similarly, we found that states whose health departments are part of umbrella agencies and employ formal, top-down regional structures perform slightly better than others. But in all instances, the differences across groups of states based on structural characteristics were small relative to the total amount of variation within any particular group.

Finally, it is possible that structure matters, but in ways not measured by the data available to us. In short, there might be better and worse ways of operating centralized and decentralized structures. Our tentative finding that centralization provides greater benefits in states with regional structures provides some insight into the conditional nature of structure.

CASE STUDIES

As we embarked upon the case studies, we were interested in understanding how public health organizational structure affects the ability of state and local public health agencies to conduct emergency preparedness activities. Our findings revealed wide variability in the organizational structures for public health. Even within states that were centralized or decentralized, we observed a high degree of variation in how state and local levels were coordinated, and variability in how public health was organized at both the state and local levels. This finding supports our quantitative results, which revealed greater within-group variation than between-group variation with respect to formal structural characteristics. Moreover, much of what we found may be related more to broader public-health-infrastructure issues than to specific state or local public health organizational structure. That said, several themes emerged from the case-study interviews regarding how organizational issues are related to preparedness.

In all but the most centralized states, there needs to be greater coordination between the state and local public health departments, and a greater specification and shared understanding of roles and responsibilities for preparedness activities. We

observed the formation of informal coalitions and working groups of local public health officers to fill this gap in some states, and we found these groups to be facilitators for sharing information among geographic regions within a state.

The challenges of recruiting and retaining qualified staff to work on public health preparedness was a strong and consistent theme of our case studies. On the positive side, interviewees recounted stories of individuals who were able to work effectively regardless of the formal organizational structures that were in place. On the negative side, other individuals told us about the effects of turnover and the inability, in some states, to fill vacant positions as a result of hiring freezes or burdensome bureaucratic processes around hiring.

In short, the case studies demonstrated that there is no clear recipe that states can follow: No one organizational structure was equally effective across all states. At the same time, the case studies provided evidence that effective leadership, good communications and IT systems, and an adequate number of staff as well as staff training were critical ingredients for a well-prepared state or locale, regardless of organizational structure.

LESSONS FROM ALTERNATIVE GOVERNANCE STRUCTURES AND STRATEGIES IN OTHER SECTORS

The most important policy implication from the analysis of other organizational structures is that there is no obvious alternative organizational model that could be the basis for a redesigned public health system. What emerges, instead, is that there are some innovative ways of thinking about public health delivery that deserve further analysis. In particular, policymakers should consider the following.

Regionalization

Further examination of both inter- and intrastate regionalization as a means of organizing public health services is warranted. Our review of the literature does not indicate that more-radical organizational alternatives are either available or feasible. As

an interim strategy that could well act as a catalyst for states to reconceptualize the delivery of public health services, therefore, we recommend additional exploration of this approach. One of its advantages would be to stimulate states to reassess the issue of centralization versus decentralization. In the process of devising a regional strategy, states would almost certainly examine which services would more appropriately be delegated to the regional structures and which would be best provided at the state or local level.

Defining Public Entrepreneurs

The concept of the public entrepreneur emerges most particularly in the literature on quasi-public organizational approaches across the sectors. A “public entrepreneur,” in contrast to a traditional “public servant,” is somebody who develops innovative processes to achieve some public health goal or value - for example, improved public health preparedness. One hypothesis with regard to organizational change is that a public health leader who is more “entrepreneurial” is more likely to embrace reforms. Future research might assess the organizational capacity of the public health system to engage in entrepreneurial activities, perhaps considering the public entrepreneur leader as a variable facilitating change. Research questions that might be addressed include the following: What are the activities a public entrepreneur would pursue in public health? Who are the public entrepreneurs of a health department? What qualities distinguish somebody who considers innovative approaches within public health? What value does a public entrepreneur work toward maximizing?

Privatization Criteria

Our analysis across sectors suggests the need for criteria to help public health professionals make important decisions about which public health services can be privatized and which should remain public. Instead of individual health department leaders making these critical decisions in isolation, some broad criteria should be developed to help. Risk represents one nascent criterion that might be explored. Services that relate to risk (including bioterrorism and communicable disease) should be maintained by the public sector to ensure that there is adequate oversight of these services

and to minimize transaction costs related to contracting these services out. Services that involve routine and repeated events may well be shifted to the private sector and monitored by the local health department through computer-based systems (Kettl, 2003).

In any event, policymakers need to determine which functions must remain with the public health system and which might easily become private-sector responsibilities. In so doing, they must be mindful of distinguishing between contracting out individual tasks or services and the wholesale privatization of critical functions or services, because each of those approaches has implications for oversight and accountability. Future research might consider the process through which such criteria should be developed and consider some (preliminary) criteria through which public health professionals can determine what functions should be maintained under a public role. Additional work is also needed to develop mechanisms to hold private entities accountable for their performance.

LIMITATIONS

Our analyses are subject to a number of important limitations, which should be kept in mind when interpreting our findings and considering our policy recommendations. With respect to the quantitative analysis, and as mentioned previously, the measures of preparedness employed are limited for a variety of reasons, not the least of which is that there is no agreed-upon definition of *preparedness*. Moreover, there are serious questions about the extent to which the self-reported data used to construct the preparedness indices represent valid indicators of capacity to actually mount a successful response. As noted in unpublished RAND research, rankings based on the CDC data are of questionable face validity given our experience in the field. There, we speculated that well-developed understanding of the complexity of preparedness might bring with it a heightened awareness of one's limitations and of what one does not know. In other words, some of the best-prepared places could potentially rank themselves relatively low because their leaders realize that much more needs to be accomplished. Thus, opinions about the face validity of a given measure will inevitably broach disagreements about what counts as

preparedness, as well as opinions about the adequacy of the measure as an accurate representation of those constructs.

Additionally, other aspects of the CDC grantee reports raise flags regarding the reliability of measures derived from them. For instance, the reporting formats do not specify who is supposed to fill out each section of the reports. As a result, at least some of the apparent variation in preparedness across states might be due to variation in the positions and perspectives of the individuals filling out the reports. Similarly, grantees might have varying interpretations of the response categories. For instance, one respondent's view of the difference between whether an item is complete, partially complete, or incomplete might differ from that of another respondent. Thus, variation in the reported data might reflect these differences, in addition to variation in true preparedness levels.

A second limitation is that our measures of public health structure include only *formal* and institutional manifestations of structure. It is well known that the actual operation of institutions depends on a host of informal norms, relationships, and practices that are not represented in our analysis. As noted above, we speculate that regionalization might be a proxy for informal networks, but whether it truly is just that--speculation.

Another important limitation is that structure may be endogenous. That is, it is possible, for instance, that a given state may have adopted a more centralized organizational structure if it had reason to doubt the ability of local health departments to mount an effective response. This type of behavior, in turn, may call into question any attempt to draw causal conclusions from correlations between structure and preparedness. Conceptually, the soundest method for assessing the causal impact of public health structure on public health emergency preparedness would involve random assignment of structures to states. Under such circumstances, any observed differences among states with different structures could be attributed to variation in structures. But it is very unlikely that structural elements are randomly distributed across the states. Structure might change as a result of perceived deficiencies in performance. If, for instance,

reformers centralize states' public health systems in response to perceived deficiencies, then the level of preparedness would determine the structure, rather than vice versa. Moreover, states' knowledge of or propensity to report performance deficiencies in surveys and CDC reports might be linked to structure.

The case-study analysis is also subject to a number of important limitations. First, although we attempted to select sites for study that are broadly representative of all CDC public health preparedness grantees, we have no way of knowing whether we were successful in this regard. As a result, we cannot claim in any rigorous sense that our findings and policy implications are applicable to all grantees. Second, in conducting the site visits, we attempted to obtain multiple points of views and to synthesize what we heard to arrive at a reasonable portrait of how events unfolded, strategies were considered, and solutions implemented. But we have not subjected our syntheses to any formal validity and reliability testing, mainly for practical purposes. Finally, our case-study results are driven largely by the degree to which interviewees were candid in their responses to our questions. Although we provided interviewees with strict confidentiality assurances prior to beginning our questioning, we have no way of determining the extent to which they provided truthful and accurate responses.

Our review of alternative governance structures and strategies contains many of the limitations found in other literature reviews. For instance, despite our efforts and intentions, we cannot claim that we have captured and analyzed all of the relevant literature. Second, it is entirely possible that other sectors may have provided important insights for public health, but budget and other constraints precluded us from casting too wide a net. Finally, we chose to organize our review by sector, as opposed to practice (e.g., privatization), reasoning that doing so would provide a preferred context for analyzing our results. This decision, however, compromised our ability to use more-formal analytic techniques, such as meta-analysis, for presenting the lessons learned from the relevant literature.

