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Assessment of Public Health Infrastructure to Determine Public Health Preparedness

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The Strategy for Homeland Security stresses the need for a robust public health component to respond to and recover from a range of emergencies. We focus on Union County, New Jersey to determine baseline staffing requirements to complete public health and bioterrorism mandates. Optimistically, Union County is staffed at 68% of the needed manpower to fulfill either state/federal health objectives or bio preparedness functions. While specific to Union County, the framework is applicable to other counties and states in their own assessments. It is imperative that the capacity of the public health infrastructure is increased as a Homeland Security priority. Federal and state spending priorities must be re-aligned for public health to become a partner in the mission of Homeland Security.

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**Assessment of Public Health Infrastructure to Determine Public Health
Preparedness**

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Abstract

The Strategy for Homeland Security stresses the need for a robust public health component to respond to and recover from a range of emergencies. However, the dire problems with the current public health manpower infrastructure have been reported for over 15 years and continue to be a problem. Bioterrorism funding can not be used to rectify manpower issues since it is temporary. We focus on Union County, New Jersey to determine baseline staffing requirements to complete public health and bioterrorism mandates. Optimistically, Union County is staffed at 68% of the needed manpower to fulfill either state/ federal health objectives or bio preparedness functions. While specific to Union County, the framework is applicable to other counties and states in their own assessments. It is imperative that the capacity of the public health infrastructure is increased as a Homeland Security priority. Federal and state spending priorities must be re-aligned for public health to become a partner in the mission of Homeland Security.

INTRODUCTION

The role of public health at the national, federal, state and local level has become an important component of The Department of Homeland Security (DHS). Homeland Security has elevated public health personnel to first responder status. However, public health has not received sustained funding to address the new directives and tasks it has been mandated to perform. Congress passed two landmark bills, the Public Health Threats and Emergencies Act of 2000 (PL-106-505), and the Public Health Security and Bioterrorism Act of 2002 (PL-107-288), that directed approximately \$99 million to rebuilding public health capacities.¹ While the additional funding was helpful in beginning bioterrorism planning, the funds were only temporary. Therefore, they could only address changes in tools, hardware, communications, and similar items but not address fundamental personnel issues. The basic assumption is that public health is an optimal system that simply needs to be refocused and aimed in new directions. This ignores the fact that public health agencies have not been a high priority for decades. As state and local budgets are squeezed, public health is one of the first agencies to face cuts, leaving most health agencies barely staffed to operate during a normal workday.² Questions arise whether public health departments have the requisite manpower to perform the duties required of them.

There is a peculiar unwillingness to address or examine fully the manpower problems facing public health. It is not as though federal and state governments are unaware of these issues or that they are recent developments.³ The problems and perils associated with the current state of the public health infrastructure has been the subject of many reports and publications for well over 15 years. A 1988 report by the Institutes of

Medicine (IOM) entitled *The Future of Public Health*, the IOM warned of the deteriorating public health workforce.⁴ In their follow up report in 2002, they felt that little improvement had been made since the first report.⁵ In 2001, the Centers for Disease Control and Prevention (CDC) prepared a Status Report, *Public Health's Infrastructure: Every Health Department Fully Prepared; Every Community Better Protected* revealing to a Congressional appropriations committee that the public health community was still structurally weak in nearly every area and there were critical gaps in workforce capacity and competency.⁶ Other studies conducted by prominent public health associations; National Association of County and City Health Officials (NACCHO) and the Association of State and Territorial Health Officials (ASTHO) supported these findings. In October 2001, NACCHO conducted a nationwide study that highlighted current infrastructure deficiencies by identifying the workforce duties and compositions of local health agencies. However, there was no effort to determine the optimal workforce staffing level needed to accomplish the government public health mission. In 2004, ASTHO published a report in which it found that the lack of public health workers is a crisis for national public health preparedness.⁷

These manpower issues have taken on a new urgency since September 11, 2001 and the subsequent anthrax attacks. In a 2003 study analyzing the response to the World Trade Center attack, Klitzman and Freudenberg concluded that planning has limits and it is vital to maintain a robust public health infrastructure that has reserve capacity beyond routine functioning.⁸ This conclusion is all the more worrisome as it has been shown that public health is frequently not staffed for even routine functioning. There is a

fundamental mismatch between expectations placed on public health and the system's ability to respond.

Public health workforce studies reveal infrastructure shortages being created by budgetary neglect and an aging workforce nearing retirement. Local health agencies (LHAs) have been hit hard because of an aging workforce with up to 45% of staff approaching retirement, vacancy rates as high as 20%, and employee turnover rates as high as 14%.⁹ The closest attempt to quantify the extent of the workforce shortage was a 2004 study titled *The Public Health Workforce* by Tilson and Gebbie who described the scope and content of work done by the (public health) workforce in the field.¹⁰ This report identified the need to gain hard evidence to formulate a rational public health policy.

