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Temporal Trends in Local Public Health Preparedness Capacity

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Temporal Trends in Local Public Health Preparedness Capacity

ABSTRACT

Local health departments (LHDs) are essential to emergency preparedness and response activities. Since 2005, LHD resources for preparedness, including personnel, are declining in the face of continuing gaps and variation in the performance of preparedness activities. The effect of these funding decreases on LHD preparedness performance is not well understood. This study examines the performance of preparedness capacities among NC LHDs and a matched national comparison group of LHDs over three years. We observe significant decreases in five of eight preparedness domains from three years of survey data collected from 2010 through 2012. Most notably, we observe significant decreases in the *Surveillance & Investigation* domain. Performance decreases may be a result of continued, compounding declines in preparedness funding.

Keywords

public health preparedness, local health departments, preparedness capacity, panel data

Cover Page Footnote

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Local health departments (LHDs) have statutory authority to perform key functions including community health assessments and epidemiologic investigations, enforcement of health laws and regulations, and coordination of the local public health system.¹ Since 2002, Congress has appropriated over \$9 billion to state and LHDs to develop and implement all hazards public health preparedness², which has led to improvements in surveillance, public health laboratories, communications, and surge capacity. Despite these early gains, funding has declined more than 38% between Fiscal Years 2005 to 2012.³ Funding cuts have resulted in declining resources for preparedness (NACCHO Profile 2010 data accessed at naccho.org October 25, 2013). The effect of decreases in preparedness funding on preparedness performance is not well understood. This study examines the performance of preparedness capacities among LHDs from North Carolina and a propensity-score matched national comparison group.

METHODS

Over a three year period (2010-2012), the North Carolina Preparedness and Emergency Response Research Center (NCPERRC) invited 333 LHDs from 40 states to participate in the *Local Health Department Preparedness Capacities Survey* (PCAS).⁴ PCAS measures LHD performance across a range of preparedness activities and identifies opportunities for future preparedness improvements. Having undergone extensive validity and reliability testing,⁴ the self-administered survey includes 58 questions with 211 sub-questions about specific preparedness or response capacities that are organized into eight domains (Table 1).

Table 1: Description of Preparedness Domains and Capacity Measures

Preparedness Domain	Description of Measured Capacities
Surveillance & Investigation <i>20 items</i>	<ul style="list-style-type: none"> ▪ Handling of urgent case reports ▪ Access to public health surveillance system ▪ Electronic storage of local case report data ▪ Specimen transportation system
Plans & Protocols <i>25 items</i>	<ul style="list-style-type: none"> ▪ Capability and components of surge capacity ▪ Formal case investigation components and protocol ▪ All-hazards emergency preparedness and response plan
Workforce & Volunteers <i>17 items</i>	<ul style="list-style-type: none"> ▪ Type and maintenance of volunteer registry ▪ Identification and training of emergency preparedness staff ▪ Assessment of emergency preparedness workforce ▪ Workforce training in emergency preparedness
Communication & Information Dissemination <i>33 items</i>	<ul style="list-style-type: none"> ▪ Emergency communication plans and procedures ▪ Capacity and assessment of communication technologies ▪ Use of health alert network
Incident Command <i>5 items</i>	<ul style="list-style-type: none"> ▪ Use of emergency operations center ▪ Local incident command structure
Legal Infrastructure & Preparedness <i>8 items</i>	<ul style="list-style-type: none"> ▪ Review and determination of legal power and authority ▪ Access and use of legal counsel

Emergency Events & Exercises ■ Determination of emergency events and exercises
4 items

Corrective Action Activities ■ Debriefing activities
28 items ■ Evaluation activities
 ■ Reporting activities

Each domain represents an equally weighted proportion of aggregate reported capacities, whereby the proportion of capacities within each domain's sub-questions is averaged across the domain. LHDs were selected using a propensity score matching methodology based on a set of representative public health agency and system characteristics obtained from the *National Association of County and City Health Officials 2010 Profile* (n=2,151) and *Area Health Resource File* (ARF) of the Department of Health and Human Services, Bureau of Health Professions, Office of Research and Planning (n=3,225). The PCAS sample included 85 NC LHDs and 248 LHDs distributed across 39 states. For all three years, the overall response was 75%, with two hundred sixty-four LHDs from 29 states responding to the survey.

Our analysis offers an initial review of changes in LHD preparedness capacities over three years of survey data. We examine the mean domain preparedness scores along with the upper and lower 95% confidence limits for these mean scores. To compare the domain scores of LHDs over time, we use the Wilcoxon Signed-Rank test to determine whether there is a significant difference in the data without the assumption of a normal distribution (due to the varied skew and kurtosis of the data).