FINAL THOUGHTS

Overall, we are optimistic about the prospects for meaningful organizational reform of the public health system. As indicated earlier, the increased funding that public health has experienced as a result of 9/11 and the anthrax attacks, coupled with a widespread recognition at the state and local levels of the importance in mounting an effective public health response to a wide range of emergencies, presents significant opportunities for change.

Our analyses, however, failed to reveal any panaceas or magic bullets for how best to structure governmental public health with regard to preparedness. But together they tell us that the time is right for an extended dialogue that includes federal, state, and local public health officials about, essentially, *who* should do *what*. Our case-study results demonstrate convincingly that policymakers should refrain from imposing a one-size-fits-all approach, and should recognize that risks, infrastructure, and capabilities vary, and will continue to vary, among and within states. At the same time, efforts must be made to determine how public health systems can provide equal levels of protection to their jurisdictions' populations. Finally, policymakers need to harmonize public health preparedness measures across federal agencies, including CDC, HRSA, and Department of Homeland Security (DHS), and arrive at a consensus regarding which governmental entities will be held accountable for developing and maintaining relevant public health preparedness capabilities, and at what level.

APPENDIX A. CDC PROGRESS REPORT INDICATORS (2004)

Table A.1: CDC Progress Report Indicators (2004)

Item ID Number	Item Description	Focus Area	Used in "Top 10" Index?
CC-1: RA-1	Continue to support a Senior Public Health Official within the state/local health department to serve as Executive Director	A	Yes
CC-1: RA-2	Establish or enhance a coordinated and integrated process for setting goals and objectives, implementing work plans with time lines, monitoring progress, and allocating resources as the process relates to this entire cooperative-agreement program (LINK WITH HRSA PRIORITY AREA 1).	A	No
CC-1: RA-3	Critical Benchmark #1: Develop and maintain a financial accounting system capable of tracking expenditures by Focus Area, critical capacity, and funds provided to local health agencies.	A	No
CC-1: RA-4	(HRSA/CDC Crosscutting Activity) Maintain and extend as appropriate a database displaying activities funded jointly by the CDC and HRSA cooperative agreements, and as applicable, from other sources, in a form that can be included readily in progress report.	A	No
CC-1: RA-5	(Smallpox) Appoint or continue to support a coordinator for the National Smallpox Vaccination Program.	A	No
CC-1: RA-6	(HRSA/CDC Cross-Cutting Activity) Establish an Advisory Committee to assist the senior State health official in overseeing both the CDC and HRSA cooperative agreements. See Attachment X for additional details (LINK WITH HRSA PRIORITY AREA 1).	A	No
CC-2: RA-1	1. Conduct a comprehensive analysis of all information and data obtained during the assessments of emergency preparedness and response capabilities related to bioterrorism, other infectious disease outbreaks, and other public health threats and emergencies. If previous assessments have not included state and local capabilities in mental health preparedness and response, they should be performed during the upcoming budget period. Document the findings and corrective actions taken and establish time lines, goals and objectives for achieving and refining the critical-capacity requirements.	A	No

Item ID Number	Item Description	Focus Area	Used in "Top 10" Index?
CC-2: RA-2	2. Conduct a comprehensive analysis of all information and data obtained during the assessments of statutes, regulations, and ordinances within the state and local public health jurisdictions that provide for credentialing, licensure, and delegation of authority for executing emergency public health measures, as well as special provisions for the liability of healthcare personnel in coordination with adjacent states. Additionally, there should be mention of workers' compensation issues and the health issues of workers and their families who may be involved in emergency response. Establish time lines, goals and objectives for achieving and refining the critical-capacity requirements.	A	Yes
CC-2: RA-3	3. (Smallpox) Conduct an assessment of statutes, regulations, and ordinances within the state and local public health jurisdictions that include special provisions for liability protection and compensation for adverse events post-vaccination of healthcare personnel who participate in the National Smallpox Vaccination Program.	A	No
CC-3: RA-1	1. Critical Benchmark #2: Develop or enhance scalable plans that support local, statewide, and regional response to incidents of bioterrorism, catastrophic infectious disease, such as pandemic influenza, other infectious disease outbreaks, and other public health threats and emergencies. Plans must include detailed preparations to rapidly administer vaccines and other pharmaceuticals, and to perform healthcare facility –based triage and provide short-term acute psychosocial interventions as well as longer-term services to large populations. This should include the development of emergency mutual-aid agreements and/or compacts, and inclusion of hospitals.	A	No
CC-3: RA-2	2. Demonstrate how preparedness and response planning is coordinated within existing emergency management infrastructure that is facilitated and supported by all appropriate federal response plans. See Attachment X for additional details.	A	No
CC-3: RA-3	3. Critical Benchmark #3: Maintain a system for 24/7 notification or activation of the public health emergency response system.	A	No
CC-3: RA-4	4. Critical Benchmark #4: Exercise all plans on an annual basis to demonstrate proficiency in responding to bioterrorism, other infectious-disease outbreaks, and other public health threats and emergencies.	A	Yes
CC-3: RA-5	5. Work with state and local emergency management agencies, environmental agencies, worker health and safety agencies, and others to conduct assessments to identify vulnerabilities in terms of human health outcomes related to a variety of biological, chemical, and mass-casualty terrorist scenarios. Establish time lines, goals, and objectives for conducting vulnerability assessments.	A	Yes

Item ID Number	Item Description	Focus Area	Used in "Top 10" Index?
CC-3: RA-6	6. Work with hospitals, the medical community, and others to plan coordinated delivery of critical health and mental health services and effective medical management emergencies. Establish time lines, goals, and objectives for achieving and refining the critical-capacity requirements. (LINK WITH HRSA PRIORITY AREA 2.)	A	No
CC-3: RA-7	7. Critical Benchmark #5: (HRSA/CDC CrossCutting Activity) Review and comment on documents regarding the National Incident Management System (NIMS), develop and maintain a description of the roles and responsibilities of public health departments, hospitals, and other health care entities in the statewide incident management system and, where applicable, in regional incident management systems.	A	No
CC-4: RA-1	1. Critical Benchmark #6: Develop or maintain, as appropriate, an SNS preparedness program within the recipient organization's overall terrorism preparedness component, including full-time personnel, that is dedicated to effective management and use of the SNS statewide. This SNS preparedness program should give priority to providing appropriate funding, human and other resources, and technical support to local and regional governments expected to respond should the SNS deploy there.	A	No
CC-4: RA-2	2. Provide funding, human and other resources, and technical support to help local and regional governments develop a similar SNS preparedness program dedicated to effective management and use of the SNS.	A	No
CC-4: RA-3	3. Prepare and implement a project area strategy, and identify personnel, to ensure the SNS preparedness functions described in Version #9 of the guide for Planning the Receipt and Distribution of the CDC National Pharmaceutical Stockpile, April 2002, will be mobilized to respond to an SNS deployment anywhere in the project area and that defines the roles of local and regional governments in leading and staffing the various functions.	A	No
CC-4: RA-4	4. Collaborate with local and regional governments leading and staffing various SNS preparedness functions to carry out coordinated orientation and training for the members of those function teams, and to carry out periodic readiness exercises for those teams, individually, as groups of interdependent functions, and as a complete SNS preparedness organization.	A	No
CC-4: RA-5	5. Collaborate with the recipient organization carrying out Focus Area F to prepare public communication campaigns that, in a bioterrorism event, would (1) inform the public of where to obtain prophylaxis; (b) encourage adherence to oral prophylaxis regimens; (c) advise on various antibiotics to be prescribed; (d) explain the threat agent and its transmissibility; and (e) address local issues, e.g., urging undocumented populations to seek prophylaxis. (LINK WITH FOCUS AREA F)	A	No