It is essential that stakeholders become aware of the actual, rather than the perceived, day-to-day functions of public health. In addition to the workload required to meet basic public health mandates, it is also necessary to assess the impact of the bioterrorism mandates in the daily functioning of LHAs. The key to improving the public health infrastructure lies in developing an empirical method to objectively determine workforce requirements. Without a clear idea of what resources are needed we will not be able to develop a realistic, defensible funding target. Currently, there are no studies that provide staffing estimates for a population based infrastructure that is able to meet the public health and bioterrorism mandates. This paper focuses on one example, Union County, New Jersey (NJ) and assesses the many activities that public health agencies are expected to perform and employs a manpower matrix to determine baseline staffing requirements for local public health departments. While specific to Union County, New

Jersey, the framework used to estimate manpower requirements will be applicable to other counties and states in their own assessment of local public health infrastructures. Investments in the public health infrastructure serve a dual purpose: improving the delivery of health services at the local level and improving the response capability of public health as a partner with other first responders.

UNION COUNTY, NEW JERSEY

Union County has a population of 522,541 individuals in 100 square miles. Union County is home to the Elizabeth Port (a critical part of the port of New York/New Jersey); major railroads and highways including the New Jersey Transit Railroad System, the New Jersey Turnpike, and the Garden State Parkway; and the Newark International Airport. Surrounding the county is the East Coast's largest Petroleum Port, the largest Auto Port and Newark, the largest city in New Jersey and a major international airport hub. There are several languages other than English that are native to Union County residents, including Spanish, Polish, Russian, Creole, Italian and Portuguese. It is assumed that there is a significant undocumented foreign population living within the community. The significance of this is to illustrate the rich critical infrastructure and opportunities for potential exposure to natural or man made biological threats. Table 1 provides base year 2000 Census information in Union County.¹¹ Almost 14% of the population is over age 65. Approximately 8.4% of the population lives below 200% of the poverty guideline (\$31,340). The Union County demographics in Table 1 are used to calculate the target segments of the population for specific public health services. This is the basis for the workload calculations.

Table 1: Demographics¹ of Union County, New Jersey (2000 Census)

Total Population 522,541

	N	N \leq 200% of Poverty ²
Sex		
Male	251,372	30,165
Female	271,169	32,540
Reportable LHER³ Categories by Age and Gender		
Children \leq 5 years of age	18,702	2,244
Children \leq 2 years of age	14,576	1,749
Teenagers 15 - 19 years of age	31,451	3,774
Females 15 - 64 years of age	173,727	20,847
Females \leq 20 years of age	35,776	4,293
Females \geq 40 years of age	145,235	17,428
Males \geq 40 years of age	146,893	17,627
Adults 22 - 61 years of age	285,766	34,292
Adults \geq 40 years of age	146,893	17,627
Adults \geq 50 years of age	212,651	25,518
Adults \geq 65 years of age	117,976	14,157

Notes:

¹ Numbers derived from the Union County, New Jersey 2000 Census

² \leq 200% of defined as households earning < \$31,340 annually as per the Department of Health and Human Services Guidelines. Reporting poverty distribution demonstrates focus of public health resources by neediest population.

³ LHER: Local Health Evaluation Report. Data were derived from the 2004 LHER Reports.

There are significant manpower issues in public health in Union County and in New Jersey in general. For Union County's population of 522,541, there are only 47 public health employees within ten local health departments. This represents a ratio of 9 public health workers per 100,000 populations. Nationally, the ratio of public health

workers was 158 per 100,000 in 2,000.¹² Based on this statistic, Union County is well below the national average in the public health workforce.

A graphic example of the workload dilemma was witnessed in April 2005 when New Jersey hosted the congressionally-mandated international terrorism exercise known as TOPOFF3 (T3). T3 was designed to identify vulnerabilities in the State of New Jersey by exercising the plans, policies, procedures, systems and facilities of federal, state, and county/local response organizations against a biological attack. The scenario was a bioterrorist attack using pneumonic plague as the agent. Officially, the public health agencies met the expectations of the week long exercise. However, in reality, the manpower needs were filled by mobilizing “notional” resources, interpreted as using imaginary public health workers to meet the expectations of the exercise. One epidemiologist was expected to conduct case contact disease investigations for more than 19,000 victims and participate in all public health/law enforcement responses. Clearly more manpower was needed. In addition, the LINCS agency (a division of the county-wide public health team) was responsible for opening points of distribution (PODS) to provide mass prophylaxis for the entire county. Using a pharmaceutical distribution-staffing model developed by the Weil/Cornell Medical School, the Bioterrorism and Epidemic Outbreak Response Model (BERM),¹³ we can predict staffing needs for Points of Distribution (POD) to provide prophylaxis for Union County. For example, using a smallpox scenario with an incubation period of thirteen days, and assuming that it takes three days to diagnose the primary outbreak, that leaves ten days to immunize 522,541 residents to mitigate the secondary outbreak. Part of the NJ health mandates are that LHAs can administer vaccine to all known or suspect contacts of cases within 3 days; and