RESULTS

Over the three years, we observed a general decrease in levels of preparedness capacity for five out of eight domains. Among these eight domains, we see fluctuations in preparedness between 2010 and 2011, as well as 2011 and 2012. For example, in *Workforce & Volunteer* capacities, we observed an initial decrease between 2010 and 2011 followed by an increase capacity scores between 2011 and 2012, resulting in near equal levels between 2010 and 2012.

Examining these changes more closely, Table 2 presents the averages and confidence limits for the three years of the survey. Overall, between 2010 and 2012, we observe statistically significant decreases in five preparedness domain scores (*Surveillance & Investigation, Plans & Protocols, Communication, Incident Command, and Legal Preparedness*). We also observed a decrease (not significant) in *Exercises and Emergency Events* and slight increases (not significant) in *Workforce and Volunteers* and *Corrective Action* domain scores over the three survey years.

Table 2: Variation in LHD Domain Preparedness Capacity, 2010-2012

Domain	2010	2011	2012	2010-2012 Difference
	Avg. (LCL-UCL)	Avg. (LCL-UCL)	Avg. (LCL-UCL)	
Surveillance & Investigation	0.64 (0.62-0.66)	0.31 (0.24-0.39)	0.46 (0.44-0.48)	-0.18 ***
Plans & Protocols	0.69 (0.66-0.71)	0.50 (0.40-0.59)	0.59 (0.57-0.62)	-0.10 ***
Workforce & Volunteers	0.49 (0.47-0.51)	0.29 (0.22-0.35)	0.51 (0.49-0.52)	0.02
Communication	0.64 (0.62-0.66)	0.30 (0.22-0.37)	0.57 (0.55-0.59)	-0.07 ***
Incident Command	0.78 (0.75-0.82)	0.59 (0.52-0.67)	0.67 (0.63-0.71)	-0.12 ***
Legal Preparedness	0.73 (0.70-0.75)	0.38 (0.29-0.47)	0.60 (0.57-0.62)	-0.13 ***
Exercises & Emergency Events	0.87 (0.84-0.90)	0.51 (0.39-0.63)	0.87 (0.83-0.90)	-0.01
Corrective Action	0.63 (0.59-0.66)	0.44 (0.33-0.56)	0.63 (0.59-0.68)	0.01

Indicated significance levels: * p<0.05; ** p<0.01; *** p<0.001

The decline in the *Surveillance & Investigation* domain is most notable between 2010 and 2012, where capacity scores decreased significantly from 0.64 to 0.46, reflecting potential changes in surveillance systems, urgent case management, and/or other means of investigation support. Within the domain of *Plans & Protocols*, the significant decline observed between 2010 and 2011 was followed by a modest increase in capacity in the year that followed. These shifts may stem from changes in local preparedness capacity associated with surge capacity, formal case investigations, and/or local all-hazards planning. Additional research is needed to explore the various aspects and dimensions of each domain to more clearly identify potential losses (and gains) in preparedness capacity.

IMPLICATIONS

While this analysis does not explore each domain in-depth, there was considerable variation in preparedness capacity across domains and over time. More importantly, there were statistically significant declines in preparedness capacities in five domains over the three years. Previous findings suggest observed decreases in preparedness capacities may be a result of continued, compounding declines in preparedness funding.³ The sample population includes LHDs from NC, a state with a robust preparedness and accreditation program, as well as LHDs who have participated in other performance programs, including Project Public Health Ready, the Public Health Accreditation Board Beta-Test, and the National Public Health Performance Standards Program. Previous analysis of the 2010 PCAS data indicates that LHDs participating in these performance programs perform better on preparedness capacities.⁵ The extent to which program participation impacts performance over time warrants additional data analysis.

Performance decreases may be a result of continued, compounding declines in preparedness funding. Additional investigation is underway to determine the extent to which these changes extend to more specific capacities within domains. For example, in the Surveillance and Investigation domain, it is important to determine whether declines occurred in surveillance systems, urgent case management, and/or other means of investigation support. Significant declines in capacities, as observed in the *Surveillance and Investigation* domain, represent not only key preparedness responsibilities, but also basic functions of public health departments. These findings support the call for reliable federal funding and decision making to modernize the public health system to address decreases in capacity and the potentially detrimental effects on essential services.

SUMMARY BOX

What is already Known About this Topic? LHD performance, including performance of preparedness functions is variable. Although there has been a considerable investment in public health preparedness, this investment has declined over the last several years.

What is Added by this Report? Surveys of LHDs from 29 states reveal significant declines in preparedness capacity between 2010 and 2012 in five of eight preparedness domains.

What are the Implications for Public Health Practice, Policy and, Research? Significant decreases were observed in preparedness capacities for five of eight domains from 2010-2012. Additional research is needed to identify for which capacities there were declines and examine the extent to which these decreases are directly related to declines in funding and mitigated by LHD participation in preparedness and performance programs.

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