Item ID Number	Item Description	Focus Area	Used in "Top 10" Index?
CC-4: RA-6	6. Develop and maintain communications between SNS preparedness program and recipient organizations carrying the other focus areas funded under this cooperative agreement, allowing for collaboration as appropriate.	A	No
CC-4: RA-7	7. (Smallpox) Describe the procedure that will be used to monitor, store, and manage large quantities of smallpox vaccine within smallpox response resources (hospitals, healthcare facilities, public health clinics).	A	No
EC-1: EA-1	1. Conduct a statewide assessment of state, local and governance capacity of the public health system using the National Public Health Performance Standards assessment instruments developed collaboratively by CDC, ASTHO, NACCHO, NALBOH [National Association of Local Boards of Health], and other national public health partners. Use the results of these assessments to guide the development of an overall public health infrastructure improvement plan.	A	No
EC-1: EA-2	2. Create a joint state-local public health infrastructure improvement plan, including time lines, goals, and objectives for achieving and refining the critical-capacity requirements. The process for plan development should be guided by the principles of state-local collaboration developed by ASTHO and NACCHO. Documentation of adherence to these principles should be provided as evidence of the collaborative process.	A	No
EC-1: EA-3	3. Conduct comprehensive system and community health improvement planning using a model such as Mobilizing for Action through Planning and Partnerships (MAPP) (see http://www.naccho.org/).	A	No
EC-2: EA-1	1. Develop or support formal state and local public health leadership and management development. Coordinate with established state/regional public health leadership institutes covering the geographic area.	A	Yes
EC-2: EA-2	2. Develop specialized state and local public health leadership and management trainings in advanced concepts of incident command and bioterrorism communication.	A	No
EC-3: EA-1	1. Update and refine state, city, and regional response plans based upon deficiencies noted from exercises or actual events. Establish time lines, goals, and objectives for achieving and refining the enhanced-capacity requirements.	A	No
EC-3: EA-2	2. Conduct vulnerability assessments and predictions of human health effects resulting from releases of chemical or etiologic material. Establish time lines, goals, and objectives for achieving and refining the enhanced-capacity requirements.	A	No
EC-3: EA-3	3. Update and refine assessments of and response to epidemiologic, laboratory, and environmental health needs resulting from scenario and vulnerability assessments.	A	No
EC-3: EA-4	4. Develop and expand the capacity to conduct environmental sampling and health follow-up of victims following terrorist attacks.	A	No

Item ID Number	Item Description	Focus Area	Used in "Top 10" Index?
EC-3: EA-5	5. Develop and expand the capacity to communicate immediately and reliably with the public, healthcare providers, the response community, the media, and elected officials.	A	No
EC-3: EA-6	6. Develop and expand capacities to respond to injuries (including psychological) resulting from terrorist events, including the capacity to develop and standardize instruments used in conducting needs assessments of the healthcare system capacity to provide optimal trauma care, and the capacity to conduct injury surveillance in an acute event, and to survey ongoing victim needs.	A	No
EC-3: EA-7	7. Develop and expand the capacity to address worker health and safety issues related to terrorism, with a primary focus on protection of emergency response workers, remediation workers, workers responsible for restoring essential public services, and other exposed occupational groups such as postal workers and healthcare workers.	A	No
CC-5: RA-1	1. Critical Benchmark #7: Complete development of and maintain a system to receive and evaluate urgent disease reports and to communicate with and respond to the clinical or laboratory reporter regarding the report from all parts of your state and local public health jurisdictions on a 24-hour-per-day, 7-day-per-week basis.	B	Yes
CC-5: RA-10	10. (Smallpox) Improve the adequacy of state and local public health surveillance and reporting capacities related to smallpox, such as active surveillance for rash illnesses, case contact tracing, and monitoring for adverse events following vaccination.	B	No
CC-5: RA-11	11. In coordination with local public health agencies, apply information technology according to established specifications, including NEDSS [National Electronic Disease Surveillance System] development or the NEDSS Base System, to develop or enhance electronic applications for reportable diseases surveillance, including electronic laboratory-based disease reporting from clinical and public health laboratories and linkage of laboratory results to case report information. (See Appendix 4 for IT Functions #1-5.) (LINK WITH FOCUS AREAS C AND E, CROSSCUTTING ACTIVITY SURVEILLANCE AND INTEROPERABILITY OF IT SYSTEMS, Attachment X.)	B	No
CC-5: RA-12	12. In coordination with your public health laboratory, develop the capacity to apply molecular epidemiologic methods (e.g., pulsed field gel electrophoresis or sequence-based methods) to outbreak investigations and surveillance as appropriate. (LINK WITH FOCUS AREA C.)	B	No
CC-5: RA-13	13. Integrate infectious-disease surveillance by establishing relationship with state veterinary diagnostic laboratory. Evaluate database system for identification and tracking of zoonotic diseases. Conduct survey of veterinary practitioners regarding laboratory utilization and specimen submission practices.	B	No

Item ID Number	Item Description	Focus Area	Used in "Top 10" Index?
CC-5: RA-2	2. Ensure legal authority to require and receive reports and investigate any suspect cases, potential terrorist events, unusual illness or injury (e.g., chemical or radiological) clusters, and respond in ways to protect the public (e.g., quarantine laws).	B	Yes
CC-5: RA-3	3. At least annually, with the input of local public health agencies, assess the timeliness and completeness of your reportable disease surveillance system for: (a) Outbreaks of illness and/or key categories of cases of reportable diseases, particularly those that are caused by agents of bioterrorism concern or those that mimic agents of bioterrorism concern; and others, such as influenza, invasive bacterial diseases, vaccine-preventable diseases, vector-borne diseases, and food- and water-borne diseases; (b) Acute dermatological conditions/rash illnesses.	B	No
CC-5: RA-4	4. Given these assessments, develop or enhance reporting protocols, procedures, surveillance activities, information dissemination, or analytic methods that improve the timeliness, completeness, and usefulness of the reportable disease system.	B	No
CC-5: RA-5	5. (a) Provide ongoing specialized disease surveillance and epidemiologic training for public health, clinical, and other healthcare professionals to develop subject-matter expertise within the public health system for disease detection, contact tracing, and outbreak analysis (LINK WITH FOCUS AREA G, CROSSCUTTING ACTIVITY EDUCATION AND TRAINING, Attachment X); (b) Evaluate disease surveillance and epidemiologic training for public health personnel.	B	No
CC-5: RA-6	6. Ensure epidemiologic capacity to manage the reportable disease system at the state and local levels by providing necessary staffing, supplies, and equipment for epidemiology, surveillance, and interpretation of clinical and laboratory information. (LINK WITH FOCUS AREAS C AND G)	B	No
CC-5: RA-7	7. (a) Educate and provide feedback to reporting sources in your jurisdiction about notifiable diseases, conditions, syndromes and their clinical presentations, and reporting requirements and procedures, including those conditions and syndromes that could indicate a terrorist event. (LINK WITH FOCUS AREA G, CROSSCUTTING ACTIVITY EDUCATION AND TRAINING, Attachment X); (b) Evaluate training provided to clinicians and other healthcare providers.	B	No
CC-5: RA-8	8. Assess and strengthen links with animal surveillance systems and the animal health community to support early-detection efforts of illness among animals.	B	No
CC-5: RA-9	9. In coordination with your public health laboratory, develop and implement a strategy to ensure laboratory testing (in clinical or public health laboratories) for rapid or specific confirmation of urgent case reports. (See Appendix 4 for IT Functions #1, 4, and 5.) (LINK WITH FOCUS AREAS C AND D)	B	No

Item ID Number	Item Description	Focus Area	Used in "Top 10" Index?
CC-6: RA-1	1. Confirm that an epidemiological response coordinator for bioterrorism, other infectious-disease outbreaks, and other public health threats and emergencies has been designated at the appropriate state and/or local levels.	B	No
CC-6: RA-10	10. Conduct bioterrorism sessions at key meetings and conferences of outside organizations involved in epidemiologic detection and response, for example, the Association for Professionals in Infection Control and Epidemiology (Inc.) (APIC), infectious-disease societies, healthcare practitioners, and veterinary organizations.	B	No
CC-6: RA-2	2. With local public health agencies, coordinate all epidemiologic response-specific planning in this section with your jurisdiction's overall planning conducted in Focus Area A and with hospital preparedness activities being facilitated by the Health Resources Services Administration.	B	Yes
CC-6: RA-3	3. (a) Provide ongoing specialized epidemiology investigation and response training for state and local public health staff (including epidemiology response teams) who would respond to a bioterrorism event. (LINK WITH FOCUS AREA G, CROSSCUTTING ACTIVITY EDUCATION AND TRAINING, Attachment X); (b) Evaluate bioterrorism epidemiologic response training for state and local public health agency personnel, healthcare providers, policymakers, law enforcement officials, and others who would be involved in responding to an event (drills/exercises).	B	No
CC-6: RA-4	4. Develop the capacity to track the degree to which persons who have not been exposed to a potential terrorist or emerging infectious agent seek acute care at healthcare facilities.	B	No
CC-6: RA-5	5. In coordination with appropriate state and local agencies responsible for food, water, and air safety, develop or ensure capacity of public health system to respond in a timely and appropriate manner to a food-, water-, or air-borne illness or threat.	B	No
CC-6: RA-6	6. Develop or acquire information and fact sheets about bioterrorism, other infectious-disease outbreaks, other public health threats and emergencies, and other relevant technical information for public use in a terrorist event. (LINK WITH FOCUS AREA F)	B	No
CC-6: RA-7	7. Critical Benchmark #8: With local public health agencies, identify and maintain a current list of physicians and other providers with experience and/or skills in the diagnosis and treatment of infectious, chemical, or radiological diseases or conditions (including psychological and behavioral) possibly resulting from a terrorism-associated event (for example, those who have seen and treated smallpox) who may serve as consultants during a public health emergency. (See Appendix 4, IT Function #7.)	B	No