if necessary to vaccinate their entire jurisdiction within 10 days.¹⁴ Entering the Union County workforce of 47 people into the program we find that we will need 197 days to immunize the entire population. If we are to meet the ten day target, based on the model and using an optimistic clinic flow rate of 120 residents per hour, BERM tells us that we need a staff 1,232 a day of people to accomplish the task. *The Public Health Workforce Enumeration 2000* credits New Jersey with a local public health workforce of 2,244 people. Union County would need 55% of the total local public health workforce in the state to meet the target timetable. There are 20 other counties in NJ that would be facing similar manpower shortfalls. Clearly, this is an overwhelming task that no agency within NJ is equipped to accomplish. The predicament remains the same for any infectious outbreak, be it pandemic influenza, bird flu, or a bioterrorist attack. When the response is in the face of a real epidemic and no longer a practice exercise, it will become necessary to find thousands of real people to staff the “notional” positions used during the exercises. There are no guidelines or plans for finding these people or training them to do the required tasks. Further complicating the issue is that within the next five years shortages due to retirement age will also impact the workforce. In point of fact, NJ does not have enough manpower to meet its needs as demonstrated by the exercise, but officials ignore this lesson.

When letters laced with powdered anthrax spores were intentionally sent through the postal system, the New Jersey public health system and its capacity to respond to an act of terrorism was significantly challenged. Overnight the New Jersey State Department of Health and Senior Services (NJDHSS) and the New Jersey State Police laboratories were overwhelmed with *white powder samples* needing identification. Issues such as

chain of custody, epidemiological investigation and mass prophylaxis needed to be addressed. In response to this crisis, New Jersey enhanced its laboratory capabilities by adding a new bio-level 3 laboratory. The hope of this study is that the public health manpower infrastructure can be improved before the advent of the next major health crisis.

The New Jersey Department of Health and Senior Services (NJDHSS) sets policy and standards for statewide public health programs; regulates and licenses health care facilities, practitioners and public health professionals; maintains a bio level three laboratory; administers various grants for public health programs; and collects and analyzes communicable disease data. In New Jersey, a local health agency (LHA) is defined as a county, regional, municipal or other governmental agency organized for the purpose of providing health services, administered by a full-time health officer and conducting a public health program pursuant to law.¹⁵ Public health services are provided almost exclusively at the local level, yet 55% of the entire New Jersey public health workforce is employed by the NJDHSS.¹⁶

NJ LHAs are established by state statute and local ordinance and operate under a “Home Rule” format, which grants municipalities’ partial autonomy of self government. One problem with home rule is that local health agencies serve population bases that are too small to financially support the level of service required by federal and state mandates. To solve this problem, many agencies resort to contracted labor, part time positions or employees being utilized in a dual role capacity. The result is a pool of public health personnel being shared by multiple agencies or across disciplines. This works passably when there is no undue stress on the system but is easily and quickly

overwhelmed with even small scale events. In an emergency, part time employees will be expected to discharge full time duties in more than one municipality, simultaneously.

In 1997, New Jersey was awarded approximately \$16 million to enhance the public health infrastructure at the local level for bioterrorism preparedness. Twenty-two Local Information Network Communication System (LINCS) public health agencies were strategically positioned throughout the state. LINCS started as a simple email system and has evolved into the “lead public health agency”¹⁷ in every county throughout the state. This evolution occurred without considering the existing legal structure and authority of LINCS employees within their counties. Today, the goal and vision of LINCS is to facilitate a regional response by enhancing the public health infrastructure while also being asked to fill in the gaps of providing essential health services.¹⁸

The new response structures, established with the creation of LINCS, duplicated and complicated an existing public health communication system. Public health communications must flow to and from a newly established health command center (HCC) instead of the traditional New Jersey Office of Emergency Management (NJOEM). The HCC creates a parallel public health silo alongside NJOEM. Further complicating this issue is another NJDHSS creation, the regional Medical Coordinating Center (MCC). At this point, it is unclear what role the MCC’s will play. However, they are worrisome as responders now must repeat messages three times to assure that information reaches all required receptors. How the system will respond to contradictory commands remains to be seen.

In New Jersey there are two significant public health mandates that provide LHAs operational direction when enforcing or reporting progress in public health within their jurisdictions. These mandates are known as: 1) Local Core Capacity for Bioterrorism Preparedness Grant (also called Attachment C) and 2) Public Health Practice Standards for Local Boards of Health (also called Practice Standards). To conduct the manpower analysis to determine the minimum staffing level required by the bioterrorism preparedness goals stated in the bioterrorism grant and the public health mandates of the NJDHSS, a state-sanctioned manpower formula, the NJSDHSS formula “Estimating Registered Environmental Health Staffing Needs for Local Health Departments”¹⁹ was used. This tool was originally developed to determine the number of staff required to fulfill the workload for the registered environmental health staff. However, its modification for use with the other core positions is straightforward. The four core public health positions examined in this paper are:

1. *Public Health Nurse*- a licensed professional position that conducts the personal health programs of the LHA
2. *Health Educator*- Certified Health Educator Specialist (CHES)- conducts health education programs designed to encourage lifestyle modifications that will eliminate or reduce risk factors of chronic diseases
3. *Registered Environmental Health Specialist (REHS)* - a licensed professional position that conducts the environmental program including investigations and enforcement of applicable laws and statutes
4. *Epidemiologist (EPI)* - investigates reportable disease cases and conduct infectious disease surveillance

The staffing level required to fulfill the mandates are compared to the actual staffing level with Union County, including all the LHAs and the LINC's agency operating within the county.