Item ID Number	Item Description	Focus Area	Used in "Top 10" Index?
CC-6: RA-8	8. (Smallpox) Develop and exercise a large-scale smallpox vaccination plan that will provide vaccine for the project's entire population and can be rapidly executed once a case of smallpox disease has been identified anywhere in the world. This plan will be implemented in conjunction with the smallpox response plan mentioned above that will aid in controlling and containing a smallpox disease outbreak should it occur within the project's jurisdiction. The plan should address: patient screening; clinic operations; outreach; adverse-event monitoring and management; reading of takes; and evaluation.	B	No
CC-6: RA-9	9. Critical Benchmark #9: Establish a secure, Web-based reporting and notification system that provides for rapid and accurate receipt of reports of disease outbreaks and other acute health events that might suggest bioterrorism. Include provision for multiple channels for routine communications (e.g., Web, email) and alert capacity for emergency notification (e.g., phone, pager) of key staff. (See Appendix 4 for IT Functions #6-9.) (LINK WITH FOCUS AREA E, CROSSCUTTING ACTIVITY INTEROPERABILITY OF IT SYSTEMS, Attachment X)	B	Yes
CC-7: EA-10	10. Enhanced Recipient Activity: (Smallpox) Develop and maintain a registry of all public health personnel, health care personnel, public health workers; security staff needed to maintain public order; EMS staff needed to transport ill patients; hospital staff; private physicians and their staff who may be occupationally at risk, to receive a vaccination in the event of the release of smallpox.	B	No
CC-7: EA-11	11. Enhanced Recipient Activity: (Smallpox) Provide the number and type of key security staff needed to maintain public order; EMS staff needed to transport ill patients; hospital staff, private physicians and their staff who may be occupationally at risk during a smallpox outbreak, who will be target recipients for vaccine.	B	No
CC-7: RA-1	1. Critical Benchmark #10: At least annually, assess, through exercises or after action reports to actual events, the 24/7 capacity for response to reports of urgent cases, outbreaks, or other public health emergencies, including any events that suggest intentional release of a biologic, chemical, or radiological agent.	B	No
CC-7: RA-2	2. Critical Benchmark #11: At least annually, assess adequacy of state and local public health response to catastrophic infectious disease such as pandemic influenza, other outbreaks of disease, and other public health emergencies.	B	No
CC-7: RA-3	3. Based on these assessments, develop or enhance case-investigation protocols, response procedures, legal or regulatory provisions, or communication and information dissemination activities that improve the effectiveness of the public health epidemiologic response.	B	No

Item ID Number	Item Description	Focus Area	Used in "Top 10" Index?
CC-7: RA-4	4. Ensure epidemiologic response capacity to investigate and respond to urgent cases, catastrophic infectious disease such as pandemic influenza, other disease outbreaks, and public health emergency interventions at the state and local levels by providing necessary staffing, supplies, equipment, consultation, and training in epidemiology; outbreak investigation; interpretation of clinical and laboratory information; public health control measures; protection measures for emergency response workers; communications systems; and management of secure information.	B	No
CC-7: RA-5	5. Maintain continuous participation in CDC's Epidemic Information Exchange Program. (See Appendix 4 for IT Functions #7-9.)	B	No
CC-7: RA-6	6. With local public health agencies, educate, especially in the context of real-life situations, key policymakers, partners, and stakeholders in your jurisdiction regarding the nature and scope of public health surveillance, investigation, response, and control.	B	No
CC-7: RA-7	7. With local public health agencies, apply information technology to enhance response capacity (for example, workflow tracking and monitoring systems; field data entry, analysis, and transmission; management of case contacts; and delivery of immunizations and chemoprophylaxis information. (See Appendix 4 for IT Functions #5, 6, and 9.)	B	No
CC-7: RA-8	8. (Smallpox) Develop a comprehensive smallpox response plan that incorporates post-event plans from participating hospitals. Exercise the plan so that it can be rapidly executed to control and contain the consequences of a smallpox outbreak should the outbreak occur within the project's jurisdiction.	B	No
CC-7: RA-9	9. (Smallpox) Identify the number and type of healthcare and public health personnel to serve as members on smallpox response (public health and healthcare response) teams who will be target recipients for vaccine.	B	No
EC-4: EA-1	1. Enhance the timeliness and completeness of a system, (e.g., death reporting, data kept by medical examiners/coroners, emergency responders, poison control centers, 911 systems, pharmacies, clinics, and veterinarians) through electronic reporting to detect or respond to a terrorist attack. (See Appendix 4 for IT Functions #1-5.)	B	No
EC-5: EA-1	1. Develop and evaluate surveillance to rapidly detect influenza-like illness (ILI) and distinguish possible bioterrorism-caused illness from other causes of ILI.	B	No
EC-5: EA-2	2. Develop active, laboratory-based surveillance for invasive bacterial diseases (for example, <i>N. meningitis</i> , <i>B. anthracis</i> , <i>Y. pestis</i> , and other causes of sepsis or meningitis). (LINK WITH FOCUS AREA C.)	B	No
EC-5: EA-3	3. Develop and evaluate surveillance for encephalitis and meningitis or unexplained critical illnesses or deaths. Link clinical reports and laboratory test results. (LINK WITH FOCUS AREAS C AND E.)	B	No

Item ID Number	Item Description	Focus Area	Used in "Top 10" Index?
EC-5: EA-4	4. Develop and evaluate surveillance for indicators of terrorist events, and catastrophic infectious diseases, including hospital admissions, hospital beds occupied (or available), intensive care unit admissions, or emergency department visits. (LINK WITH FOCUS AREA E.)	B	No
EC-5: EA-5	5. Evaluate existing databases (for example, data kept by medical examiners/coroners, emergency responders, poison control centers, 911 systems, pharmacies, clinics, and veterinarians) for use in surveillance systems. (LINK WITH FOCUS AREA E.)	B	No
EC-6: EA-1	1. Regularly provide relevant public health information to key partners through an appropriate Web site and/or a jurisdiction wide newsletter. (LINK WITH FOCUS AREA E.)	B	No
EC-6: EA-10	10. With local public health agencies, enhance relationships with environmental health and management agencies to support the surveillance, investigation, and response activities required in the event of a chemical or radiological terrorism-associated event.	B	No
EC-6: EA-11	11. With local public health agencies, enhance relationships with worker safety and health agencies and the emergency response community to address issues related to the protection of emergency response workers, health care workers, remediation workers, workers involved in restoring essential public services, and others who may be involved in the response to a terrorist event.	B	No
EC-6: EA-2	2. With local public health agencies, enhance relationships with infection-control professionals through development of a formal public health network or support of state activities that build relationships between the health department and the Association for Practitioners in Infection Control and Epidemiology.	B	No
EC-6: EA-3	3. With local public health agencies, enhance relationships with infectious-disease physicians by participating in infectious-disease rounds and conferences, supporting an infectious-disease society or network, or supporting a health department-based infectious-disease fellow. (LINK WITH FOCUS AREA G.)	B	No
EC-6: EA-4	4. With local public health agencies, enhance relationships with emergency department providers and emergency responders by attending and participating at conferences, developing and evaluating surveillance activities, or engaging in NEDSS-related activities for development of electronic systems for emergency department reporting. (See Appendix 4 for IT Functions #1-2.)	B	No
EC-6: EA-5	5. With local public health agencies, enhance relations with medical schools, nursing schools, Centers for Public Health Preparedness, and other schools of public health through jointly sponsoring conferences, teaching, assisting in curriculum development and offering health department electives to students and residents. (LINK WITH FOCUS AREA G.)	B	No

Item ID Number	Item Description	Focus Area	Used in "Top 10" Index?
EC-6: EA-6	6. With local public health agencies, enhance relations with law enforcement agencies, the business community, and the National Guard by establishing designated points of contact and through cross-training in each discipline and/or jointly sponsoring conferences.	B	No
EC-6: EA-7	7. With local public health agencies, enhance relations with veterinarians by encouraging infectious-disease testing and reporting; participating in veterinary school grand rounds; encouraging relationships with the state board of animal health, department of agriculture, department of natural resources, veterinary school, and veterinary diagnostic laboratory.	B	No
EC-6: EA-8	8. With local public health agencies, enhance relations with members of the medical examiner and coroner response community by providing education, designating points of contact, and providing joint sponsorship of meetings.	B	No
EC-6: EA-9	9. With local public health agencies, enhance relationships with emergency management agencies to support public health agency role during emergency response activities through cross-training in each discipline, especially enhancing public health's understanding of the Incident Command System.	B	No
CC-8: RA-1	1. Develop and maintain the capability of Level A (sentinel) laboratories to (a) perform rule-out testing on critical bioterrorism (BT) agents, (b) safely package and handle specimens, and (c) refer to LRN [Laboratory Response Network] Level B/C (reference/confirmatory) laboratories for further testing. (LINK WITH FOCUS AREAS D AND G AND HRSA PRIORITY AREA #4.)	C	Yes
CC-8: RA-2	2. Critical Benchmark #12: Complete and implement an integrated response plan that directs how public health, hospital-based, food testing, veterinary, and environmental testing laboratories will respond to a bioterrorism incident, to include: (a) roles and responsibilities; (b) inter- and intrajurisdictional surge capacity; (c) how the plan integrates with other department wide emergency response efforts; (d) protocols for safe transport of specimens by air and ground; and (e) how lab results will be reported and shared with local public health and law enforcement agencies, ideally through electronic means. (LINK WITH FOCUS AREAS A, B, D, E, AND F, and CROSSCUTTING ACTIVITY LABORATORY CONNECTIVITY, Attachment X.)	C	Yes

Item ID Number	Item Description	Focus Area	Used in "Top 10" Index?
CC-8: RA-3	3. In accordance with Critical Benchmark #12, address the identified needs for testing food specimens for critical BT pathogens. This may be done by contracting for services with laboratories that possess the requisite capabilities, by sponsoring such capability development within collaborating organizations (such as food regulatory laboratories), and/or by developing the requisite capabilities directly within public health department laboratories. Technical assistance with respect to selection of analytic methods is available through FDA [the Food and Drug Administration], in consultation with CDC (see Appendix 1 for FDA contact information).	C	No
CC-8: RA-4	4. Establish and maintain operational relationships with local members of HazMat [Hazardous Material] teams, first responders, local law enforcement, and FBI [Federal Bureau of Investigation] to provide laboratory support for their response to bioterrorism, including environmental testing for exposure assessment and chain-of-custody procedures. Examples of these enhanced relationships include providing designated points of contact, cross-training in each discipline, and/or jointly sponsoring conferences. (LINK WITH FOCUS AREA D.)	C	No
CC-8: RA-5	5. Enhance relationships with hospital-based laboratory practitioners, university laboratories, and infectious-disease physicians through participation in infectious disease rounds and conferences. (LINK WITH FOCUS AREA D.)	C	No
CC-8: RA-6	6. (Smallpox) Appoint a liaison from the state or local LRN-member laboratory to participate in meetings and conference calls with smallpox steering committee, stakeholders, and any other activities relevant to LRN operations and smallpox activities.	C	No
CC-9: RA-1	1. Continue to develop or enhance operational plans and protocols that include: (a) specimen/samples transport and handling; (b) worker safety; (c) appropriate Biosafety Level (BSL) working conditions for each threat agent; (d) staffing and training of personnel; (e) quality control and assurance; (f) adherence to laboratory methods and protocols; (g) proficiency testing to include routine practicing of LRN-validated assays as well as participation in the LRN's proficiency testing program electronically through the LRN Web site; (h) threat assessment in collaboration with local law enforcement and FBI to include screening for radiological, explosive, and chemical risk of specimens; (i) intake and testing prioritization; (j) secure storage of critical agents; and (k) appropriate levels of supplies and equipment needed to respond to bioterrorism events with a strong emphasis on surge capacities needed to effectively respond to a bioterrorism incident. (LINK WITH FOCUS AREA D)	C	Yes
CC-9: RA-2	2. Critical Benchmark #13: Ensure that capacity exists for LRN-validated testing for all Category A agents and other Level B/ C protocols as they are approved.	C	No

Item ID Number	Item Description	Focus Area	Used in "Top 10" Index?
CC-9: RA-3	3. Ensure that at least one public health laboratory in your jurisdiction has the appropriate instrumentation and appropriately trained staff to perform CDC-developed real-time polymerase chain reaction (PCR) and time-resolved fluorescence (TRF) rapid assays. Integrate new advanced rapid identification methods approved by the LRN into the current laboratory-testing algorithm for human, environmental, animal, or food specimens. Contact CDC technical support staff for further information on approved equipment as necessary. (LINK WITH FOCUS AREA B.)	C	No
CC-9: RA-4	4. Critical Benchmark #14: Conduct at least one simulation exercise per year, involving at least one threat agent in Category A, that specifically tests laboratory readiness and capability to perform from specimen threat assessment, intake prioritization, testing, confirmation, and results reporting using the LRN Web site. (MAY LINK WITH ALL FOCUS AREAS.)	C	No
CC-9: RA-5	5. Ensure the availability of at least one operational Biosafety Level 3 (BSL-3) facility in your jurisdiction. If not immediately possible, BSL-3 practices, as outlined in the CDC-NIH publication "Biosafety in Microbiological and Biomedical Laboratories, 4th Edition" (BMBL), should be used (see www.cdc.gov/od/ohs) or formal arrangements (i.e., MOU [Memorandum of Understanding]) should be established with a neighboring jurisdiction to provide this capacity.	C	No
CC-9: RA-6	6. Ensure that laboratory registration, operations, safety, and security are consistent, at a minimum with the requirements set forth in Select Agent Regulation (42 CFR 73) "Possession, Use and Transfer of Select Agents and Toxins; Interim Final Rule" and any subsequent updates as detailed in www.cdc.gov/od/sap and www.aphis.usda.gov/vs/ncie/bta.html . Pursuant to 18 U.S.C. section 175b, as added by section 817 of the USA PATRIOT Act of 2001, P.L. 107-56, aliens (other than aliens lawfully admitted to the United States for permanent residence) are prohibited from possessing select agents if they are nationals of countries	C	No
CC-9: RA-7	7. Enhance electronic communications and LRN electronic laboratory reporting, at the bench level, to enable integration with CDC's LRN capacity-monitoring efforts, online results reporting, sentinel surveillance, proficiency testing, multicenter validation studies, and support for future LRN site enhancements. Laboratories should participate in reporting results of LRN proficiency testing electronically, as they would in an actual event. Laboratories should have appropriate computer equipment, firewall, and high-speed Internet connectivity to access the LRN's protocols, reagents, and lab user applications. (LINK WITH FOCUS AREAS D and E AND CROSSCUTTING ACTIVITY LABORATORY DATA STANDARD, Attachment X.)	C	No

Item ID Number	Item Description	Focus Area	Used in "Top 10" Index?
CC-9: RA-8	8. (Smallpox) Identify the laboratories that have the capacity for LRN-validated testing and reporting of <i>Variola major</i> , <i>Vaccinia</i> , and <i>Varicella</i> through human and environmental samples. Each state should have at least one laboratory that can meet CDC biosafety and security requirements for <i>Variola</i> -specific testing.	C	No
CC-10: RA-1	1. Critical Benchmark #15--APPLICABLE TO LEVEL-ONE LABORATORIES: Hire and train a chemical terrorism laboratory coordinator (chemist or medical technologist) and assistant coordinator to advise the laboratory director, the State Terrorism Coordinator, and other public health and environmental health officials about chemical terrorism incidents and preparedness. These individuals are responsible for ensuring the proper collection, labeling, and shipment of blood, urine, and other clinical specimens required in response to known or suspected chemical terrorism incidents and for ensuring that associated data and communication requirements are met.	D	No
CC-10: RA-2	2. Develop a component, incorporated within the comprehensive response plan, that directs how public health, food testing, environmental testing, and other laboratories within your jurisdiction will respond to a chemical terrorism incident. The plan must include (a) roles and responsibilities; (b) inter- and intrajurisdictional surge capacity; (c) a description of how the plan integrates with other department wide emergency response efforts; (d) protocols for the safe transport of specimens by air and ground; and (e) a mechanism for reporting laboratory data to public health officials, law enforcement agencies, and other chemical terrorism LRN laboratories. (LINK WITH ALL OTHER FOCUS AREAS.)	D	No
CC-10: RA-3	3. Establish and document in the comprehensive response plan, relationships with local members of HazMat teams; first responders, local, state, and federal law enforcement; and the Army National Guard (WMD-CST), to coordinate laboratory support for response to chemical terrorism with their response activities.	D	No
CC-10: RA-4	4. Join the chemical terrorism component of the Laboratory Response Network (LRN) and ensure that capacity exists (within the state, through partnerships with Level-Two and/or Level-Three laboratories in other states, or CDC) for validated testing of chemical agents in clinical specimens.	D	No
CC-10: RA-5	5. Enhance relationships with other chemical terrorism –related resources, such as poison control centers, emergency medical personnel, medical toxicologists, food regulatory laboratories, schools of public health, and other partners, with a view to ensuring that medical and public health officials have the benefit of at least preliminary chemical laboratory analyses in time to facilitate both the care of victims and the management of the incident. To this end, sponsor outreach efforts, professional conferences, and meetings.	D	No