TRADITIONAL EXPECTATIONS OF PUBLIC HEALTH

Public health is the provider of last resort for an array of health services for people without financial resources or health insurance.²⁰ Public Health services that are performed by private practitioners or hospitals are expected to be reimbursed by insurance and therefore they reach those at or above 200% of the poverty level. Although acute medical care for the indigent is available through hospital emergency rooms and other health clinics, non-emergency, non-acute preventive services for the medically indigent remains almost exclusively the responsibility of the LHA.

Public Health Practice Standards of Performance for Local Boards of Health, promulgated by the NJDHSS, Division of Local Health and Emergency Services were adopted by the state Public Health Council as the model system to provide local public health activities. The standards are intended to “assure the provision of a modern and manageable array of public health services to all citizens of New Jersey”²¹ and are enforced by the LHAs. Each of the core staff positions has corresponding responsibilities enumerated in the Practice Standards; these mandates are imposed on every LHA regardless of population base or staffing levels. The core component of the Practice Standards includes disease screening, vaccinations, disease monitoring, inspections (food establishments, pools, camps, etc.), educational classes and other disease prevention activities, as well as performance monitoring and evaluation of local programming and services. LHAs are expected to conduct community surveys, health risk assessments, and

resource inventories as well as form public health partnerships with outside agencies and disciplines.

To assess the workload associated with these Practice Standards in Union County, the first step was to determine the population that will be served by the LHAs. We used a conservative approach and limited population served to individuals living below the 200% poverty line. Families above the 200% of poverty guideline will be more likely to have health insurance or have regular access to health care and are therefore less likely to need or utilize public health clinics. This calculation represents a lower limit on services requested since some services, such as cervical cancer screening services, are well established and accepted by individuals of all income categories. In addition, although the 200% poverty guideline was also employed in the Older Adult Health Services target estimates, seniors of all income categories typically utilize these services. These calculations underestimate the actual level of need, however, this serves to bias against the hypothesis proposed in this research.

Once the target population size was determined, the target activities were calculated using the Adult Health Services Guidelines, published by NJDHSS.²² These guidelines are performance objectives and provide detailed targets for public health services. For example, the cancer education targets are 5% of women aged 15-64 for breast cancer and 3% of both sexes for colo-rectal cancer; 85% of children under 2 years of age are targeted for screening for lead poisoning. The guidelines form the basis of the Local Health Evaluation Report (LHER) that each LHA must submit to NJDHSS every year. The LHER is a very detailed assessment of a number of core tasks which form the basis of the Practice Standards. Tables 2 through 5 through shows the workload for the

epidemiologist, the Health Educator/Risk Communicator (HERC), the Public Health Nurse, and Registered Environmental Health Specialist (REHS) positions.

When the delivered services as reported in the LHER are compared to the targeted services as specified by the Practice Standards, there are numerous gaps that become apparent, especially in health education and public health nursing (data available from the corresponding author). To quantify the manpower needs to conduct the minimum service levels identified by NJDHSS, we apply the formula on the State Health Department web site that enables health officers and Board of Health members to estimate the Registered Environmental Health Specialist manpower needs.²³ As detailed in the Appendix, we estimate an annual work year of 983 hours for REHS and 1,313 hours for the remaining core positions. These two numbers differ because travel is a significant portion of the REHS workday, where the other positions have limited expected travel time. Dividing the number of hours needed to meet target performance levels by the hours per manpower-year, we can determine the optimal manpower level for each position. Tables 2 through 5 show the estimated manpower needs the by core public health positions to comply with the NJ Public Health Practice Standards.

Table 2 details the results of the manpower estimates for the epidemiologist position. There are no local epidemiologists in the LHAs. There is only one epidemiologist employed and assigned to Union County LINCS. Therefore, all investigations were conducted by staff other than an epidemiologist. Table 3 shows the results of the manpower estimates for the health education position. Using the LHER reported number of clients served, divided by the number of health education sessions conducted, yields a result of 15 clients per session. The number of sessions conducted

divided by the available health education man-hours yields a time frame of 6.3 hours per session. Based on experience, this is a reasonable figure to use for planning purposes when class preparation time, class time, outreach, follow-up and reporting are considered as components making up one session. Health education population targets are based on Adult Health Services Guidelines, divided by 15 clients per session, multiplied by 6.3 hours per session. This result, divided by 1,313 work hours per year, yields the estimated number of Health Educators needed to reach objectives.

Table 4 details the results of the manpower estimates for the public health nurse. Each of the required activities is assigned an hourly rate that is derived from LHA experience. These time estimates are multiplied by the target population number and then divided by 1,313 hours to arrive at the full time equivalent manpower estimate. Table 5 shows the manpower estimates for the Registered Environmental Health Specialist (REHS). Manpower estimates are obtained by following the same procedure as in Table 4. It is interesting to note that a general rule of thumb calls for one Registered Environmental Health Specialist per population of 15,000.²⁴ Using this ratio would result in a more serious staff deficiency.

The manpower estimates for the four core positions and reveals the need for three epidemiologists, three Health Educators, seven public health nurses and ten REHS to

Table 2. Epidemiology Manpower Requirements for Practice Standards Compliance

	Hours per Disease Report ¹	LHER ²	Hours per Activity
Target Activity			
Reportable Disease Investigation			
<i>Cases</i>	0.33	2,106	695
<i>Follow-Up</i>	2	966	1,932
Communicable Diseases			
Sexually Transmitted Diseases (STD)			
<i>Cases</i>	1	539	539
<i>Follow-Up</i>	1	539	539
Tuberculosis (TB)			
<i>Cases</i>	0.33	64	21
<i>Follow-up</i>	1	141	141
Annual Required Workload Hours			3,867
Annual Hours Available³ per Epidemiologist			1,313 ³
Epidemiologists Required to Complete Workload Hours (N)			3
Available Epidemiologists (N)			0
Manpower Deficit Epidemiologists (N)			3

Notes:

¹ 0.33 hours (or 20 minutes) is based on local health experience

² As no targets are available, actual workload in terms of cases and follow-up were obtained from the Local Health Evaluation Report forms

³ Available work hours formula as explained in detail in the Appendix

comply with New Jersey Practice Standards. These estimates would significantly increase the public health workforce in the county and yet they would still be well below

Table 3. Health Education/Risk Communications (HERC) Manpower Requirements for Practice Standards Compliance

Health Education Category	Hours per Unit¹	Target Number of Sessions²	Hours per Health Education Category³
Alcohol: Target 56.5% of adult population between 22-61 years of age	6.3	538	3,389
Smoking: Target 20% of adult population between 22-61 years of age	6.3	191	1,203
Physical Fitness: Target 22% of adult population between 22-61 years of age	6.3	210	1,323
Drug Abuse: Target 36% of teenage population between 15-18 years of age	6.3	38	239
Annual Required Workload Hours			6,155
Annual Hours Available³ per HERC			1,313
HERC's Required to Complete Workload Hours (N)			5
Available HERC's (N)			2
Manpower Deficit HERC's (N)			3

Notes:

¹ 6.3 hours per unit is based on local health agency experience with conducting programs

² Target numbers based divide hours/category by hours/unit

³ Hours calculated by multiplying hours/unit by target sessions

the national average of 158 per one hundred thousand residents. The current manpower estimate is limited by restricting targeting to residents living at 200% of poverty or less. If the income restriction is removed, the manpower deficit would increase dramatically.

Table 4. Public Health Nurse Manpower Requirements for Practice Standards Compliance

Activity	Hours per Unit¹	Target Number of Clients (N)	Hours per Activity
Maternal and Child Health			
Maternal and Child Health Clinics: Those at $\leq 200\%$ poverty	0.75	2,244	1,683
Lead Screening: 85% ≥ 2 years of age and those at $\leq 200\%$ poverty	0.40	1,487	595
Improved Pregnancy Outcome (IPO): Females ≤ 20 years of age receiving prenatal and post partum visits and those at $\leq 200\%$ poverty	2.25	482	1,085
Childhood Immunizations: Those at $\leq 200\%$ poverty	0.40	2,244	898
Cancer Screening and Education			
Cervical/Breast Cancer Screening: 3% of females 15-64 years of age	0.45	625	281
Prostate Cancer Screening: 5% of males ≥ 40 years and those at $\leq 200\%$ poverty	0.54	881	476
Mammography: 50% of females ≥ 40 years and those at $\leq 200\%$ poverty	1.10	8,714	9,585
Cancer Education	0.40	10,221	4,088
Adult Health and Diabetes			
Diabetes Screening: 1% of adults ≥ 50 years	0.40	2,127	851
Diabetes Education	0.40	2,127	851
Adult Health and Cardiovascular Disease			
Cardiovascular Disease Screenings: 1% of adults ≥ 50 years	0.30	2,127	638

Activity	Hours per Unit¹	Target Number of Clients (N)	Hours per Activity
Cardiovascular Disease Education	0.40	2,764	1,106
Older Adult Services: ≥ 65 Years of Age			
Influenza and Pneumonia Vaccinations: 20% of Older Adults	0.75	16,989	12,742
Health Screenings: 1% of Older Adults	0.40	1,180	472
School Health			
Public School Audits	2.50	230	575
Private and Preschool	2.50	191	478
Annual Required Workload Hours²			36,402
Annual Hours Available per Public Health Nurse³			1,313
Public Health Nurses Required to Complete Workload Hours (N)			28
Available Public Health Nurses (N)			21
Manpower Deficit Public Health Nurses (N)			7