Item ID Number	Item Description	Focus Area	Used in "Top 10" Index?
EC-7: EA-1	1. Develop or enhance plans and protocols that address: (a) clinical specimen transport and handling; (b) worker safety; (c) appropriate BSL conditions for working with clinical specimens; (d) staffing and training of personnel; (e) quality control and assurance; (f) internal and external proficiency testing; (g) triage procedures for prioritizing intake and testing of specimens or samples before analysis; (h) secure storage of critical agents and samples of forensic value; and (i) appropriate levels of supplies and equipment needed to respond to chemical terrorism events. This should be documented in your comprehensive response plans.	D	No
EC-7: EA-2	2. Level-Two laboratories must, in collaboration with CDC, purchase equipment, hire and train staff, implement analytic methods, participate in proficiency-testing programs, and demonstrate competency in the analysis of Level-Two chemical agents or their metabolites in human specimens. Level-Two laboratories must achieve CLIA certification within 18 months of funding.	D	No
EC-7: EA-3	3. Critical Benchmark #16: APPLICABLE TO LEVEL-TWO LABORATORIES ONLY: Participate in at least one exercise per year that specifically tests chemical terrorism laboratory readiness and capability to detect and identify at least one chemical-threat agent.	D	No
EC-7: EA-4	4. Use BSL-2 practices, as outlined in the CDC-NIH publication "Bio-safety in Microbiological and Biomedical Laboratories, 4th Edition" (BMBL), to process clinical specimens (e.g., blood and urine)--see www.cdc.gov/od/ohs. CDC also recognizes the need that state laboratories have to safely handle unknown environmental samples. Laboratories are encouraged to participate with federal partners, the LRN, HazMat, first responders, and other state public health laboratories to develop and disseminate standardized methods, procedures, and protocols to safely triage, aliquot, transfer, ship, and store unknown clinical or environmental specimens potentially containing chemical, biological, radiological, or explosive agents. (LINK WITH FOCUS AREA C.)	D	No
EC-7: EA-5	5. At a minimum, ensure that laboratory security is consistent with standards set forth in the Select Agent Rule or subsequent updates. Note that, pursuant to 18 U.S.C. section 175b, as amended by section 817 of the USA PATRIOT Act of 2001, P.L. 107-56, aliens (other than aliens lawfully admitted to the United States for permanent residence) are prohibited from possessing select agents if they are nationals of countries about which the Secretary of State (pursuant to provisions of the Export Administration Act of 1979, the Foreign Assistance Act of 1981, or the Arms Export Control Act) has made an unrevoked determination that such countries have repeatedly provided support for acts of international terrorism.	D	No
EC-7: EA-6	6. Enhance and document Internet connectivity to enable rapid communication via the Internet for information and data transfer with chemical laboratories in the LRN. (LINK WITH FOCUS AREAS C AND E.)	D	No

Item ID Number	Item Description	Focus Area	Used in "Top 10" Index?
EC-8: EA-1	1. Level-Three laboratories must, in collaboration with CDC, purchase equipment, hire and train staff, implement analytic methods, participate in proficiency-testing programs, and demonstrate competency in the analysis of Level-Three chemical agents or their metabolites in blood and urine.	D	No
EC-8: EA-2	2. Critical Benchmark #17: APPLICABLE TO LEVEL-THREE LABORATORIES ONLY: Participate in at least one exercise per year that specifically tests chemical terrorism laboratory readiness and capability to detect and identify at least two chemical-threat agents.	D	No
EC-8: EA-3	3. In collaboration with CDC and other Level-Three laboratories, participate in method development and validation studies.	D	No
EC-8: EA-4	4. Provide surge capacity to CDC and serve as a referral laboratory for Level-One and Level-Two laboratories.	D	No
EC-8: EA-5	5. Develop and implement a plan for 24/7 staff coverage in the event of a chemical terrorism emergency. Documentation of this plan should be provided to CDC to coordinate efforts.	D	No
CC-11: RA-1	1. Critical Benchmark #18: Implement a plan for connectivity of key stakeholders involved in a public health detection and response including a 24/7 flow of critical health information, such as clinical data (build according to IT functions #1-3 in Appendix 4), alerts (build according to IT Functions #7-9 in Appendix 4), and critical event data (IT Functions #1-3 in Appendix 4), among hospital emergency departments, state and local public health officials, law enforcement, and other key participants (e.g., physicians, pharmacies, fire departments, 911 Centers). (LINK TO CROSSCUTTING ACTIVITY INTEROPERABILITY OF IT SYSTEMS, Attachment X.)	E	Yes
CC-11: RA-2	2. Critical Benchmark #19: Ensure, by testing and documentation that at least 90 percent of the key stakeholders involved in a public health response can receive and send critical health information, including alerts and critical-event data. (Build according to Appendix 4--IT Functions and Specifications.)	E	No
CC-11: RA-3	3. Develop effective public health communications connectivity by identifying local health agencies to serve as model sites for training and education, support for organizational capacity building, and the creation of knowledge management systems for public health practitioners. In selecting sites, grantees should consider localities that were among the 120 cities identified in the Response to Weapons of Mass Destruction Act of 1997, are the largest population centers in the state, are state capitals, have special significance for terrorism preparedness and response (e.g., military base, strategic location, international port of entry, special population), and are not direct recipients of funding under this cooperative agreement.	E	No
CC-11: RA-4	4. (Smallpox) Develop a system to enhance public health capacity for recruitment and tracking of participants; data collection, storage, and management; reporting; and evaluation activities related to the National Smallpox Vaccination Program.	E	No
CC-11: RA-5	5. (Smallpox) Ensure that hospitals, clinics, and other participants in the National Smallpox Vaccination Program maintain a directory of smallpox vaccination team members and are provided regular updates on implementation of program activities, with appropriate technical assistance.	E	No

Item ID Number	Item Description	Focus Area	Used in "Top 10" Index?
CC-12: RA-1	1. Assess the capacity in your jurisdiction for redundant communication systems/devices (two-way radios, cell phones, voicemail boxes, satellite phones, amateur radio groups, hand radios, or wireless messaging), the capacity of existing systems at the state and local levels to broadcast and/or autodial to automatically distribute alerts and messages to these systems/devices, and the capacity to link to the emergency communication systems of local emergency response partners. If necessary, make improvements during this budget cycle.	E	No
CC-12: RA-2	2. Implement a second method of receiving critical alerts, such as pagers, cell phones, voice mailboxes, or other devices, to allow public health participants to receive alerts in full redundancy with email.	E	No
CC-12: RA-3	3. Work with CDC and, as appropriate, other federal agencies, to develop and acquire high-frequency and satellite voice/data communications systems between local, state, and federal partners. These systems will be standards-based to ensure interoperability.	E	No
CC-12: RA-4	4. Collaborate with local emergency service providers to acquire technologies and utilize standards developed by CDC to develop UHF/VHF/HF [ultra-high-frequency/very-high-frequency/high-frequency] data and/or voice communication capability between key Public Health Partners.	E	No
CC-12: RA-5	5. Develop broadcast auto-dialing voice messaging capabilities.	E	No
CC-12: RA-6	6. Provide for technological and staffing redundancy of critical information and communication systems to support these functions. (Build according to IT function #9 in Appendix 4.)	E	No
CC-12: RA-7	7. Critical Benchmark #20: Routinely assess the timeliness and completeness of the redundant method of alerting, as it exists to reach participants in public health response.	E	No
CC-13:OA-3A	3. Activities that may be considered: (a) Establish a firewall for the protection of critical information resources from the Internet;	E	No
CC-13:OA-3B	(b) Implement Public Key Encryption (PKI), according to specifications in IT Function #9 (see Appendix 4) or equivalent methods of strong authentication for remote access from the Internet;	E	No
CC-13:OA-3C	(c) Develop role-based authorization technology and processes to ensure selective authorization to information resources using technologies identified in IT Function #7 (see Appendix 4);	E	No
CC-13:OA-3D	(d) Institute server- and client-based virus-checking software to protect critical systems;	E	No
CC-13:OA-3E	(e) Contract with an independent IT security firm to perform ongoing penetration testing and vulnerability analysis;	E	No
CC-13:OA-3F	(f) Integrate all remote access to health department IT resources using commercial, off-the-shelf products for a single method of authentication;	E	No
CC-13:OA-3G	(g) Implement software systems and/or servers to support Critical Capacities elsewhere in this guidance. Provide training and support on these systems to improve the ability of public health participants to effectively use them.	E	No

Item ID Number	Item Description	Focus Area	Used in "Top 10" Index?
CC-13: RA-1	1. Assess the existing capacity in your jurisdiction regarding policies and procedures for protecting and granting access to secure systems for the management of secure information, system backups, and systems redundancy. If necessary, develop a proposal for improvements during this budget cycle.	E	No
CC-13: RA-2	2. Perform regular, independent validation and verification of Internet security, vulnerability assessment, and security and continuity of operations practices, and rapidly implement recommended remedial activities.	E	No
CC-14: RA-1	1. Assess the existing capacity in your jurisdiction to exchange electronic data in compliance with public health information and data-elements exchange standards, vocabularies, and specifications as referenced in the NEDSS initiative. (Build according to IT Functions #1-9 in Appendix 4.) If necessary, develop a proposal for improvements during this budget cycle. (LINK WITH CROSSCUTTING ACTIVITY INTEROPERABILITY OF IT SYSTEMS, Attachment X.)	E	No
CC-14: RA-2	2. Critical Benchmark #21: Ensure that the technical infrastructure exists to exchange a variety of data types, including possible cases; possible contacts; specimen information; environmental sample information; lab results; facilities; and possible threat information. (Build according to IT Functions #1-9 in Appendix 4).	E	Yes
CC-14: RA-3	3. Develop firewall capabilities and Web technology and expertise to implement and maintain an XML-compliant SOAP service for the secure exchange of information over the Internet.	E	No
CC-14: RA-4	4. Develop systems and databases to implement the specifications, vocabularies, and standards to exchange like data with public health partners.	E	No
CC-14: RA-5	5. Implement message-parsing technology to allow for the creation and processing of public health information messages.	E	No
CC-14: RA-6	6. Participate in national stakeholders meetings, data-modeling activities, and joint application-development sessions to help specify the data types that will be exchanged among public health partners and to understand how to implement them.	E	No
CC-14: RA-7	7. (HRSA/CDC Cross-Cutting Activity) Laboratory Data Standard: (a) Critical Benchmark #22: Adopt and implement LOINC as the standard for electronic exchange of clinical laboratory results and associated clinical observations between and among public health department laboratories, hospital-based laboratories, and other entities, including collaborating academic health centers, that have a major role in responding to bioterrorism and other public health emergencies; (b) in connection with CDC-provided technical assistance, identify areas in which refinement or extension of LOINC would enhance public health emergency preparedness.	E	No

Item ID Number	Item Description	Focus Area	Used in "Top 10" Index?
EC-10: EA-1	1. Assess the existing capacity in your jurisdiction for the full provision of information technology support according to industry standard practices, including modern software development practices, user support practices, and ongoing monitoring and maintenance of systems. If necessary, develop a proposal for improvements during this budget cycle.	E	No
EC-10: EA-2	2. Implement explicit arrangements/written policies for adequate network and desktop user support, including the ability of users to obtain answers to hardware and software operational questions; repair of equipment; installation of new equipment and software; administration of servers where appropriate; and other general technical support.	E	No
EC-10: EA-3	3. Develop technical support staff available in an industry standard ratio of one full-time equivalent support person for each 60-100 workstations covered.	E	No
EC-10: EA-4	4. Provide critical operational support functions with less than 24-hour alternate site provision.	E	No
EC-10: EA-5	5. Implement software and/or systems to support critical activities elsewhere in this guidance with appropriate redundancy, systems mirroring, and/or systems fail-over to provide secure and continuous access to critical IT services.	E	No
CC-15: RA-1	1. Critical Benchmark #23: Complete a plan for crisis and emergency risk communication (CERC) and information dissemination to educate the media, public, partners, and stakeholders regarding risks associated with the real or apparent threat and an effective public response.	F	No
CC-15: RA-10	10. For border states, consider joining a public information and crisis communication working group, led by CDC, the Mexico Department of Health, and Health Canada to coordinate critical response plans and exchange best practices. (LINK WITH CROSSCUTTING ACTIVITY BORDER STATES, Attachment X.)	F	No
CC-15: RA-11	11. Establish mechanisms to translate emergency messages into priority languages spoken within the jurisdiction. (LINK WITH CROSSCUTTING ACTIVITY POPULATIONS WITH SPECIAL NEEDS, Attachment X.)	F	Yes
CC-15: RA-12	12. (Smallpox) Test responsiveness of participants within the public information system, including call-down lists of public health and clinical contacts that can be activated to address communications and information-dissemination needs regarding smallpox. (LINK WITH FOCUS AREA E.)	F	No
CC-15: RA-13	13. Complete the CDC Emergency Risk Communication train-the-trainer program.	F	No
CC-15: RA-2	2. Critical Benchmark #24: Conduct trainings, drills, and exercises involving your communication systems to ensure that channels of communication to inform the public, partners, and stakeholders about recommendations during public health emergencies work in a timely and effective manner. (LINK WITH FOCUS AREA A.)	F	No

Item ID Number	Item Description	Focus Area	Used in "Top 10" Index?
CC-15: RA-3	3. (HRSA/CDC Cross-Cutting Activity) Complete a plan for activities that will be implemented to meet the specific needs of special populations that include but are not limited to people with disabilities, people with serious mental illness, minority groups, the non-English speaking, children, and the elderly. Consider all operational and infrastructure issues, as well as public information/risk communication strategies. Such activities must be integrated between the public health and the hospital communities.	F	No
CC-15: RA-4	4. Assess state and local public information needs and identify communication resources needed to support the distribution of supplies to the public from the Strategic National Stockpile program (12-hour "push packages," as well as the vendor-managed inventory). Assessments and plans should consider language barriers, cultural sensitivities, hearing and sight impairment, and the means by which population groups and communities access information. (LINK WITH FOCUS AREA A, and CROSSCUTTING ACTIVITY POPULATIONS WITH SPECIAL NEEDS, PSYCHOSOCIAL NEEDS, Attachment X.)	F	No
CC-15: RA-5	5. Coordinate risk communication planning with key state and local government and nongovernment emergency response partners (e.g., municipal emergency operation centers and chapters of the American Red Cross).	F	No
CC-15: RA-6	6. Establish capabilities to provide "hotline" services when needed, including those that provide mental health services. (LINK WITH CROSSCUTTING ACTIVITY PSYCHOSOCIAL CONSEQUENCES, Attachment X.)	F	No
CC-15: RA-7	7. Train key state and local public health spokespersons in crisis and emergency risk-communication principles and standards.	F	No
CC-15: RA-8	8. (Smallpox) Identify participants in a public information system, including call-down lists of public health and clinical contacts that can be activated to address communications and information-dissemination needs regarding smallpox. (See Appendix 4, IT Function #7.) (LINK WITH FOCUS AREA E.)	F	Yes
CC-15: RA-9	9. (Smallpox) Develop, for dissemination communications, materials regarding smallpox training and education for local stakeholders, such as community members, school representatives, physicians, local emergency service responders, and the general public.	F	No
EC-11: EA-1	1. Develop and conduct a testing program for emergency communication plans to ensure that channels of communication exist and resources are available to provide effective public information and risk communication during public health emergencies. (LINK WITH FOCUS AREA A.)	F	No
EC-11: EA-2	2. With local public health agencies, enhance relationships with mental health planners and providers by providing education, attending and participating at conferences, providing joint sponsorship of meetings, and developing and evaluating activities necessary to report the degree to which persons who have not been exposed to a potential terrorist or emerging infectious agent seek acute care at healthcare facilities.	F	No

Item ID Number	Item Description	Focus Area	Used in "Top 10" Index?
EC-11: EA-3	3. Partner with CDC, other states and/or Public Health Centers for Excellence located in schools of public health, and Centers for Public Health Preparedness to identify research gaps and conduct research on risk-communication issues related to special populations, cultural and psychological aspects of crisis communication, and communication barriers to effective public response during public health emergencies, including terrorism, infectious-disease outbreaks, and other public health emergencies.	F	No
EC-11: EA-4	4. With local public health agencies, establish a Web-based clearinghouse of resources and activities related to crisis and emergency risk communication and link to CDC's clearinghouse. (LINK WITH FOCUS AREA E.)	F	No
EC-11: EA-5	5. With local public health agencies and other stakeholders, establish the capacity to conduct public outreach campaigns, which may include town-hall meetings and presentations to civic organizations, schools, businesses, faith-based institutions, and special ethnic and cultural groups.	F	No
EC-11: EA-6	6. With local public health agencies, ensure consistent message content and establish mechanisms to track and monitor message dissemination and media coverage, audience reaction, and changing communication issues and priorities at the state or local level.	F	No
EC-11: EA-7	7. Establish plans and working relationships to ensure that consistent and accurate information is disseminated, especially among adjacent state and local health jurisdictions.	F	No
EC-11: EA-8	8. Ensure that the competencies and credentialing requirements for communication specialists in public information, public affairs, and health education related to crisis and emergency risk communication are reviewed annually and that requirements for continuing education are met. Attention should be paid to the recruitment, training, and the proper career development of these personnel. (LINK WITH FOCUS AREA G.)	F	Yes
EC-11: EA-9	9. As part of the health department's mobilization capabilities, consider the purchase of PDA hardware and software packages that allow off-site office capabilities, such as the following (LINK WITH FOCUS AREA E): (a) A portable JIC [Just in CPP] with names and contacts; (b) a full list of contacts for key responders; (c) a complete list of health professionals in the state, sortable by geography, area of expertise, etc.; (d) images of rashes or other pictures that may be used as visual aids; (e) an array of other software possibilities available to meet specific needs (e.g., the ability to produce and print word documents from the PDA).	F	No
CC-16: RA-1	1. Support a Focus Area G Coordinator.	G	No
CC-16: RA-2	2. Implement a learning management system capable of collecting and reporting data on all training and educational activities, as well as sharing best practices with other public health agencies. (See Appendix 4 for IT Functions #1-5.)	G	No
CC-16: RA-3	3. Critical Benchmark #25: Develop and initiate a training plan (1 year) that ensures that priority preparedness training is provided across all Focus Areas to the state and local public health workforce, healthcare professionals, and laboratorians.	G	No