Notes:

¹ Hours per unit is based on local health agency experience with conducting programs

² As reported in Local Health Evaluation Report LHER report

³ Available work hours formula as explained in detail in the Appendix

Table 5. Registered Environmental Health Specialist (REHS) Manpower Requirements for Practice Standards Compliance

Workload	Hours per Unit ¹	Target Number of Activities	Hours per Activity
Bathing Place			
<i>Inspection</i>	2	83	166
<i>Re-inspection</i>	1	22	22
Youth Camp			
<i>Inspection</i>	2	60	120
<i>Re-inspection</i>	1	15	15
Food Establishment Surveillance			
<i>Inspection</i>	2.5	3,026	7,565
<i>Re-inspection</i>	2	696	1,392
<i>Complaint</i>	2	545	1,090
<i>Plan review</i>	1	151	151
Public Health Nuisance			
<i>Complaint</i>	1	5,566	5,566
<i>Investigation</i>	1	5,984	5,984
Childhood Lead Poisoning			
<i>Risk assessments</i>	2	466	932
<i>Residences abated</i>	8	40	320
Rabies and Zoonosis Control ²			
<i>Animal bite investigations</i>	1	1,280	1,280
<i>Pet shop inspection</i>	2	9	18
Other			
<i>Schools and Institutions</i>	2.5	230	575
<i>Court/Enforcement action</i>	3	541	1,623
Annual Required Workload Hours			26,819
Annual Hours Available³ per REHS			1,313
REHS's Required to Complete Workload Hours (N)			27
Available REHS's (N)			17
Manpower Deficit REHS's (N)			10

Note:

¹ Hours per unit is based on local health agency experience

² Zoonosis: Diseases transmitted from animals to humans

³ Available work hours formula as explained in detail in the Appendix

EXPECTATIONS OF PUBLIC HEALTH IN HOMELAND SECURITY

The National Strategy for Homeland Security was developed in July 2002 as a foundation to direct local, state and federal agencies in their planning efforts for protecting the homeland.²⁵ The Strategy aligns the functions of homeland security into six critical mission areas: (1) intelligence and warning (2) border and transportation security (3) domestic counterterrorism (4) protecting critical infrastructure (5) defending against catastrophic terrorism and (6) emergency preparedness and response. When the strategy was unveiled it made clear that public health sectors are to be specifically involved with:

- protection of the food, water and public health critical infrastructures,
- surveillance for defending against catastrophic threats, and
- quick and effective response with other first responders.²⁶

On December 17, 2003, President Bush issued Homeland Security Presidential Directive 8 (HSPD 8): National Preparedness, which establishes policies, procedures and goals that strengthen the preparedness of the United States to prevent, deter, respond to, and recover from terrorist attacks, major disasters, and other emergencies. HSPD 8 introduced the concept of *all hazards preparedness* which is based on the existence of plans, procedures, policies, training, and equipment to maximize the effectiveness of a multi discipline response effort in the event of any type of emergency.²⁷

The Public Health Security and Bioterrorism Act of 2002 allocated close to \$1 billion to improve state and local public health capabilities.²⁸ CDC used the money to establish a Public Health Emergency Preparedness “Cooperative Agreements” to aid state and local governments in their efforts of bioterrorism preparedness and planning. As of

2005, the all hazards approach stressing nine preparedness goals was adopted in the Cooperative Agreements. The preparedness goals align program activities, tasks, and deliverables with Homeland Security's mission to prevent, protect, respond and recover from an event whether manmade or natural disaster. The goals are designed to measure public health system response parameters.²⁹ The CDC Preparedness Goals are:

- Prevent:**
- (1) Increase the use and development of interventions known to prevent human illness from chemical, biological, radiological agents, and naturally occurring health threats.
 - (2) Decrease the time needed to classify health events as terrorism or naturally occurring in partnership with other agencies.
- Detect/Report:**
- (3) Decrease the time needed to detect and report chemical, biological, radiological agents in tissue, food or environmental samples that cause threats to the public's health.
 - (4) Improve the timeliness and accuracy of information regarding threats to the public's health as reported by clinicians and through electronic early event detection, in real time, to those who need to know.
- Investigate:**
- (5) Decrease the time to identify causes, risk factors, and appropriate interventions for those affected by threats to the public's health.
- Control:**
- (6) Decrease the time needed to provide countermeasures and health guidance to those affected by threats to the public's health.
- Recover:**
- (7) Decrease the time needed to restore health services and environmental safety to pre-event levels.
 - (8) Increase the long-term follow-up provided to those affected by threats to the public's health.