Item ID Number	Item Description	Focus Area	Used in "Top 10" Index?
CC-16: RA-4	4. Collaborate with Centers for Public Health Preparedness, other schools of public health, schools of medicine, and academic health centers to develop, deliver, and evaluate competency-based training to enhance preparedness. Describe activities and training provided in collaboration with CDC-funded Academic Centers for Public Health Preparedness. (LINK WITH CROSSCUTTING ACTIVITY INVOLVEMENT WITH ACADEMIC HEALTH CENTERS, Attachment X.)	G	No
CC-16: RA-5	5. (Smallpox) Develop and provide education and training sessions on all components of the smallpox response plan, especially smallpox disease identification and reporting; contact tracing; training of vaccinators; training people to read "takes"; and recognition and management of adverse events after vaccination of public health and health care response teams, and other individuals who may be involved in a response (key healthcare workers, key public health workers, key security staff needed to maintain public order, key EMS staff needed to transport ill patients, key hospital staff, key private physicians and their staff who may be occupationally at risk).	G	No
CC-16: RA-6	6. (Smallpox) Following exercise, assess training needs for smallpox preparedness as it pertains to large-scale vaccination clinics—with special emphasis on emergency department personnel, intensive care unit staff, general medical staff (including physicians who will likely encounter adverse events), infectious-disease specialists, security personnel, housekeeping staff, other healthcare providers, and public health staff.	G	No
CC-16: RA-7	7. (Smallpox) Develop and regularly update a community-based online inventory that lists all available technical, clinical, epidemiological, and other expertise that could provide needed services during a smallpox outbreak. (See Appendix 4, IT Function #7.) (LINK WITH FOCUS AREA E.)	G	No
CC-16: RA-8	8. (Smallpox) Identify staff needed to support large-scale clinic operations, including vaccinators; security personnel; traffic control staff; vaccine storage and handling staff; clinic managers; screeners; medical staff; and others needed to run a large-scale smallpox clinic, according to previously issued CDC guidance, "Guidelines for Smallpox Vaccination Clinics (Annex 2" and "Smallpox Vaccination Clinic Guide (Annex 3)."	G	No
CC-16: RA-9	9. (Smallpox) Train staff needed to support large-scale clinic operations, including vaccinators; security personnel; traffic control staff; vaccine storage and handling staff; clinic managers; screeners; medical staff; and others needed to run a large-scale smallpox clinic, according to previously issued CDC guidance, "Guidelines for Smallpox Vaccination Clinics (Annex 2)" and "Smallpox Vaccination Clinic Guide (Annex 3)."	G	No

Item ID Number	Item Description	Focus Area	Used in "Top 10" Index?
EC-12: EA-1	1. In collaboration with local health agencies, clinician professional organizations, hospital associations, occupational health agencies, Centers for Public Health Preparedness, academic health centers, and other community-based partners, identify and prepare a list of qualified public health, healthcare, and responder personnel who would make up a local, geographically defined response workforce for specific hazards and threats (e.g., biological, chemical, radiological, mass trauma). (See Appendix 4, IT Function #7.) (LINK WITH FOCUS AREA E.)	G	Yes
EC-13: EA-1	1. Design and develop formal evaluations and competency reviews to assess performance of the public health, healthcare delivery, and laboratory workforce in responding to a public health emergency. Include an analysis to identify performance gaps and a strategy to implement recommended improvements. Collaborate with state-based and national public health and healthcare professional organizations and agencies.	G	Yes
EC-9: EA-1	1. Assess the existing capacity in your jurisdiction related to emergency response management systems. Identify existing systems and ascertain their relevance and suitability for public health participation, including disaster simulation, logistics management, threat tracking and management, geographic mapping for visualization of events, and emergency resource provision and management. If necessary, develop a proposal for improvements during this budget cycle. (LINK TO CROSSCUTTING ACTIVITY INTEROPERABILITY OF IT SYSTEMS, Attachment X.)	A	No
EC-9: EA-2	2. Ensure participation, training, and drilling of public health personnel in the use of an emergency response management system.	A	No
EC-9: EA-3	3. If an adequate system does not exist with emergency response partners, implement a commercial, off-the-shelf system for the support of these functions.	A	No
EC-9: EA-4	4. Train and drill public health participants in the use of existing emergency response systems.	A	No

**APPENDIX B. PUBLIC HEALTH LABORATORIES' SURVEY QUESTIONS
USED IN ANALYSIS (FIELD BY ASSOCIATION OF PUBLIC HEALTH
LABORATORIES [APHL])**

Raw data sent by APHL included 45 items. The index includes 22 yes/no items out of 45 in total. We excluded items that sought to elicit subjective opinions (e.g., "Have delays in receiving reagents caused testing delays?"), redundant items (in some cases, there were separate items for "yes" and "no"), and items on which there was little or no variation (e.g., "Does your laboratory maintain a database of all the sentinel laboratories and pertinent laboratorians in your state?").

Table B.1: Survey Questions for Public Health Laboratories

Description
Do you have a designated screening (triage) area for receiving unknown samples? APHL BT Survey Question 15: If YES, go to question number 14, can your screening (triage) area be used to rule out the following types of unknown samples? (Please check all that apply): Chemical, Biological, Radiological, Nuclear, Explosive (5 separate "yes/no" questions)
Do you have a performance measurement system in place to assess the competency of sentinel (Level A) laboratories to rule out BT agents (using mock agents)?
What types of CT samples are accepted for analysis at your SPHL? (Clinical specimens are blood, urine, and serum. Environmental samples are air, soil, water, surface and others. Environmental samples do not include food. Food is considered its own category for the purposes of this question.) (3 separate "yes/no" questions)
Does your SPHL screen multihazard or unknown clinical samples for any of the following in-house? (Please check all that apply): Chemical, Biological, Radiological (3 separate "yes/no" questions)
Does your SPHL screen multihazard or unknown environmental samples for any of the following in-house? (Please check all that apply): Biological, Chemical, Radiological, Explosive (4 separate "yes/no" questions)
If you answered yes to the previous question (number 25), specify the hazards that a sample may contain and still be accepted by your SPHL. (Please check all that apply): Biological, Chemical, Explosive, Radiological (4 separate "yes/no" questions)
Does your SPHL have a LIMS that can accommodate chemical terrorism data? Clinical? Environmental? (2 separate "yes/no" questions)

APPENDIX C. ROBUST REGRESSION WITH CENTRALIZATION-REGIONALIZATION INTERACTIONS

**Table C.1: Robust Regression with Centralization-Regionalization Interactions
(standard errors are in parentheses)**

Variable	All CDC Items	Top 10 CDC Items	APHL Index
Intercept	0.24*** (0.03)	0.28*** (0.04)	0.32*** (0.07)
Mixed	-0.01 (0.05)	-0.06 (0.07)	-0.04 (0.11)
Centralized	-0.09 (0.13)	-0.09 (0.09)	-0.09 (0.14)
Freestanding	-0.03 (0.03)	-0.02 (0.04)	-0.09 (0.07)
Regionalized	-0.03 (0.04)	-0.05 (0.06)	-0.009 (0.09)
Mixed*Regionalized	0.07 (0.06)	0.12 (0.10)	0.19 (0.16)
Centralized*Regionalized	0.19*** (0.07)	0.20* (0.11)	0.21 (0.17)
Log(density)	-0.01 (0.01)	-0.02 (0.02)	0.01 (0.03)
Log(population)	0.01 (0.02)	0.005 (0.03)	0.01 (0.04)
N^a	46	46	46
R^2	0.31	0.16	0.16

*** $p < 0.01$

** $p < 0.05$

* $p < 0.10$

NOTE: ^a Four states were missing data on the “Regionalized” variable.

R^2 estimates are based on analysis of variance models

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