Improve: (9) Decrease the time needed to implement recommendations from after-action reports following threats to the public's health.³⁰

The Local Core Capacity Infrastructure for Bioterrorism Grant aka Attachment C is the New Jersey version of the CDC Preparedness Goal Grant with very few changes except for additional reporting requirements. The core LINCS staff in Union County is tasked with ensuring that the preparedness goals are met in accordance with the expectations of the NJDHSS.

There are many grant reporting requirements that are required on a quarterly basis. In addition to the general reporting requirements, there are additional reporting requirements required by the NJDHSS. A conservative estimate of the “reporting-only” manpower drain is one full time equivalent. Almost 20% of the county’s preparedness effort is devoted to satisfying NJDHSS over-sight. This reporting time is not accounted for in these manpower estimates to ensure that we use the most conservative approach.

Table 6 details the time estimate, evaluated by each core position, needed to complete each of Preparedness Goals and over 78 required critical tasks in the Bioterrorism Preparedness Grant. To obtain these estimates, the Local Core Capacity Infrastructure for Bioterrorism Preparedness grant was reviewed by each core position and critical task. An estimate of time to complete each function per position was determined for each task. Total hours per position were divided by available hours (1,313) to determine the full time equivalent. Registered environmental health specialists do not have any specific additional duties associated with bioterrorism preparedness. Since most tasks require local health agency cooperation, a local time estimate was included, but is not specifically assigned to any of the four positions. A LINC’s

coordinator role was included in this analysis. The grant funds one epidemiologist, one public health nurse, one LINC coordinator and one health education/risk communication specialist (HERC) (as well as a state planner, one health officer, and an information technology specialist). Table 6 shows that given the workload requirements, the grant funded positions are not adequate, needing one more epidemiologist, one more HERC, and one more LINC coordinator. Not only is there a shortfall in the funded positions but there is a significant need in the area of LHA involvement. Successful completion of each of the grant's critical tasks requires a significant local commitment and substantial cooperation that will require an influx of three FTE's at the local level.

Table 6. Estimating Manpower Requirements for Compliance with Bioterrorism Preparedness⁵

Preparedness Goals	Local Health Duties³	Epi-demiologist	Public Health Nurse	LINCS¹ Coordinator	HERC²
1. A. All Hazards Planning	884	109	109	109	109
2. A. Information Collection/ Threat Recognition	40	364	7	388	364
2. B. Hazard Vulnerability Analysis	20	0	7	7	30
4. A. Health Intelligence Integration/ Analysis	385	962	234	7	982
5. A. Public Health Epidemiological Investigation	280	153	153	28	153
6.A. Emergency Response Communications	0	24	24	1,113	133
6. B. Emergency Public Information	30	64	36	47	162

Preparedness Goals	Local Health Duties³	Epi-demiologist	Public Health Nurse	LINCS¹ Coordinator	HERC²
6. C. Worker Health Safety	120	72	21	7	72
6. D. Isolation and Quarantine	2,120	52	52	52	60
6. E. Mass Prophylaxis/Vaccination	70	205	205	205	331
6. F. Medical & Pub Health Surge	0	46	102	18	18
7. A. Economic & Community Recovery	0	0	0	21	84
8. Recover	0	32	4	14	32
Total Hours (Annual)	3,949	2,083	947	2,016	2,530
Manpower Needed (N)⁴	3	2	1	2	2
Current Staff (N)	0	1	1	1	1
Total Deficit	3	1	0	1	1

Notes:

¹ Local Information Network Communication System

² Health Education/Risk Communications

³ Not specified to one of the four positions

⁴ Number's are rounded to nearest whole number

⁵ Goal 3 (detect) & 9 (improve) were intentionally left out. Goal 3 has no critical tasks assigned to this area. It is related to laboratory testing and the state department of health is responsible for this area. Goal 9 does not have any immediate impact on manpower requirements until recommendations from an incident are made.

CONCLUSION

The mantras of “all hazard preparedness” and “dual use functionality” can not overcome the basic problem of insufficient manpower. All hazards preparedness begins by strengthening the response elements that are common to a spectrum of emergency

situations. Training and equipping an inadequate workforce does little to improve preparedness. Dual use functionality assumes that there were sufficient resources for “single” use.

Table 7 is a summary of the total manpower deficit for public health professionals in Union County, NJ. To be in compliance with NJ practice standards and conform to the bioterrorism preparedness goals, 29 additional staff members must be added to the public health workforce. This is a very conservative estimate since we restricted the service population to those living at or below the 200% poverty line. At its most optimistic, Union County is currently staffed at 68% of the needed workforce level.

Table 7. Summary of Manpower Requirements for Compliance with Practice Standards and Bioterrorism Preparedness in Union County, New Jersey

Position	Workload Hours Practice Standards	Workload Hours BT¹	Manpower Needed	Current Staff (2006)	Deficit	
Epidemiology	3,867	2,083	5	1	4	
Health Education/Risk Communication	6,155	2,530	7	3	4	
Public Health Nurse	36,402	947	29	22	7	
Registered Environmental Health Specialist	26,819	...	27	17	10	
LHA ² Support for Bioterrorism Grant (unspecified labor category)	...	3,949	3	0	3	
LINCS Coordinator	...	2,016	2	1	1	
			Total	73	44	29

Note:

¹ BT: Bioterrorism

² LHA: Local Health Agency

Klitzman and Freudenberg suggested that a standing workforce with not only the capacity to provide recognized health services but a reserve capacity was needed to effectively meet the challenges of a large scale emergency.³¹ Clearly there are not enough funded positions to even provide the absolute minimum level of services required by the NJDHSS. In the 2004 edition of America's Health: State Health Rankings; A Call to Action for People and Their Communities, New Jersey ranked a dismal 41st out of 50 in per capita spending on public health.³² As if this ranking wasn't bad enough, between 2003 and 2004, New Jersey witnessed an 11% decrease in the public health budget.³³ In 2004, NJ fell to 48th decreasing spending from \$32 to \$14 per person.³⁴ Public health will have a more difficult time meeting New Jersey mandated bioterrorism efforts and traditional health services at the local level as the state 2006 budget is posted with an expected decrease of 13.2%.³⁵ To close the manpower gap in Union County, in addition to not having a budget cut, an additional, sustained \$3 million per year needs to be added to the public health budget to fund and equip an additional 29 full time employees.

This study has shown that the Union County New Jersey's Public Health infrastructure is inadequate from a manpower standpoint to fulfill either state/ federal health objectives or bio preparedness functions. National studies indicate that Union County is not unique in this position.

The role of public health in responding to natural and man-made disasters is an important Homeland Security issue. Even the tasks associated with traditional public health play a central role in accomplishing the Homeland Security mission. Public Health prevention concepts and personnel are essential to control infection spread, reduce

vulnerabilities, minimize damages and aid recovery from a biological emergency. If public health is to become the “indispensable pillar of our national security framework”³⁶ that has been called for, then it will require not only political support but increased funding and additional manpower. If governments are serious about including public health in the homeland security mission of preventing, protecting, responding, and recovering from major events or threats, then the identified shortages must be rectified in every jurisdiction across the country. Public health resources need to be aligned with the new planning goals.

The Strategy for Homeland Security stresses the need for a robust public health component to respond to and recover from a range of emergencies from the biological dangers posed by an influenza pandemic to the use of toxic agents in a terrorist attack. This Strategy relies on the same infrastructure that has proven incapable of meeting US Department of Health and Human Services National Health objectives. If it is to be truly effective the national strategy must be based upon the actual, rather than the expected, capabilities of the weakest unit in the region of highest risk or vulnerability.

It is imperative that the capacity of the public health manpower infrastructure is increased as a Homeland Security priority. If manpower infrastructure capacity is not the first step in public health preparedness, each succeeding step will be addressed by robbing resources from other mandated programs. Trade-offs between mandated programs will be necessary as it will not be possible to support all programs, revealing a tug-of-war of daily priorities without concern for actual service levels on any program. Investments in manpower capacity should be targeted according to population based health objectives if we are to maximize the dual domestic preparedness / public health

uses. Federal and state spending priorities need to be re-aligned for public health to become a partner in the mission of Homeland Security. This study argues that that the goal of sustainable funding for public health begins with an accurate measure of the capacities of the system in relation to demands placed upon it. Without such a measure public health will continue to fail in its primary functions and lack the capacity to meet Homeland Security goals.

Appendix: Formula for Estimating Core Public Health Personnel Availability in Hours per Year

Step 1. Determine total man-hours per year

$$35 \text{ work hours per week} * 52 \text{ weeks} = 1,820 \text{ total annual work hours}$$

Step 2. Determine total man-hours per year expected to be absent

Time-Off Category	Work Hours per Day	Total Days	Total Hours
Vacation	7	12	84
Holidays	7	13	91
Sick	7	7	49
Personal	7	2	14
Training	7	7	49
Expected time off due to absences			287

Step 3. Calculate total (net) available work hours

$$1,820 \text{ total annual work hours} - 287 \text{ expected time-off hours} = 1,533 \text{ total available work hours}$$

Step 4. Determine travel and office time

Travel time ^a	Days	Weeks of Work per year		Travel time (Hours)
1.5	5	44	=	330
Office Hours ^b	Days			Office time (Hours)
1	5	44	=	220
Travel time +	Office time		=	550

Step 5. Determine field hours for core positions (Step 3 – Step 4)

	Total Available Work Hours	Office /Travel Time (Hours)	Available Field Hours
Epidemiology ^c	1,533	-220	1,313
HERC ^c	1,533	-220	1,313
Public Health Nurse ^c	1,533	-220	1,313
REHS ^{2, a}	1,533	-550	983

Step 6. Determine annual workload hours for each core position in LHA^d by multiplying the hourly average of each activity by the target number of activities per year

Step 7. Determine the number of core positions needed^d by dividing Step 6 by Step 5

Notes:

^a Travel time is only considered for REHS.

^b Defined as office coverage, filing, research etc.

^c Travel time is not a significant component of the work

Endnotes

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